APPENDIX B7. FISH RELATIVE ABUNDANCE

1. INTRODUCTION

This appendix provides information on the relative number of target fish species present upstream and downstream of the proposed Watana Dam, including tributary streams. The target species identified in Appendix B1 include Arctic grayling, burbot, Chinook salmon, Dolly Varden, humpback whitefish, longnose sucker, and round whitefish. Of these seven target species only Chinook salmon are considered to have obligate anadromous life history. Humpback whitefish are usually, but not always considered anadromous (Morrow, 1980) and Dolly Varden are considered to have a facultative anadromous life history pattern, but primarily exhibit a resident life history in the Middle Susitna River (Jennings 1985). Schmidt et al. (1983) suggested anadromous Dolly Varden may be present in the Susitna River, but no empirical evidence is available confirming this life history pattern.

2. ARCTIC GRAYLING

- Arctic grayling appear to be most abundant fish species in the Upper Susitna River, particularly in tributaries (Table B7-1).
    - Total estimated population size for tributaries surveyed during 1981 was 10,279 Arctic grayling.
    - Total estimated population size for tributaries surveyed during 1982 was 16,346 Arctic grayling.
- Arctic grayling are relatively common in the Middle Susitna River, particularly at tributary mouths (Figure B7-1).

3. BURBOT

- Burbot are commonly found in the mainstem Susitna River both upstream and downstream of Devils Canyon.
- They are generally not present in smaller tributaries, except at the mouth; however, they are present and abundant in the larger tributaries downstream of Devils Canyon, such as the Yentna and Deshka rivers.
- 88 burbot captured by trotline during 1981 near tributary mouths upstream of Devils Canyon; maximum catch rate was 1.14 fish per trotline; average 0.68 fish per trotline.
- 135 burbot captured by trotline during 1982 at mainstem sites upstream of Devils Canyon with a maximum catch rate of 3.5 fish per trotline and average 0.7 fish per trotline.
- For comparison, 130 trotlines were set at 17 DFH sites in the Middle and Lower River during 1982 with a maximum catch rate of 2.7 burbot per trotline and average of 0.4 burbot per trotline.

4. CHINOOK SALMON

- Upstream of Devils Canyon, Chinook salmon adults and juveniles are relatively rare.
    - Distribution is at least to the Oshetna River.
    - Adult relative abundance declines rapidly from the first impediment to the Watana Dam site (Tables B7-2 and B7-3).
    - Upstream of Watana Dam site, Chinook have been observed in Kosina Creek and Oshetna River.
- Downstream of Devils Canyon, Chinook salmon adults and juveniles are common.
    - Adults exclusively spawn in tributary streams.
    - Portage Creek and Indian River account for over 90 percent of the production in the Middle River.
    - Relative abundance is higher downstream of Three Rivers confluence; Middle River accounts for up to about 10 percent of Susitna River production.
    - Chinook salmon juveniles primarily use side sloughs and side channels in the Middle River for summer rearing and overwintering, but most juveniles that exit tributaries during the open water period appear to migrate to the Lower Susitna River.

5. DOLLY VARDEN

- Based on recent sampling upstream of Devils Canyon, the Dolly Varden population appears to be much larger than during 1981 and 1982, suggesting it may be an expanding, colonizing population.
    - Few Dolly Varden were captured in the Susitna River and tributaries upstream of Devils Canyon during 1981 (1 fish) and 1982 (16 fish).
        - Delaney et al. (1981) noted it was the first observation of Dolly Varden in the Upper Susitna River other than Lake Louise.
    - HDR (2013) captured 246 Dolly Varden in the Susitna River and tributaries upstream of Devils Canyon during 2012.
        - 243 (98.8%) of the Dolly Varden were captured in tributaries by backpack electrofishing (210 fish), minnow trap (20 fish), or angling (13 fish).
- Downstream of Devils Canyon, Dolly Varden are present, but relatively uncommon in the Middle River.
- Maximum catch at DFH sites during 1982 from all gear types was two fish per sample period. Eight of 17 DFH sites had zero catch of Dolly Varden.
- Schmidt and Bingham (1984) suggested Dolly Varden had a higher relative abundance downstream of the Three Rivers Confluence compared to Middle River.

6. HUMPBACK WHITEFISH

- Humpback whitefish are rare upstream of Devils Canyon.
    - During 1981, 1982 and 2013 three humpback whitefish were captured upstream of Devils Canyon, one each year.
- Humpback whitefish are uncommon in the Middle River downstream of Devils Canyon.
    - Maximum total catch at 12 DFH sites upstream of Three Rivers Confluence during 1982 was five fish per site and period 3 sites had zero catch, and three sites had one or zero fish captured each period (Figure B7-2).

7. LONGNOSE SUCKER

- Longnose sucker are common both upstream and downstream of Devils Canyon.
    - During 1981, 144 longnose suckers were captured near tributary mouths upstream of Devils Canyon by gillnet.
    - During 1982, 66 longnose suckers were captured by gillnet at four of seven mainstem sampling sites.
    - During 2012, 32 longnose suckers were captured primarily by backpack electrofishing within mainstem habitats (20 fish) or tributary plumes by boat electrofishing (8 fish).
    - Longnose appear to be slightly more abundant in the Lower River compared to the Middle River downstream of Devils Canyon (Figure B7-3).

8. ROUND WHITEFISH

- Round whitefish are common in the Middle and Lower River downstream of Devils Canyon.
    - During 1981, 33 round whitefish were captured near tributary mouths upstream of Devils Canyon by gillnet.
    - During 1982, 5 round whitefish were captured by gillnet at one of seven mainstem sampling sites upstream of Devils Canyon.
    - During 2012, 14 round whitefish were captured primarily by backpack electrofishing within mainstem habitats (20 fish) or tributary plumes by boat electrofishing (8 fish).
    - Schmidt and Bingham (1983) suggested round whitefish were ten times more abundant than humpback whitefish downstream of Devils Canyon.
    - Surveys at 17 DFH sites downstream of Devils Canyon during 1982 suggest round whitefish are more abundant in the Middle River downstream of Devils Canyon than in the Lower River (Figure B7-4).

9. REFERENCES

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10. TABLES

Table B7-1. Estimated Arctic grayling population sizes in tributaries to the upper Susitna River during 1981 and 1982. Source: Delaney et al. (1981b), Sautner and Stratton (1983).

Stream	1981[1]		1982[1]	
	Point Estimate (fish)	95% Confidence Interval (fish)	Point Estimate (fish)	Point Estimate (fish/mile)
Oshetna River	2,017	1,525 - 2,976	2,426	1,103
Goose Creek	1,327	1,016 - 1,913	949	791
Jay Creek	1,089	868 - 1,462	1,592	455
Kosina Creek	2,787	2,228 - 3,720	5,544	1,232
Deadman Creek	979	604 - 2,575	734	1,835
Tsusena Creek	1,000	743 - 1,530		
Fog Creek	176	115 - 369		440
Watana Creek			3,925	324
Upper Susitna River	10,279	9,194 - 11,654	16,346[2]	

Notes:

1 Fish densities were not reported for 1981. Confidence intervals were not reported for 1982.

2 Total of point estimates from 1982 plus 1981 point estimates for Tsusena and Fog creeks.

Table B7-2. Chinook salmon escapement survey results from 1982 to 1985 upstream of RM 152. Surveys conducted by helicopter.

	1982				1983				1984				1985			
Stream	# Flights	Date of Peak Count	Peak Count	APA Source/PD F Page	# Flights	Date of Peak Count	Peak Count	APA Source/PD F Page	# Flights	Date of Peak Count	Peak Count	APA Source/PD F Page	# Flights	Date of Peak Count	Peak Count	APA Source/PD F Page
Cheechako Cr	9	6-Aug	16	589/314	2	1-Aug	25	1450/111	7	1-Aug	29	2748/60, 506	11	24-Jul	18	3412/127
Chinook Cr	5	6-Aug	5	589/314	2	1-Aug	8	1450/111	7	1-Aug	15	2748/60, 506	11	23-Aug	1	3412/128
Devil Cr	5		0	589/314	1	1-Aug	1	1450/111	6		0	2748/60, 506	11		0	3412/128
Fog Cr	0			2748/60	0			2748/60	4	21-Jul	2	2748/60, 506	3		0	3412/128
Bear Cr	0				0			2748/151	4		0	2748/506	3		0	3412/128
Tsusena Cr	0				0			2748/151	4		0	2748/507	3		0	3412/128
Deadman Cr	0				0				3		0	2748/507	0			
Watana Cr	0				0				2		0	2748/507	0			

Table B7-3. Chinook salmon information from Buckwalter (2011) Synopsis of ADF&G's Upper Susitna Drainage Fish Inventory, August 2011.

Stream	River Mile	Date	Lifestage	Number of Fish	Method	Reference
Above Devils Canyon (RM 152)						
Fog Creek	176.7	8/1/2003	adults	2	helicopter/foot	Buckwalter 2011, AWC Survey ID: FSS03USU01
Tsusena Creek	181.3	8/1/2003	adults	1	helicopter/foot	Buckwalter 2011, AWC Survey ID: FSS03USU02
Fog Creek	176.7	8/13/2003	juveniles	5	electrofishing	Buckwalter 2011, AWC Survey ID: FSS0305A01
Fog Creek Trib	176.7	8/6/2011	juveniles	8	electrofishing	Buckwalter 2011, AWC Survey ID: FSS1104c01
Fog Creek	176.7	8/6/2011	redds			Survey ID: FSS1104B01
Above Watana Dam Site (RM 184)						
Kosina Creek	201	8/14/2003	juveniles	1	electrofishing	Buckwalter 2011, AWC Survey ID: FSS0306A01
Oshetna River	225	8/14/2003	juveniles	3	electrofishing	Buckwalter 2011, AWC Survey ID: FSS0306A05
Kosina Creek	201	8/15/2003	juveniles	2	electrofishing	Buckwalter 2011, AWC Survey ID: FSS0307A06
Kosina Creek	201	7/27/2011	adults	1	helicopter/foot	Buckwalter 2011, Survey ID: FSS1101G04

11. FIGURES

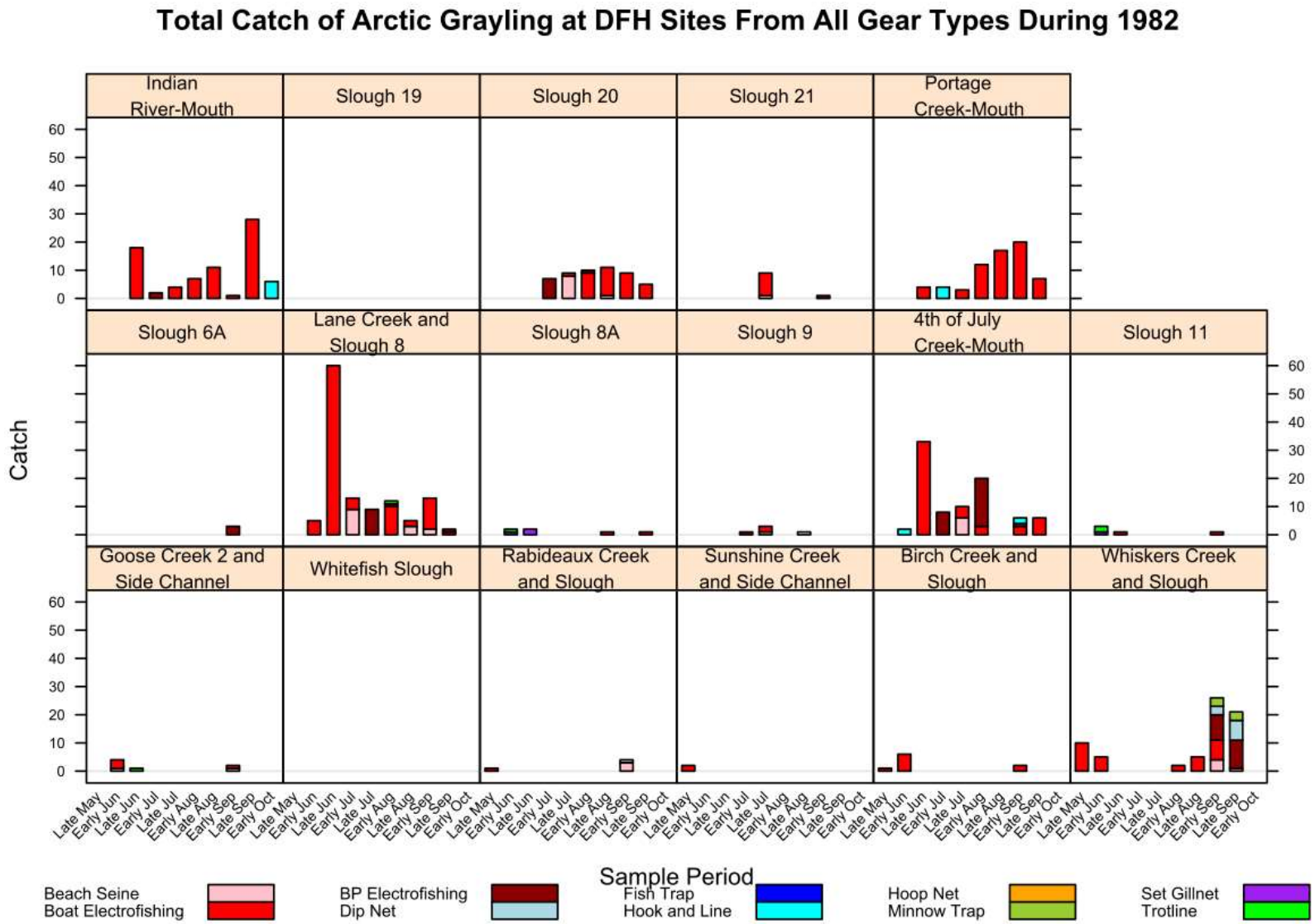

Figure B7-1. Total catch of Arctic grayling at DFH sites in the Lower and Middle Susitna River during 1982. Data Source: Schmidt et al. (1983).

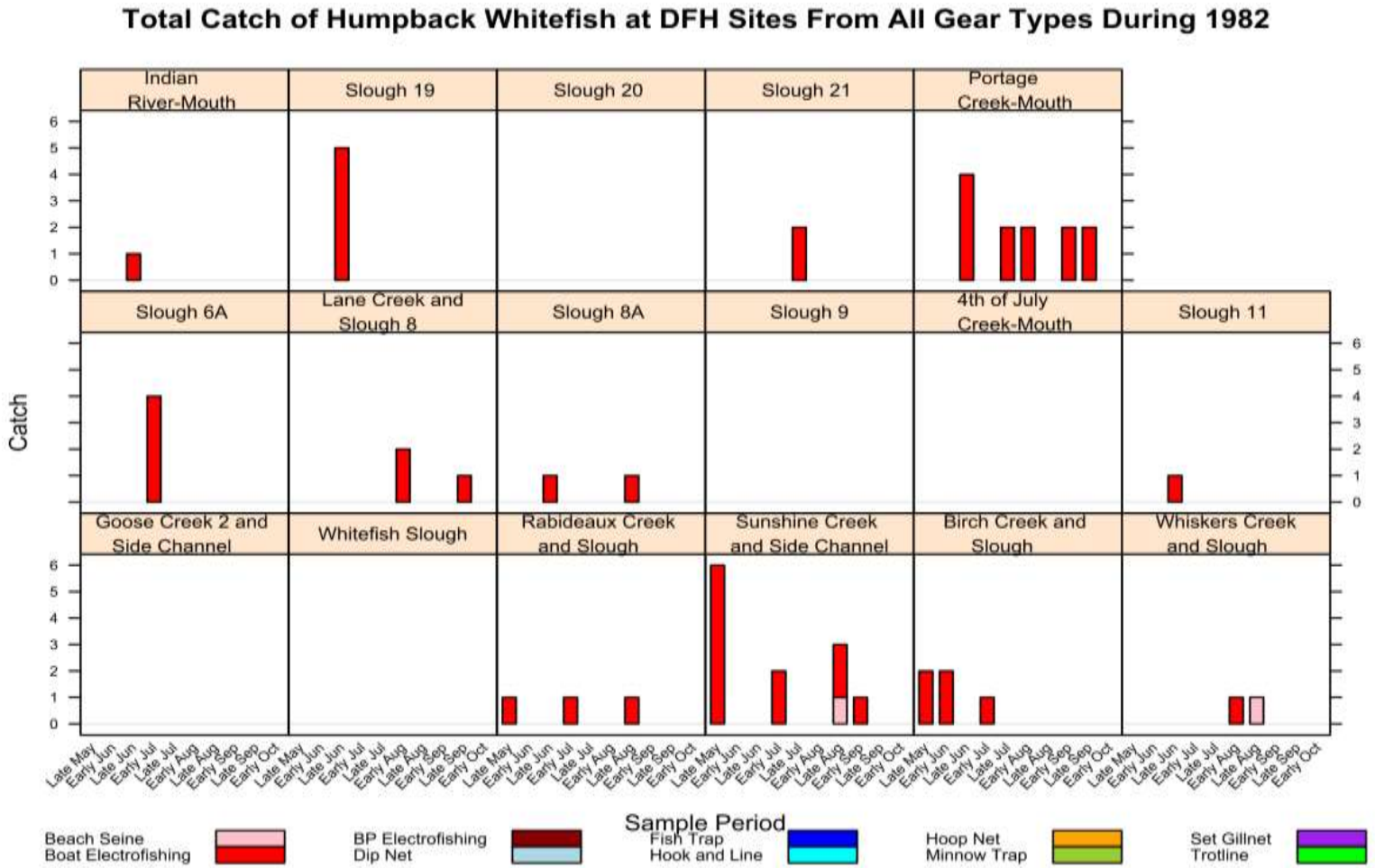

Figure B7-2. Total catch of humpback whitefish at DFH sites during 1982 by gear type. Data Source: Schmidt et al. (1983).

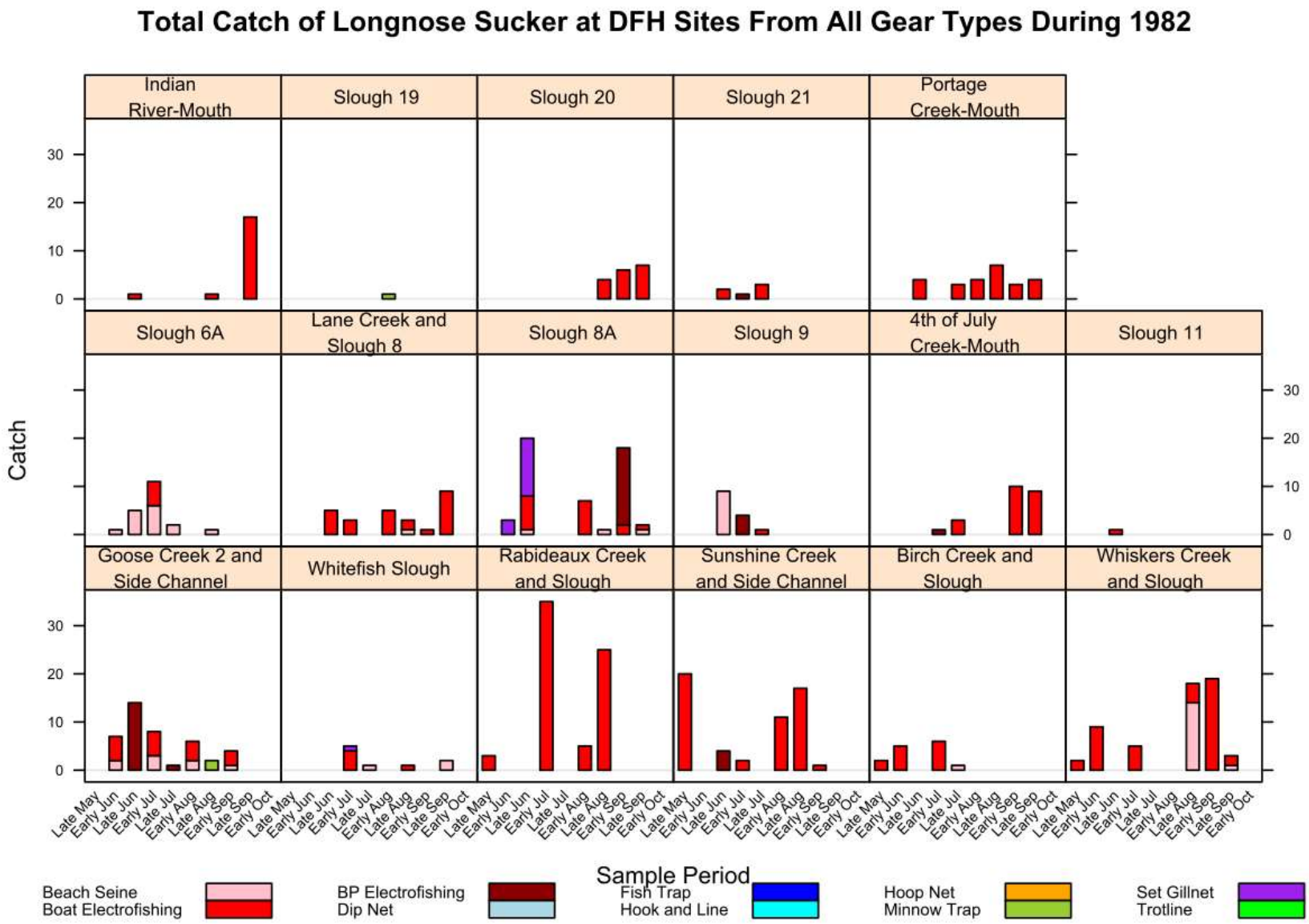

Figure B7-3. Total catch of longnose sucker at DFH sites during 1982 by gear type. Data Source: Schmidt et al. (1983).

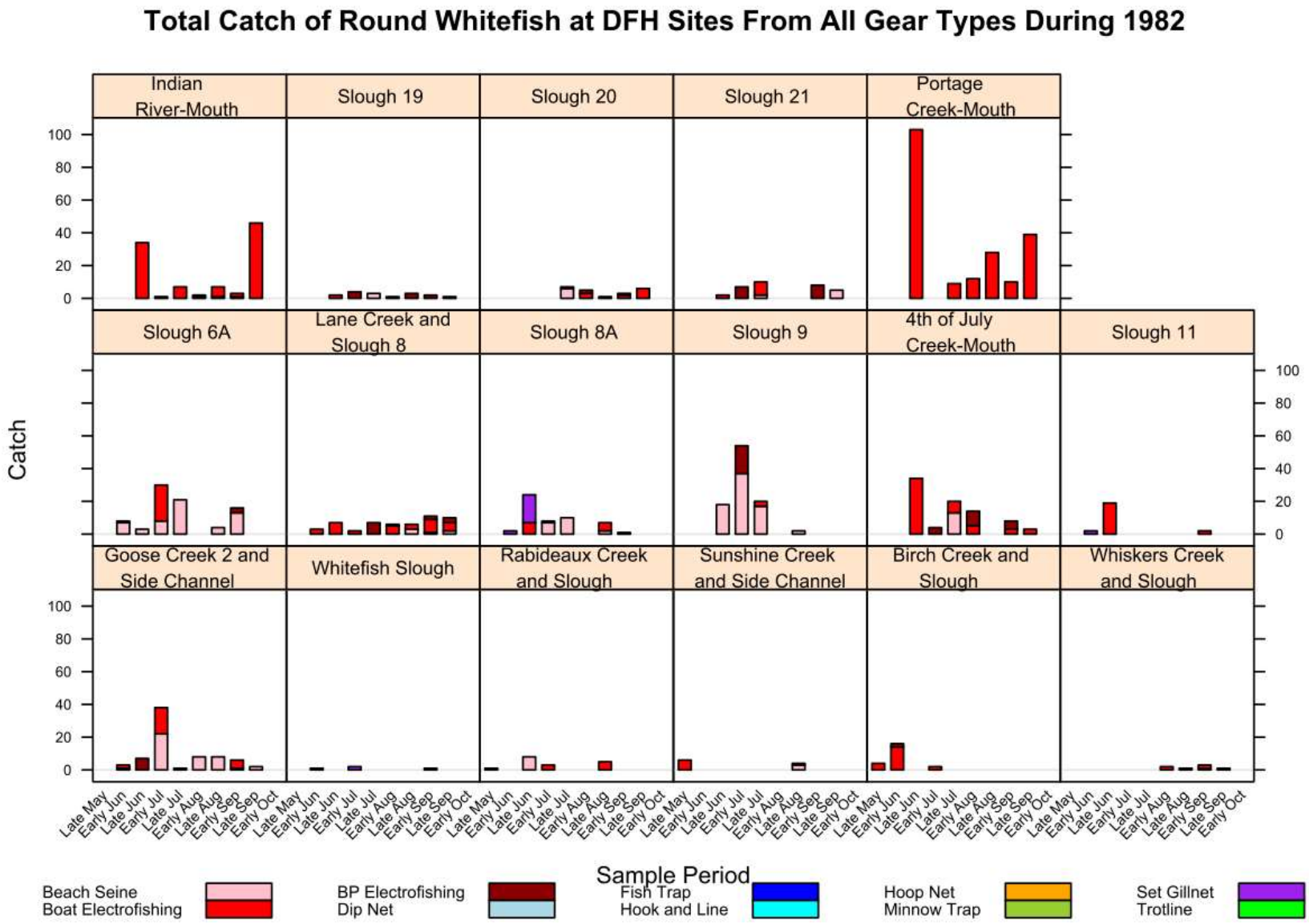

Figure B7-4. Total catch of round whitefish at DFH sites during 1982 by gear type. Data Source: Schmidt et al. (1983).