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APPENDIX 5. MIDDLE RIVER SEGMENT MACROHABITAT TYPES

Susitna-Watana Hydroelectric Project (FERC No. 14241)

Mapping of Aquatic Macrohabitat Types at Selected Sites in the Middle and Lower Susitna River Segments from 1980s and 2012 Aerials

2012 Study Technical Memorandum

Prepared for
Alaska Energy Authority

SUSITNA-WATANA HYDRO
Clean, reliable energy for the next 100 years.

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Tetra Tech Inc.

February 2013

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Table 5-1. Delineated habitat type areas in the Middle River in the 1980s.

Habitat Site Number	Discharge (CFS)	Main Channel	Side Channel	Side Slough	Upland Slough	Tributary	Vegetated Island	Background	Exposed Main Channel	Exposed Side Channel	Exposed Side Slough	Exposed Upand Slough	Exposed Tributary	Another Other Water	Tributary Mouth	Total Area
		$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$
1	12,500	3,818	2,893	388	46	0	3,480	12,669	614	2,109	130	0	0	0	0	26,147
2	12,500	5,015	441	0	132	0	43	8,723	605	248	0	0	0	0	0	15,207
3	12,500	4,459	177	0	40	0	0	6,637	591	385	0	0	0	0	0	12,289
4	12,500	2,565	2,172	0	105	0	2,077	7,500	129	573	0	6	0	0	0	15,126
5	12,500	4,756	3,288	178	0	7	3,272	6,339	349	3,430	179	0	6	0	49	21,852
6	12,500	5,805	2,004	265	0	0	6,051	5,599	1,446	375	141	0	0	0	0	21,687
7	12,500	5,623	2,024	1,138	0	0	15,022	4,539	966	1,505	1,777	0	0	0	8	32,601
8	12,500	3,246	1,627	494	74	0	5,632	6,104	224	2,268	1,713	0	0	0	0	21,382
9	12,500	5,028	2,440	22	0	0	4,813	5,213	895	4,038	0	0	8	0	79	22,535
10	12,500	2,929	1,674	333	80	0	2,299	7,742	650	1,577	56	0	0	0	0	17,341
11	12,500	6,013	1,616	321	42	0	6,668	6,780	2,542	2,539	1,009	3	0	0	80	27,613
12	12,500	3,219	324	142	116	0	1,959	10,442	1,178	643	81	3	322	0	274	18,703
13	12,500	3,283	2,051	0	67	0	948	6,425	498	1,206	0	0	78	0	113	14,670
14	12,500	6,899	1,571	743	15	0	3,119	8,632	1,095	1,999	1,113	0	0	0	0	25,185
15	12,500	1,851	869	134	0	0	2,363	2,676	486	165	162	0	0	0	54	8,759
16	12,500	3,018	0	0	0	0	574	2,937	587	0	0	0	0	0	0	7,115
17	12,500	1,009	0	0	0	0	0	335	76	0	0	0	41	0	100	1,560
Totals		68,533	25,171	4,157	717	7	58,321	109,291	12,931	23,060	6,360	12	454	0	757	309,773

Table 5-2. Delineated habitat type areas in the Middle River in 2012.

Habitat Site Number	Discharge (CFS)	Main Channel	Side Channel (SC)	Side Slough	Upland Slough	Tributary	Vegetated Island	Background	Exposed Main Channel	Exposed Side Channel	Exposed Side Slough	Exposed Upand Slough	Exposed Tributary	Another Other Water	Main Channel Trib. Mouth	Side Channel Trib. Mouth	Tribuary Trib. Mouth	Total Area
		$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$	$ft^2 \times 10^3$
0	12,900	131,297	5,725	1,328	780	1,620	43,450	404,394	23,968	7,496	1,099	62	238	2,108	0	0	0	623,566
1	12,900	6,174	914	212	84	104	4,493	12,177	1,112	727	76	0	0	16	57	0	0	26,147
2	12,900	5,507	0	0	30	0	64	8,659	885	0	0	0	0	55	6	0	0	15,207
3	12,900	4,549	134	0	66	0	129	6,428	567	233	0	8	0	174	0	0	0	12,289
4	12,900	4,546	0	0	110	0	2,224	7,413	722	0	0	0	0	112	0	0	0	15,127
5	12,900	6,073	1,474	93	0	19	4,630	6,234	945	1,946	31	0	0	371	36	0	0	21,852
6	12,900	6,014	2,252	99	0	0	6,026	5,760	1,147	329	38	0	0	15	0	8	0	21,687
7	12,900	8,278	567	597	0	11	15,649	4,369	1,927	805	286	0	44	61	7	0	0	32,601
8	12,900	4,072	821	414	0	0	6,691	6,484	211	1,096	1,432	0	0	160	0	0	0	21,382
9	12,900	6,487	823	0	10	39	6,249	5,319	1,796	1,696	0	0	17	5	93	0	1	22,535
10	12,900	4,764	279	128	86	0	3,109	7,638	948	264	110	0	0	16	0	0	0	17,341
11	12,900	6,471	2,134	283	0	0	3,984	11,260	1,188	1,828	336	7	0	121	0	0	0	27,613
12	12,900	3,413	181	33	118	17	2,371	10,372	553	1,176	159	0	0	151	107	53	0	18,703
13	12,900	5,440	274	0	74	82	2,039	5,181	1,292	56	6	0	109	0	115	0	3	14,670
14 D/S	12,900	1,910	0	9	33	0	192	1,873	455	0	13	8	0	0	0	0	0	4,495
14 U/S	17,000	7,300	811	294	0	0	2,902	7,139	737	1,484	15	0	0	9	0	0	0	20,691
15	17,000	2,931	0	90	0	10	2,521	2,527	305	17	293	0	0	0	63	0	2	8,759
16	17,000	3,187	0	0	0	0	645	2,952	315	18	0	0	0	0	0	0	0	7,115
17	17,000	1,139	0	0	0	0	0	293	67	0	0	0	32	0	17	0	12	1,560
18	17,000	3,893	17	50	0	0	748	4,131	537	101	498	0	0	24	0	0	0	10,001
19	17,000	4,883	0	534	0	0	3,647	5,483	825	0	2,614	24	0	61	0	0	0	18,071
20	17,000	4,860	143	0	32	0	80	14,795	761	453	0	258	0	32	0	0	0	21,414
21	17,000	2,285	0	0	16	234	132	9,170	444	0	0	0	49	114	31	0	9	12,485
22	17,000	9,148	9	110	0	0	4,396	10,783	2,440	86	722	0	0	28	0	0	0	27,722
23	17,000	2,653	222	0	0	0	179	860	802	377	0	0	0	0	0	0	0	5,092
Totals		247,272	16,780	4,274	1,440	2,136	116,549	561,693	44,950	20,189	7,732	367	489	3,633	532	61	27	1,028,124

APPENDIX 6. LOWER RIVER SEGMENT MACROHABITAT TYPES

Susitna-Watana Hydroelectric Project (FERC No. 14241)

Mapping of Aquatic Macrohabitat Types at Selected Sites in the Middle and Lower Susitna River Segments from 1980s and 2012 Aerials

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Tetra Tech Inc.

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Table 6-1. Delineated habitat types areas in the Lower River in the 1980s.

Habitat Site Name	Habitat Site Number	Discharge (CFS)	Main Channel	Primary Side Channel	Secondary Side Channel	Turbid Backwater	Tributary	Tributary Mouth	Clearwater or Side Slough	Exposed Main Channel	Exposed Primary Side Channel	Exposed Secondary Side Channel	Exposed Tributary	Exposed Clearwater or Side Slough	Vegetated Island	Background	Total Area
			sq ft x 10^3	sq ft x 10^3	sq ft x 10^3	sq ft x 10^3	sq ft x 10^3	sq ft x 10^3	sq ft x 10^3	sq ft x 10^3	sq ft x 10^3	sq ft x 10^3	sq ft x 10^3	sq ft x 10^3	sq ft x 10^3	sq ft x 10^3	sq ft x 10^3
SC IV-4	1	36,600	6,071	0	5,906	79	0	0	293	1,594	0	3,901	0	102	22,022	8,378	48,346
Willow Creek	2	36,600	2,882	0	9,884	101	1,513	290	306	958	0	3,787	682	34	34,501	44,583	99,522
Goose Creek	3	36,600	3,473	0	3,995	252	425	52	947	2,846	0	6,629	199	3,228	44,566	22,128	88,739
Montana	4	36,600	3,729	0	555	0	250	21	283	2,115	0	466	365	903	7,816	3,583	20,086
Sunshine Slough	5	36,600	6,701	0	9,850	202	85	36	278	1,265	0	9,905	8	68	31,678	37,911	97,988
		Totals	22,857	0	30,190	634	2,273	399	2,107	8,777	0	24,689	1,254	4,335	140,583	116,583	354,681

Table 6-2. Delineated habitat types areas in the Lower River in 2012.

Habitat Site Name	Habitat Site Number	Discharge (CFS)	Main Channel	Primary Side Channel	Secondary Side Channel	Turbid Backwater	Tributary	Tributary Mouth	Clearwater or Side Slough	Exposed Main Channel	Exposed Primary Side Channel	Exposed Secondary Side Channel	Exposed Tributary	Exposed Clearwater or Side Slough	Vegetated Island	Backgroun d	Additional Open Water	Total Area
			sq ft x 10^3	sq ft x 10^3	sq ft x 10^3	sq ft x 10^3	sq ft x 10^3	sq ft x 10^3	sq ft x 10^3	sq ft x 10^3	sq ft x 10^3	sq ft x 10^3	sq ft x 10^3	sq ft x 10^3	sq ft x 10^3	sq ft x 10^3	sq ft x 10^3	sq ft x 10^3
SC IV-4	1	55,000	7,061	0	7,836	256	0	0	66	1,875	0	710	0	0	22,218	8,295	28	48,318
Willow Creek	2	55,000	0	0	12,921	0	2,959	525	594	0	0	3,812	193	93	50,401	27,871	153	99,368
Goose Creek	3	48,000	7,280	0	3,316	97	82	99	1,732	1,731	0	1,462	10	413	50,563	21,575	380	88,360
Montana	4	38,200	3,637	0	1,882	0	68	347	29	1,004	0	1,408	132	0	7,952	3,544	84	20,003
Sunshine Slough	5	38,200	12,587	0	7,746	2	70	66	651	2,227	0	6,316	0	322	30,139	37,725	137	97,850
		Totals	30,564	0	33,701	355	3,179	1,037	3,072	6,836	0	13,709	335	828	161,274	99,010	783	353,899

APPENDIX 7. MIDDLE RIVER MACROHABITAT TYPE AREA BAR CHARTS

Susitna-Watana Hydroelectric Project (FERC No. 14241)

Mapping of Aquatic Macrohabitat Types at Selected Sites in the Middle and Lower Susitna River Segments from 1980s and 2012 Aerials

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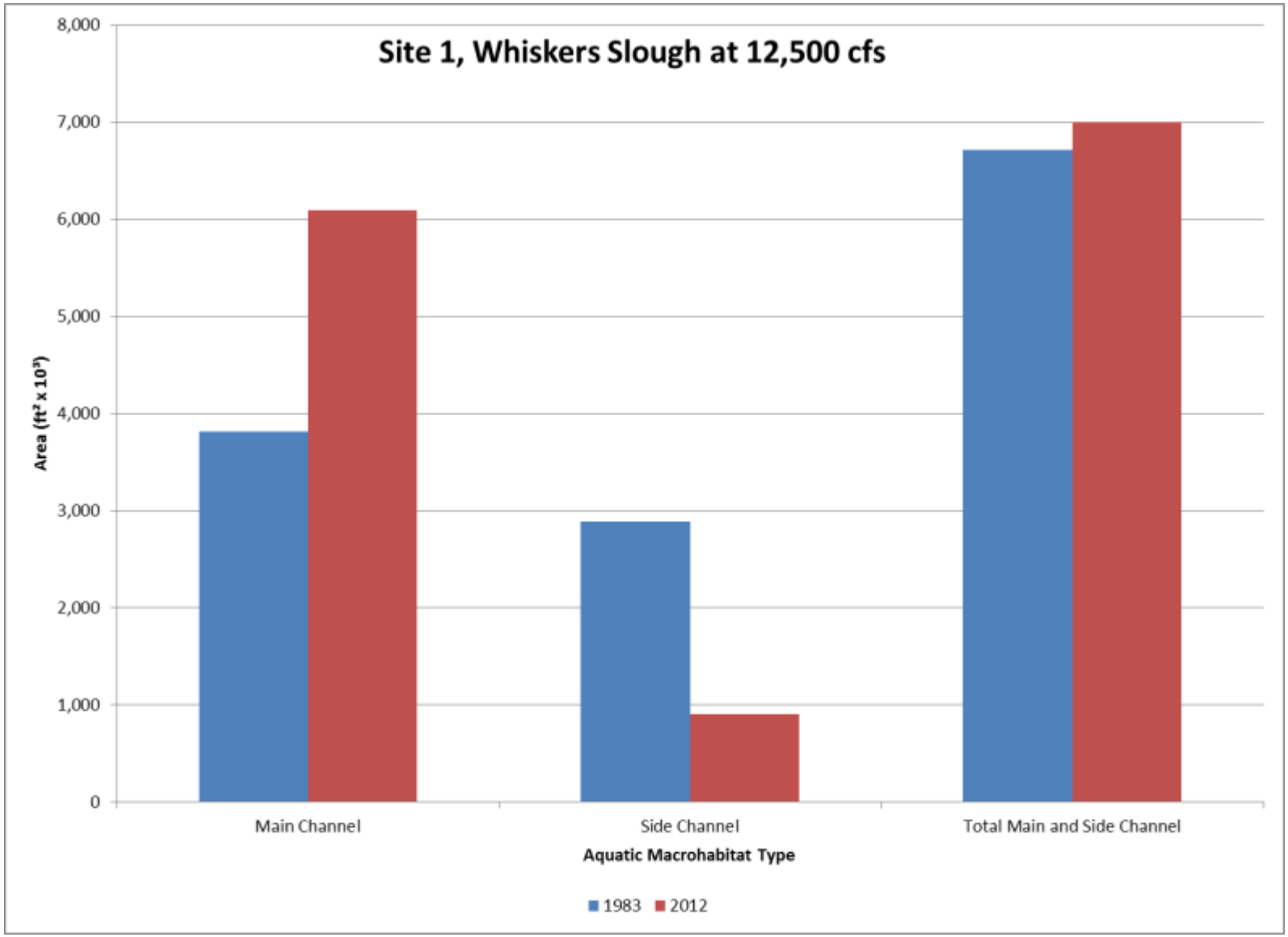

Figure 7-1. Comparison of main and side channel aquatic macrohabitat types from 1983 to 2012 at Whiskers Slough.

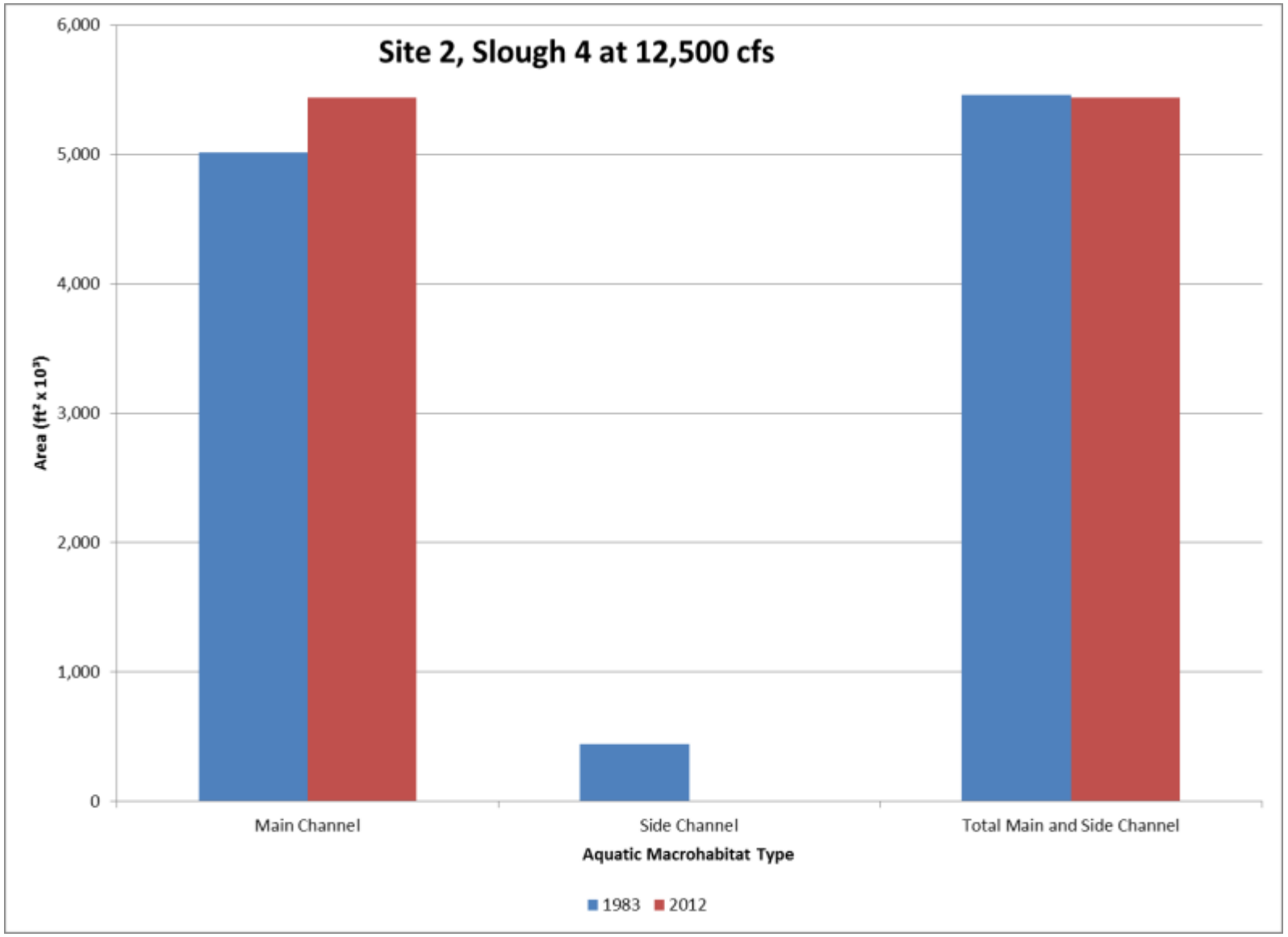

Figure 7-2. Comparison of main and side channel aquatic macrohabitat types from 1983 to 2012 at Slough 4.

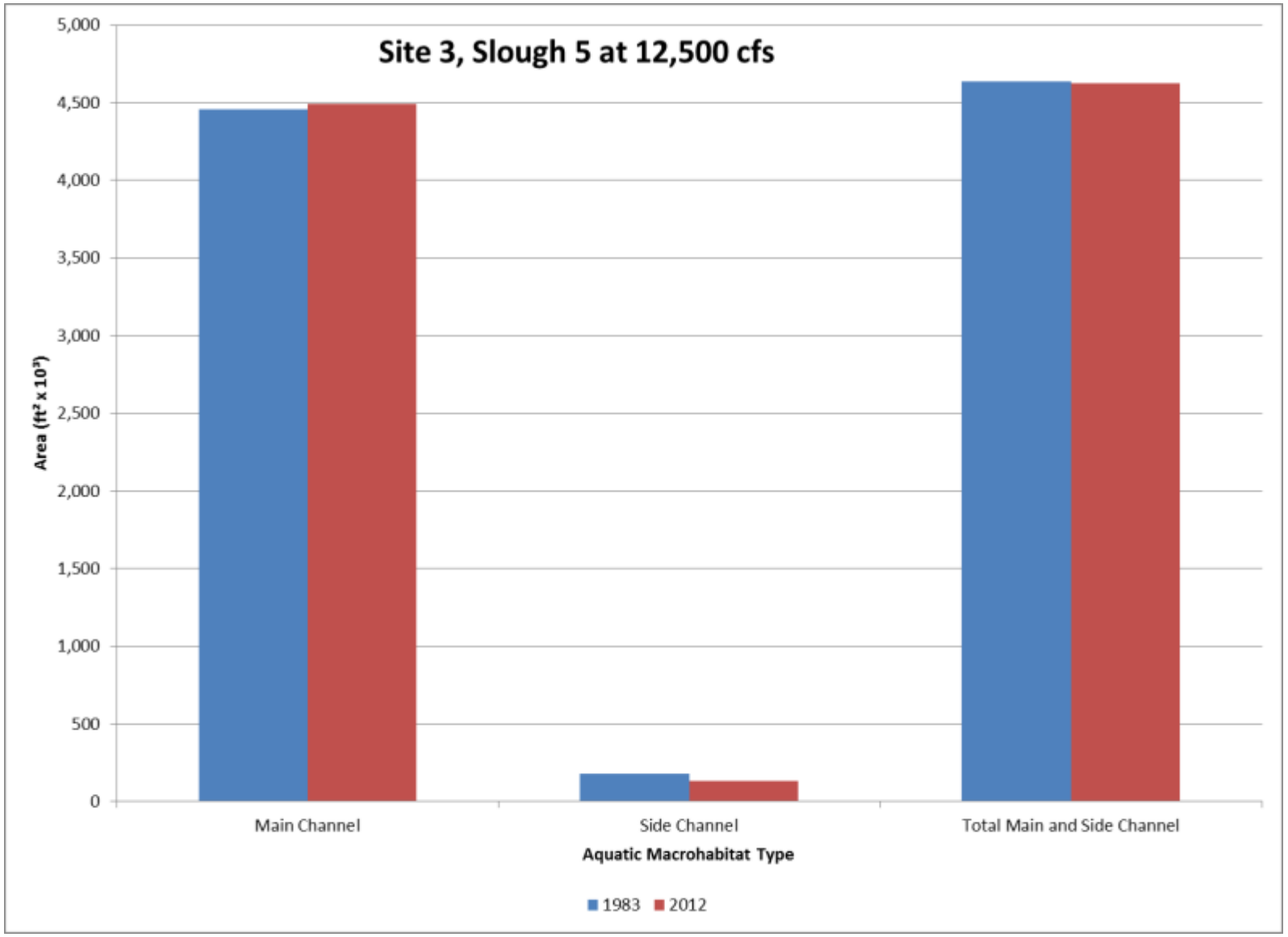

Figure 7-3. Comparison of main and side channel aquatic macrohabitat types from 1983 to 2012 at Slough 5.

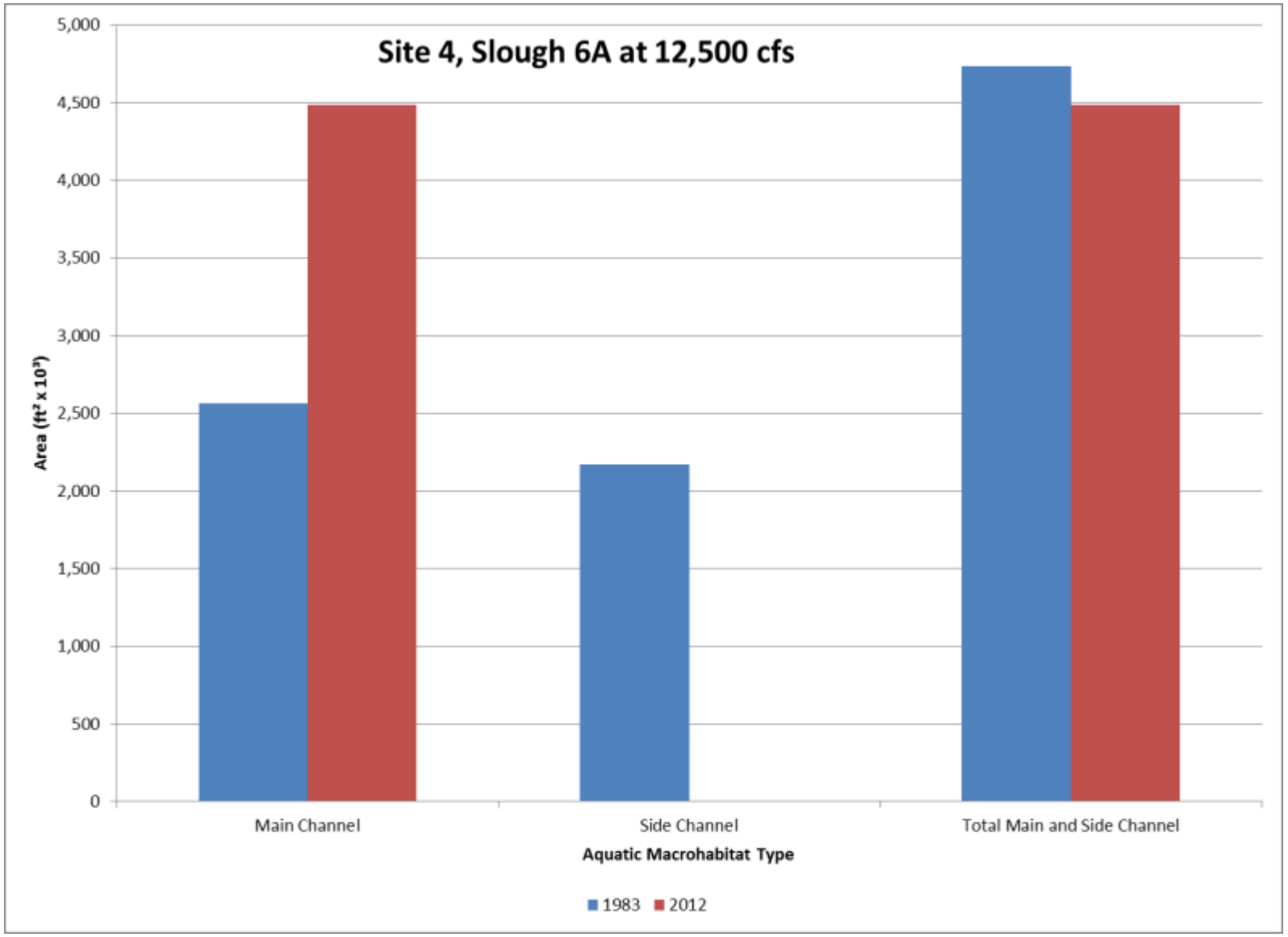

Figure 7-4. Comparison of main and side channel aquatic macrohabitat types from 1983 to 2012 at Slough 6A.

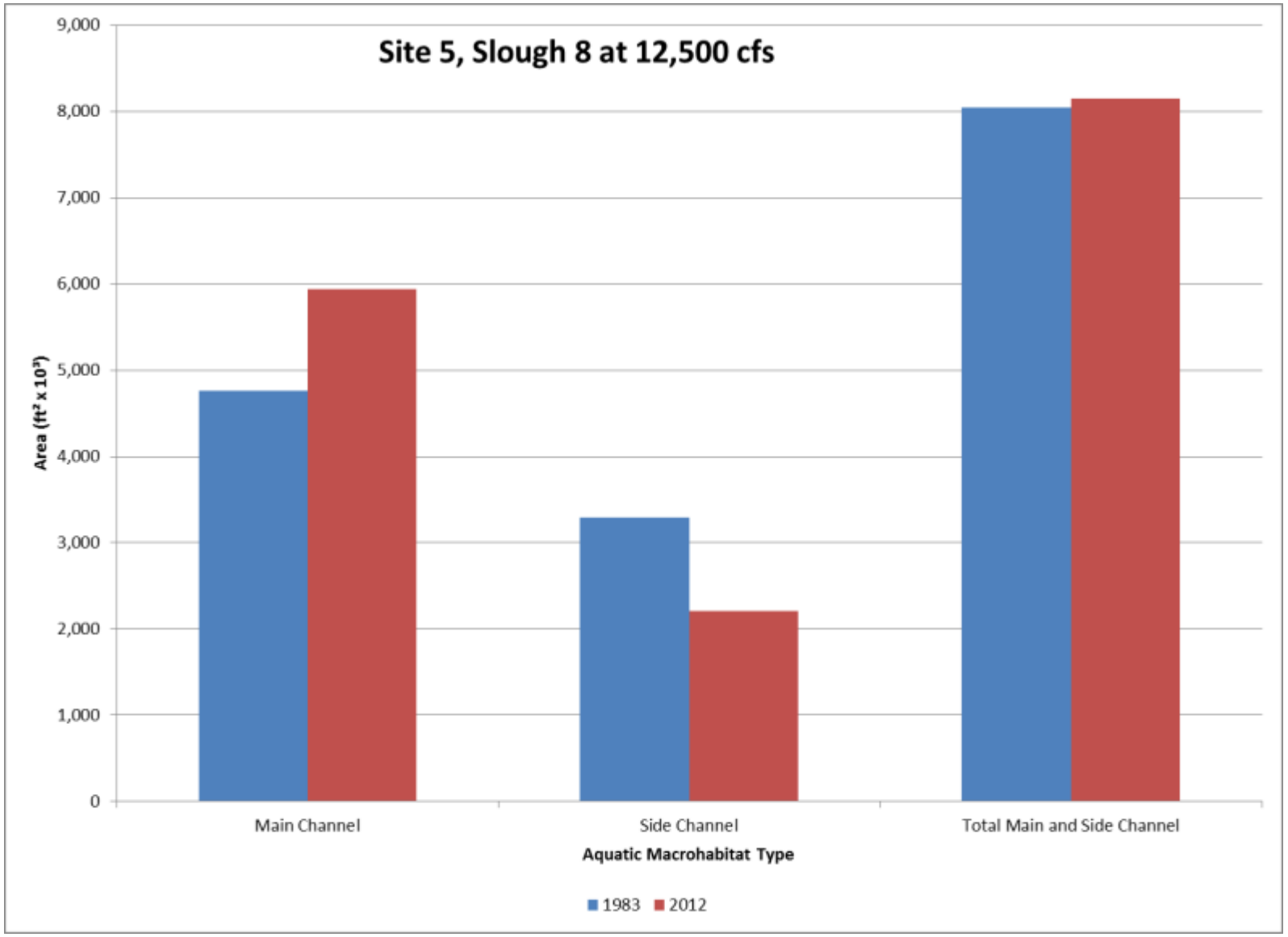

Figure 7-5. Comparison of main and side channel aquatic macrohabitat types from 1983 to 2012 at Slough 8.

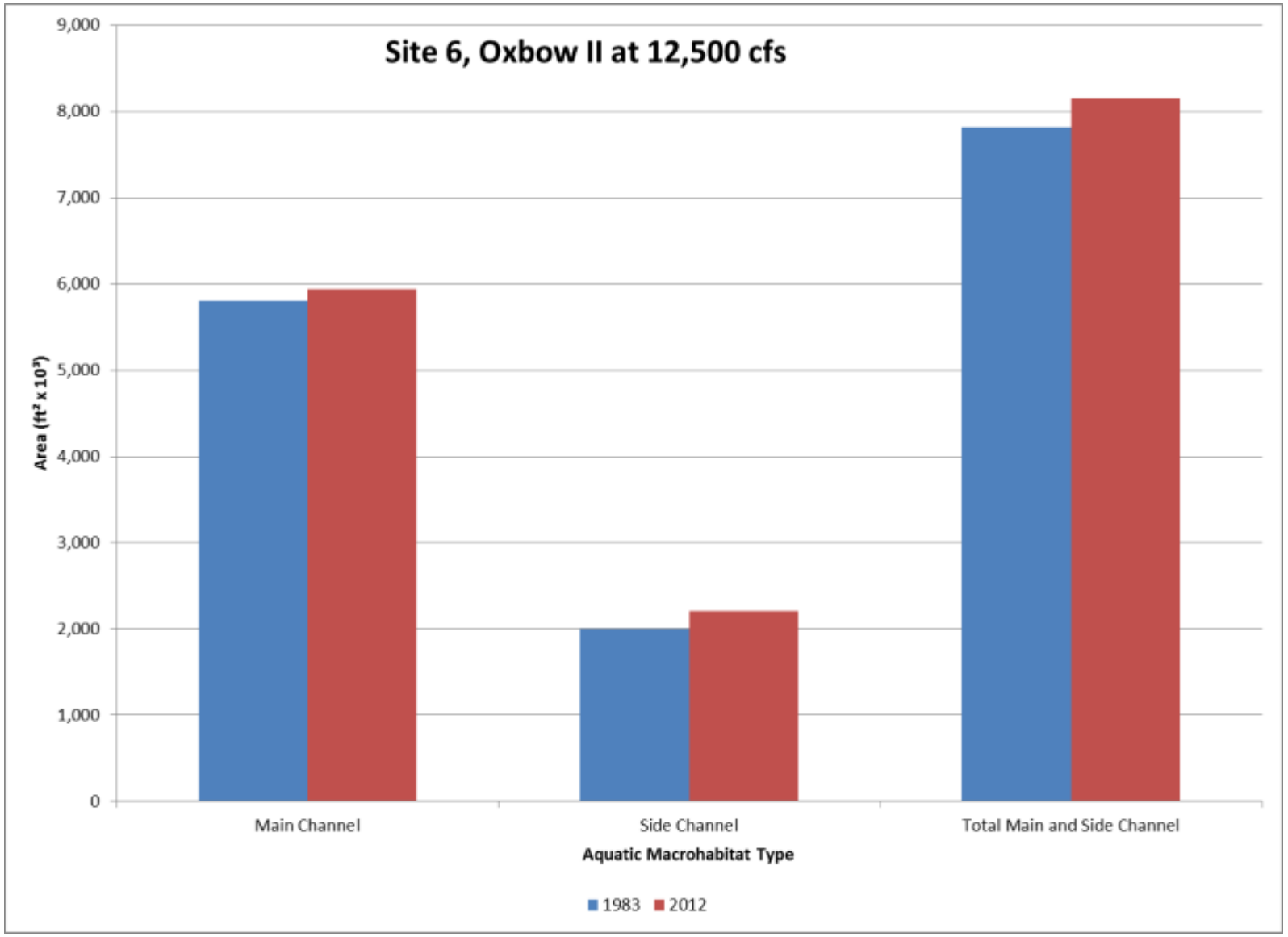

Figure 7-6. Comparison of main and side channel aquatic macrohabitat types from 1983 to 2012 at Oxbow II.

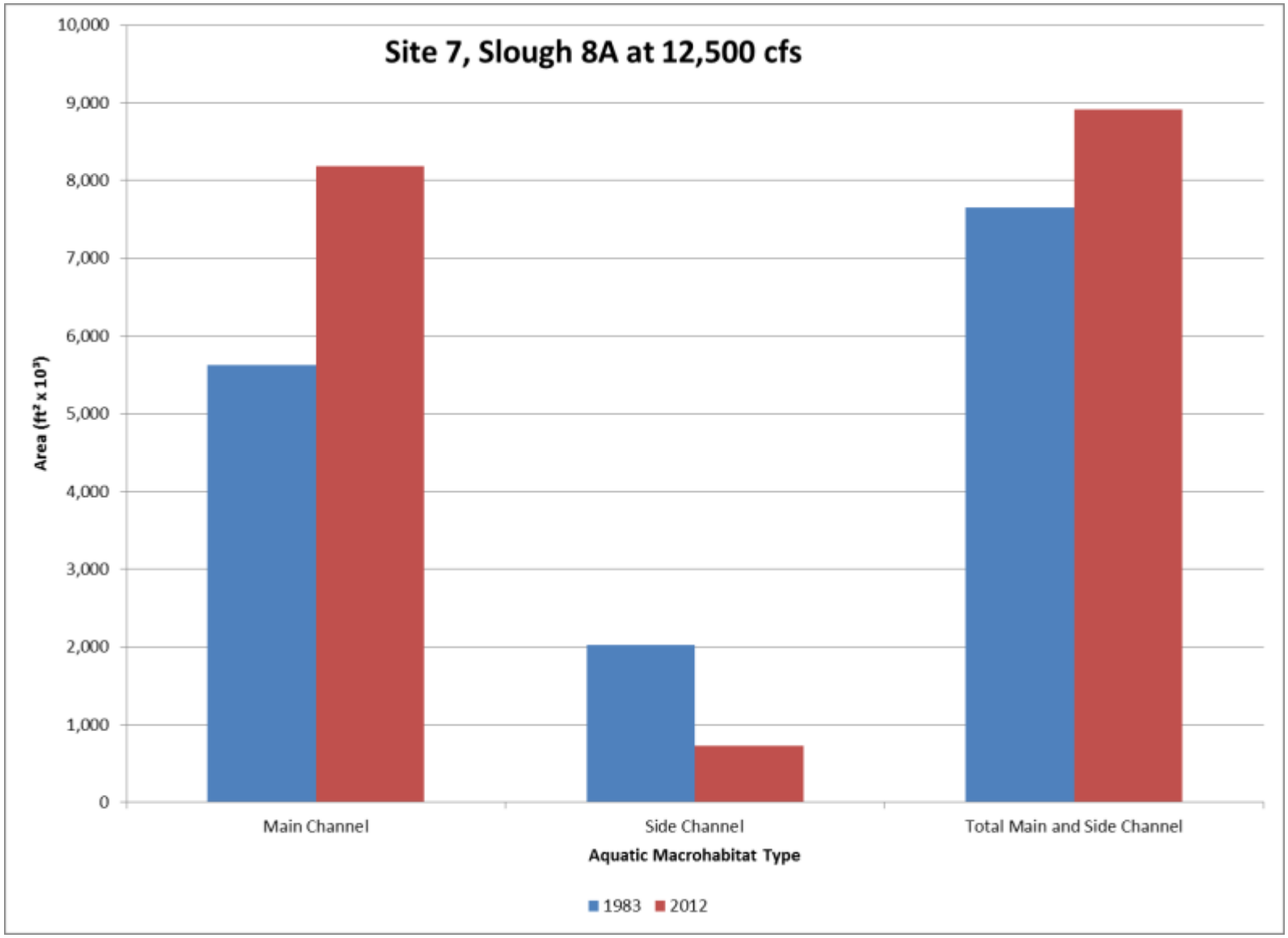

Figure 7-7. Comparison of main and side channel aquatic macrohabitat types from 1983 to 2012 at Slough 8A.

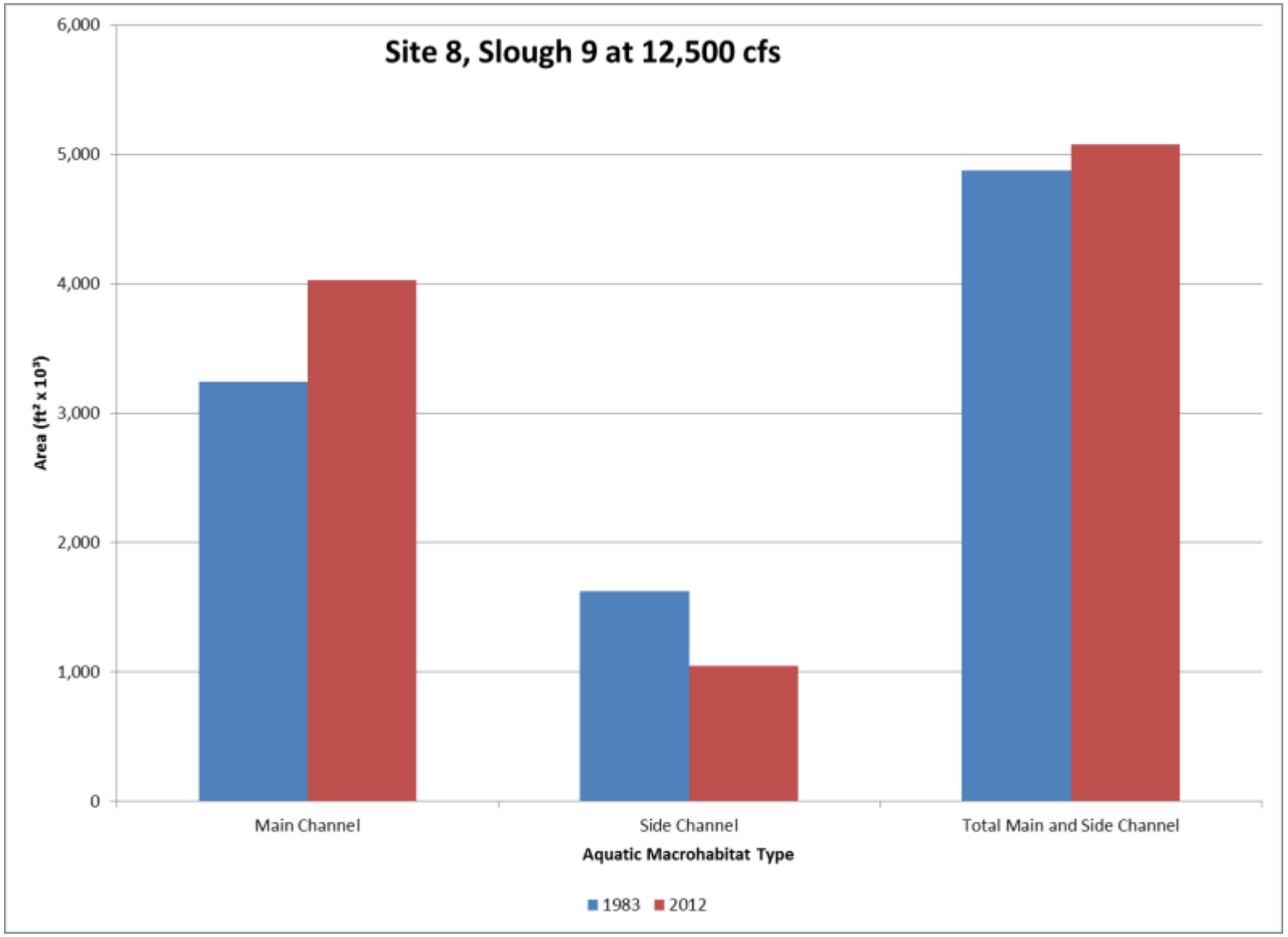

Figure 7-8. Comparison of main and side channel aquatic macrohabitat types from 1983 to 2012 at Slough 9.

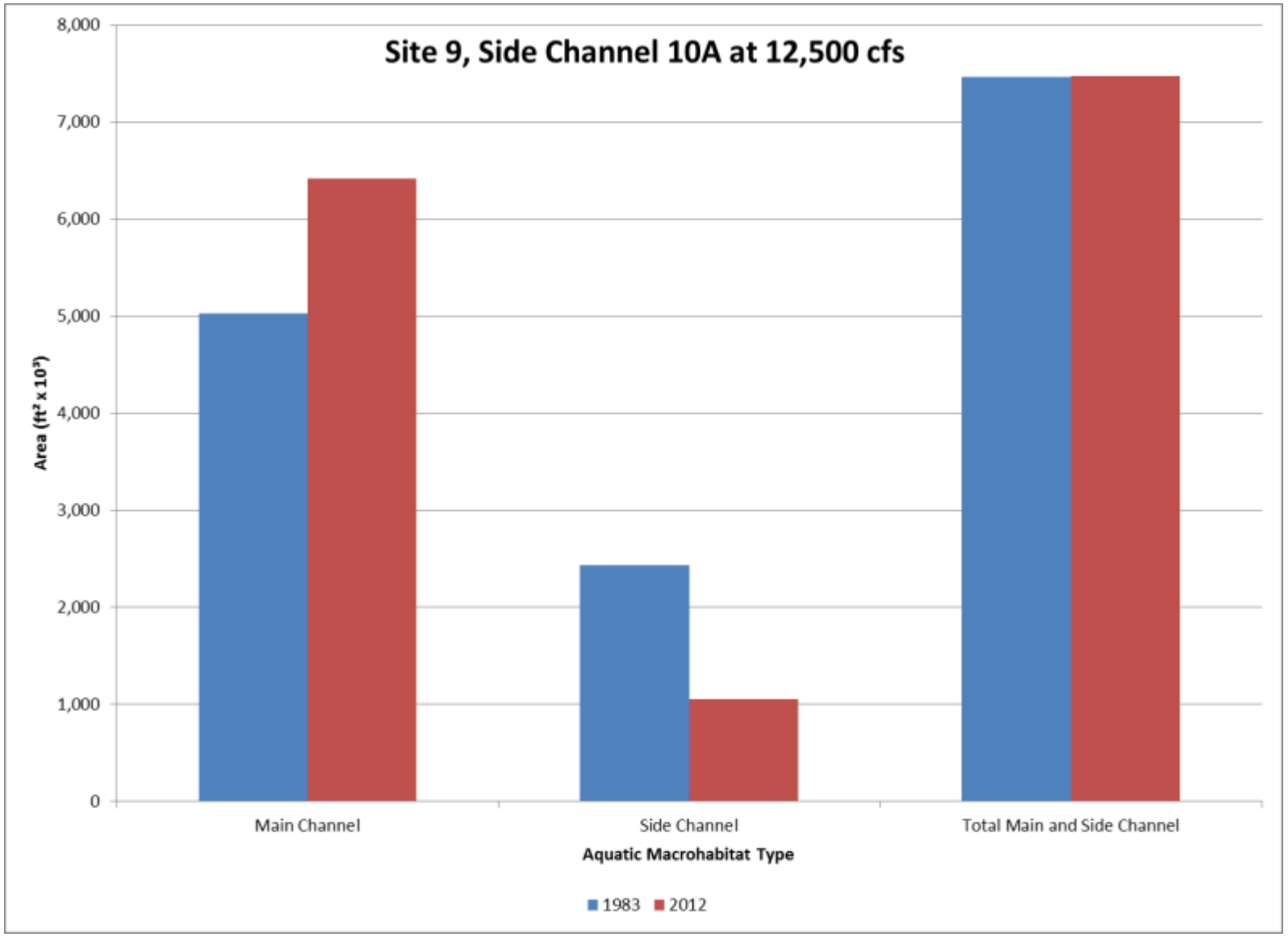

Figure 7-9. Comparison of main and side channel aquatic macrohabitat types from 1983 to 2012 at Side Channel 10A.

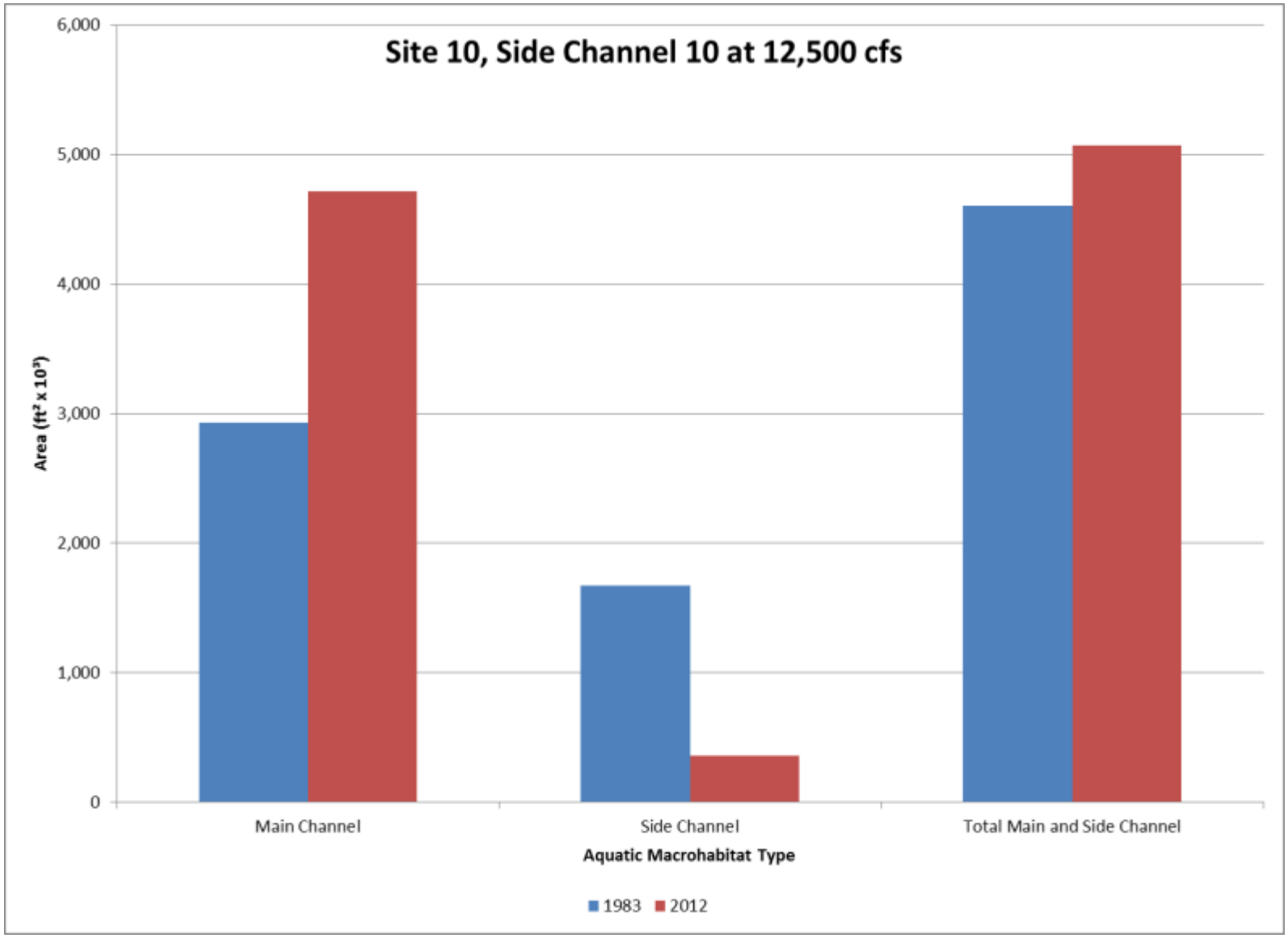

Figure 7-10. Comparison of main and side channel aquatic macrohabitat types from 1983 to 2012 at Side Channel 10.

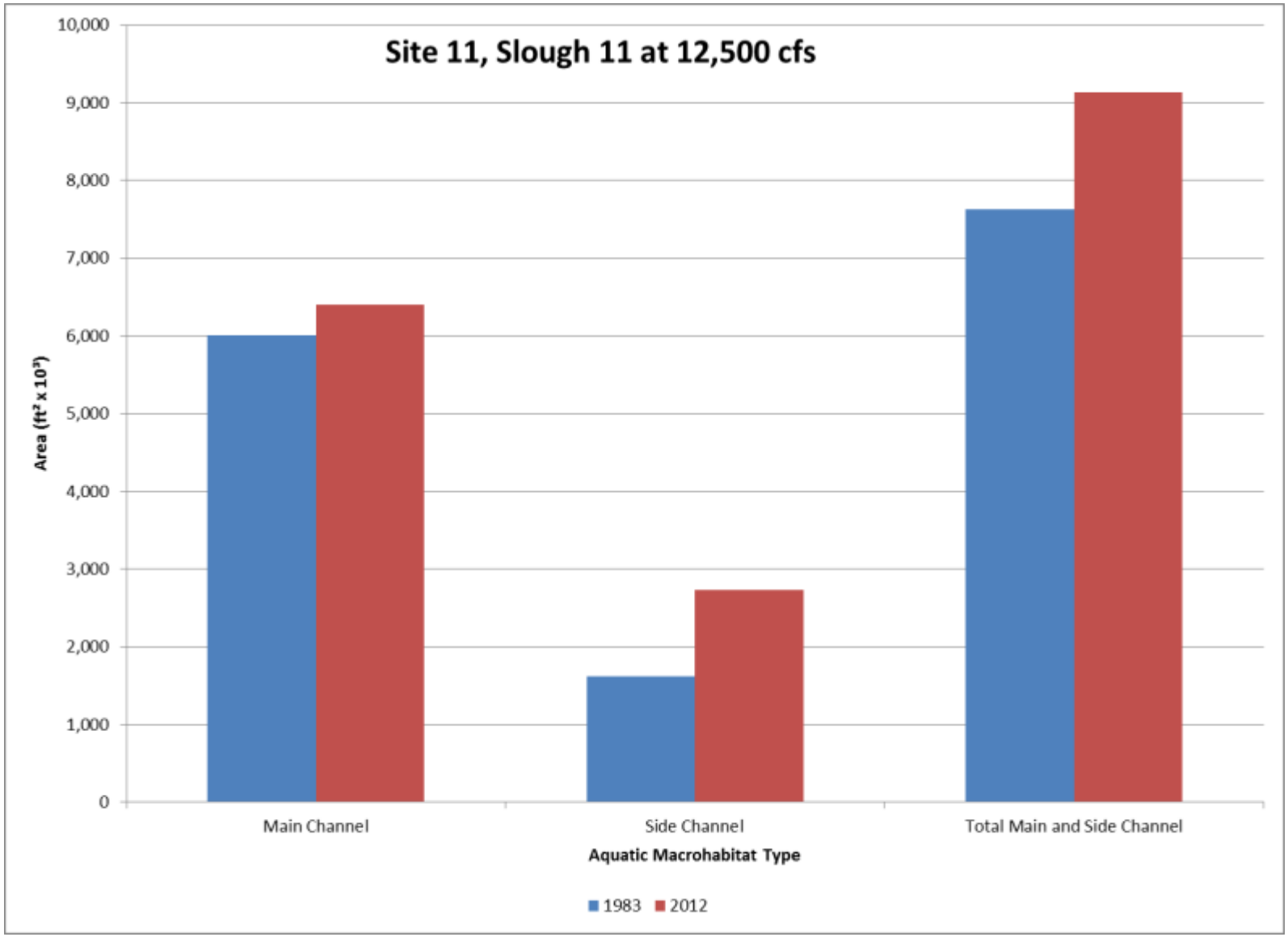

Figure 7-11. Comparison of main and side channel aquatic macrohabitat types from 1983 to 2012 at Slough 11.

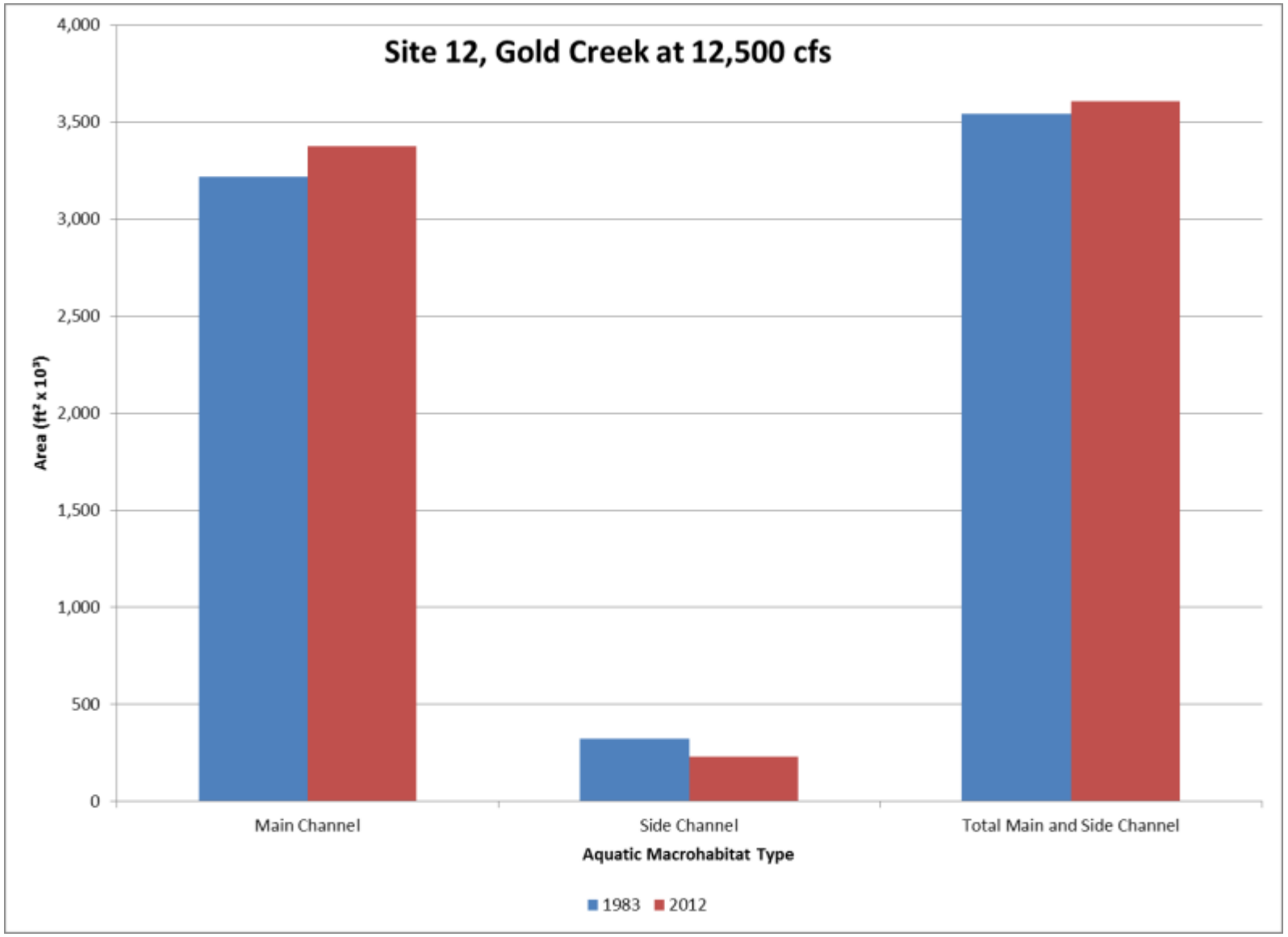

Figure 7-12. Comparison of main and side channel aquatic macrohabitat types from 1983 to 2012 at Gold Creek.

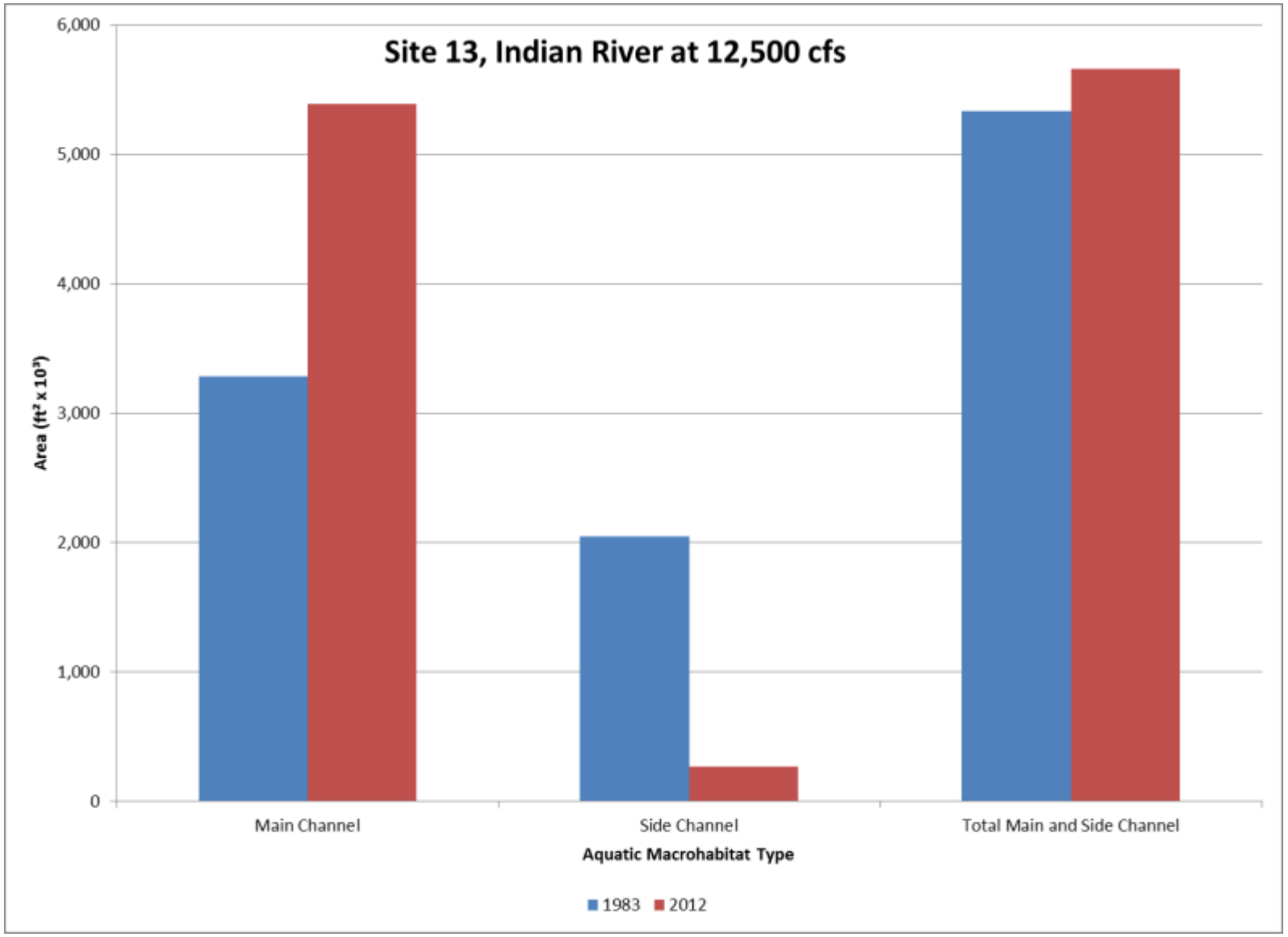

Figure 7-13. Comparison of main and side channel aquatic macrohabitat types from 1983 to 2012 at Indian River.

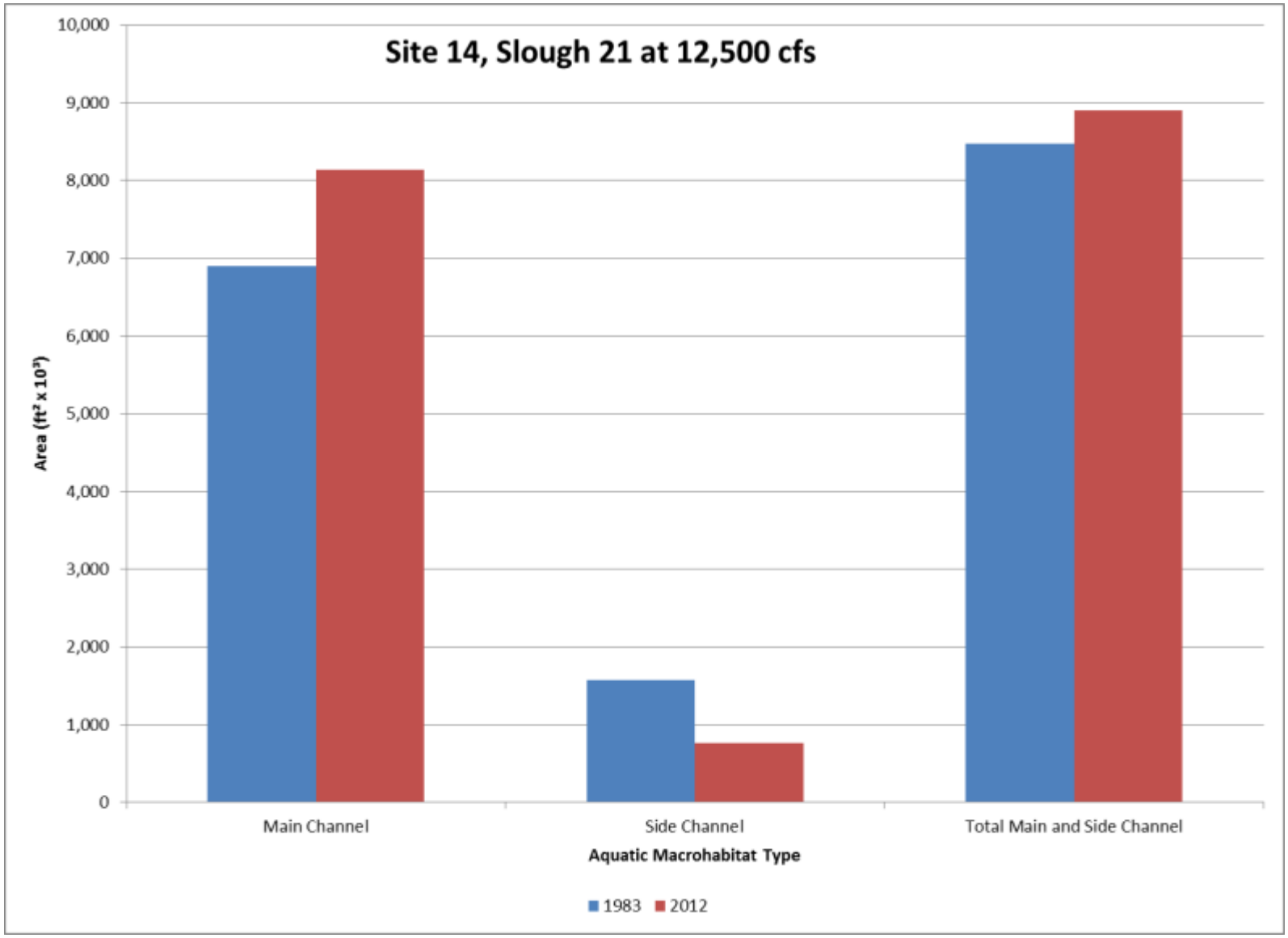

Figure 7-14. Comparison of main and side channel aquatic macrohabitat types from 1983 to 2012 at Slough 21.

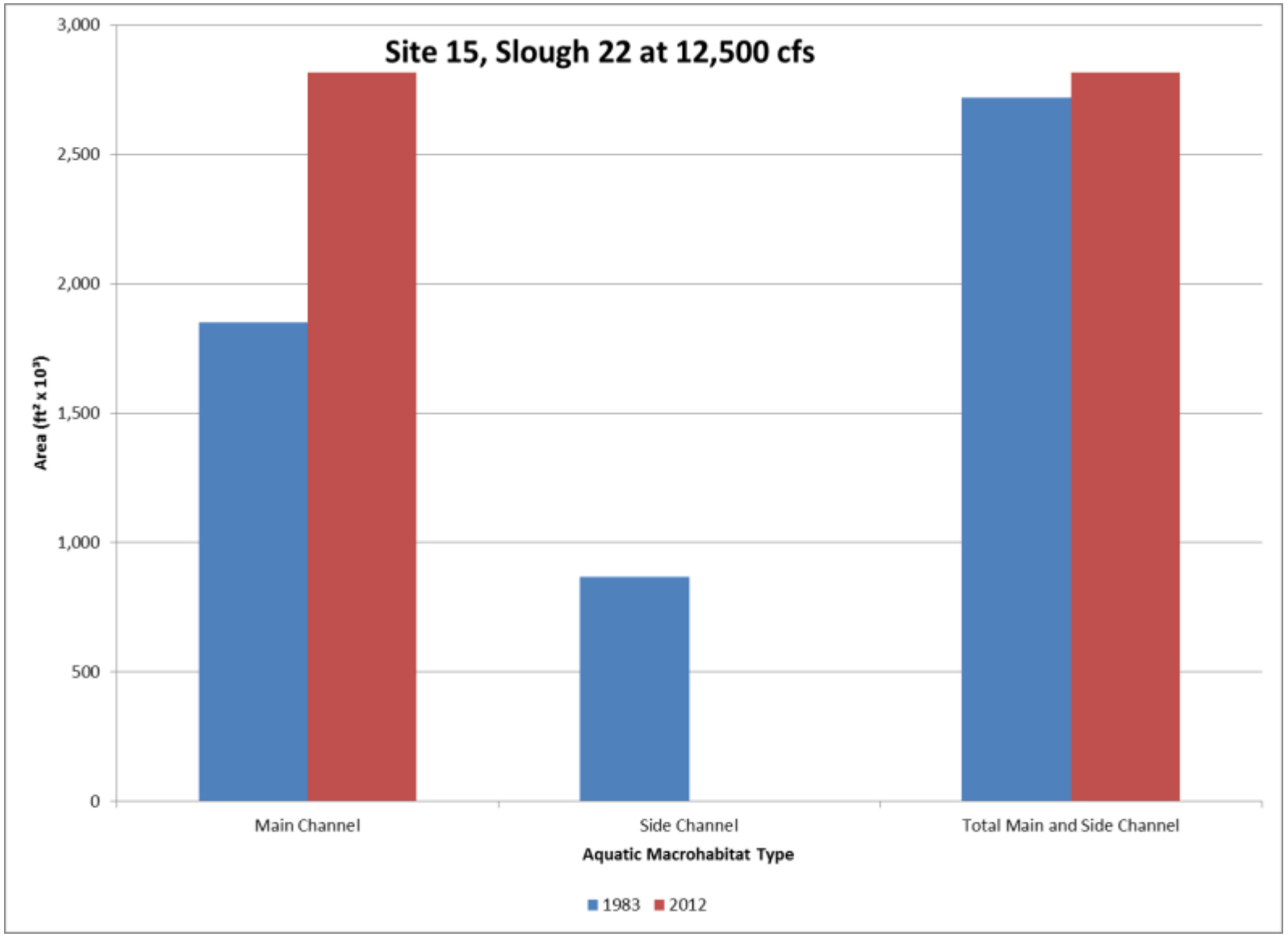

Figure 7-15. Comparison of main and side channel aquatic macrohabitat types from 1983 to 2012 at Slough 22.

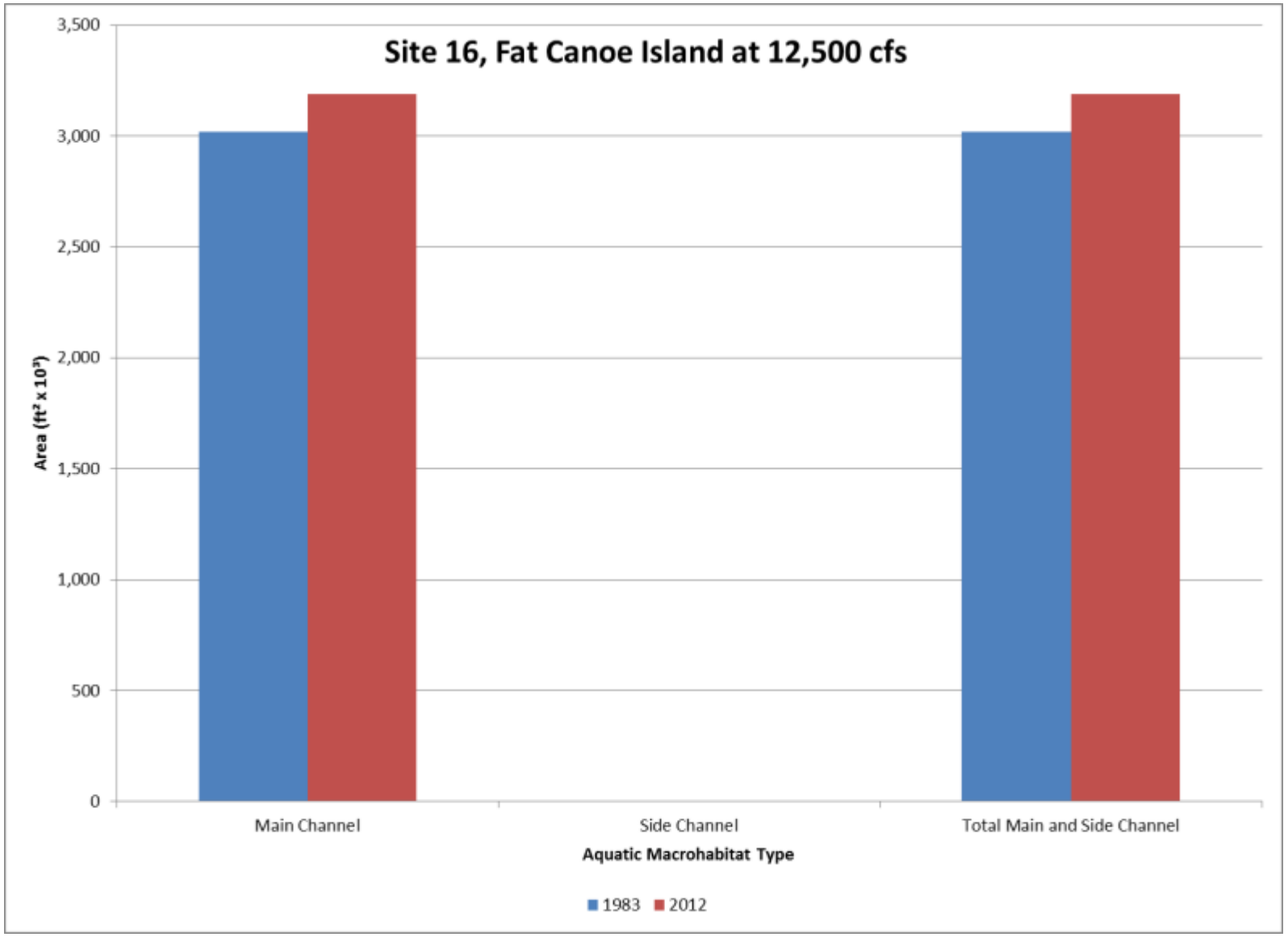

Figure 7-16. Comparison of main and side channel aquatic macrohabitat types from 1983 to 2012 at Fat Canoe Island.

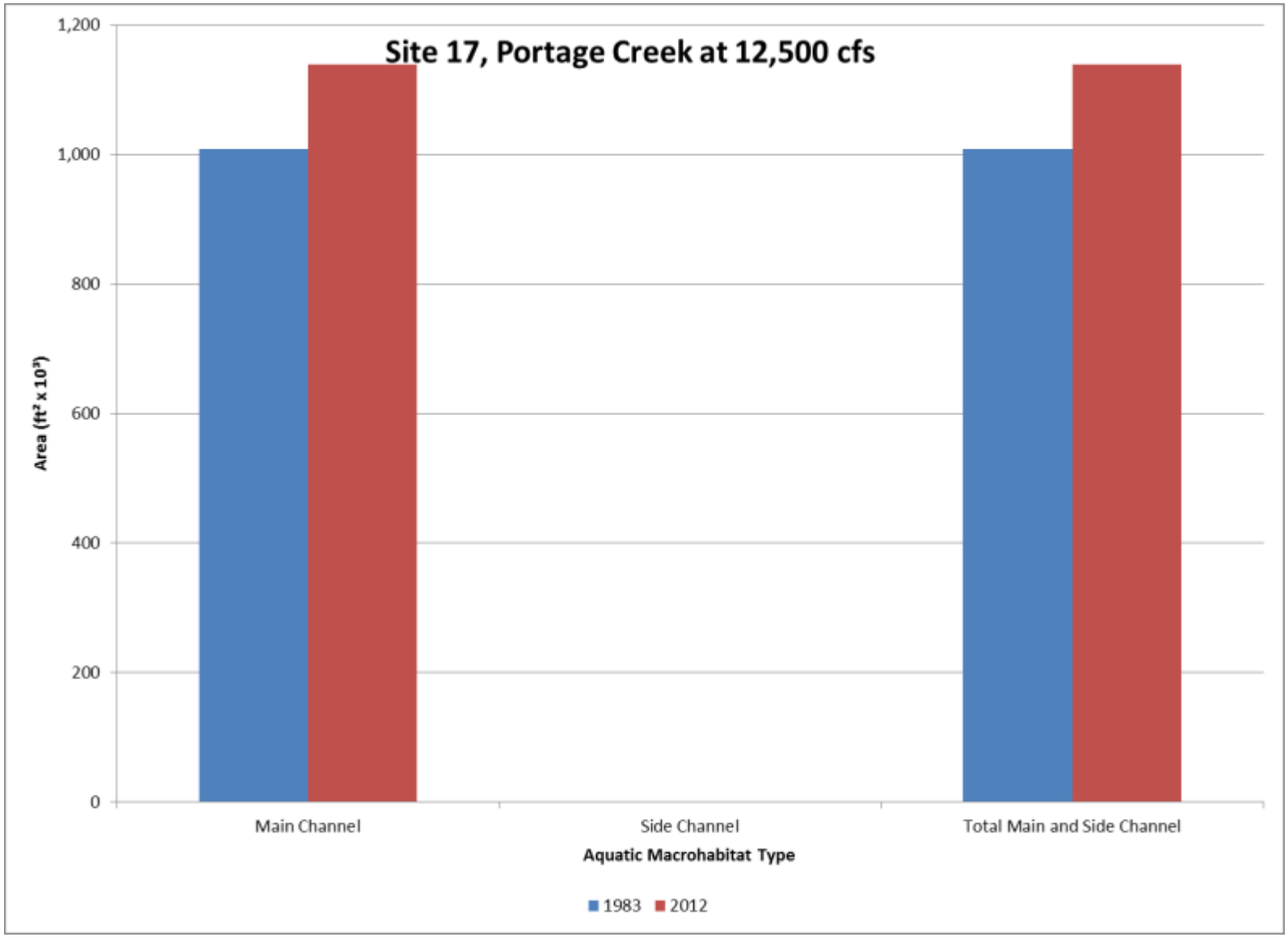

Figure 7-17. Comparison of main and side channel aquatic macrohabitat types from 1983 to 2012 at Portage Creek.

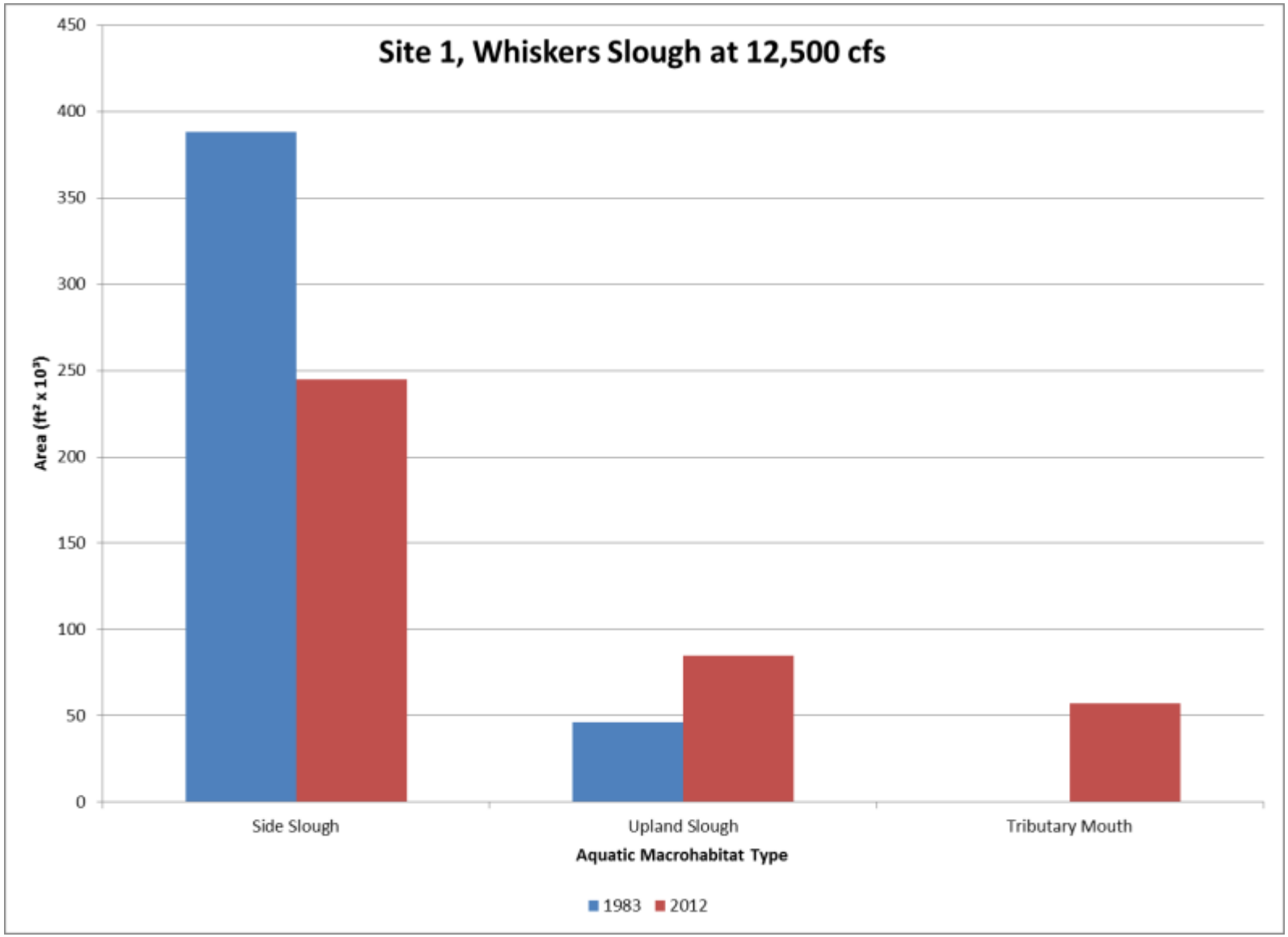

Figure 7-18. Comparison of side and upland slough and tributary mouth aquatic macrohabitat types from 1983 to 2012 at Whiskers Slough.

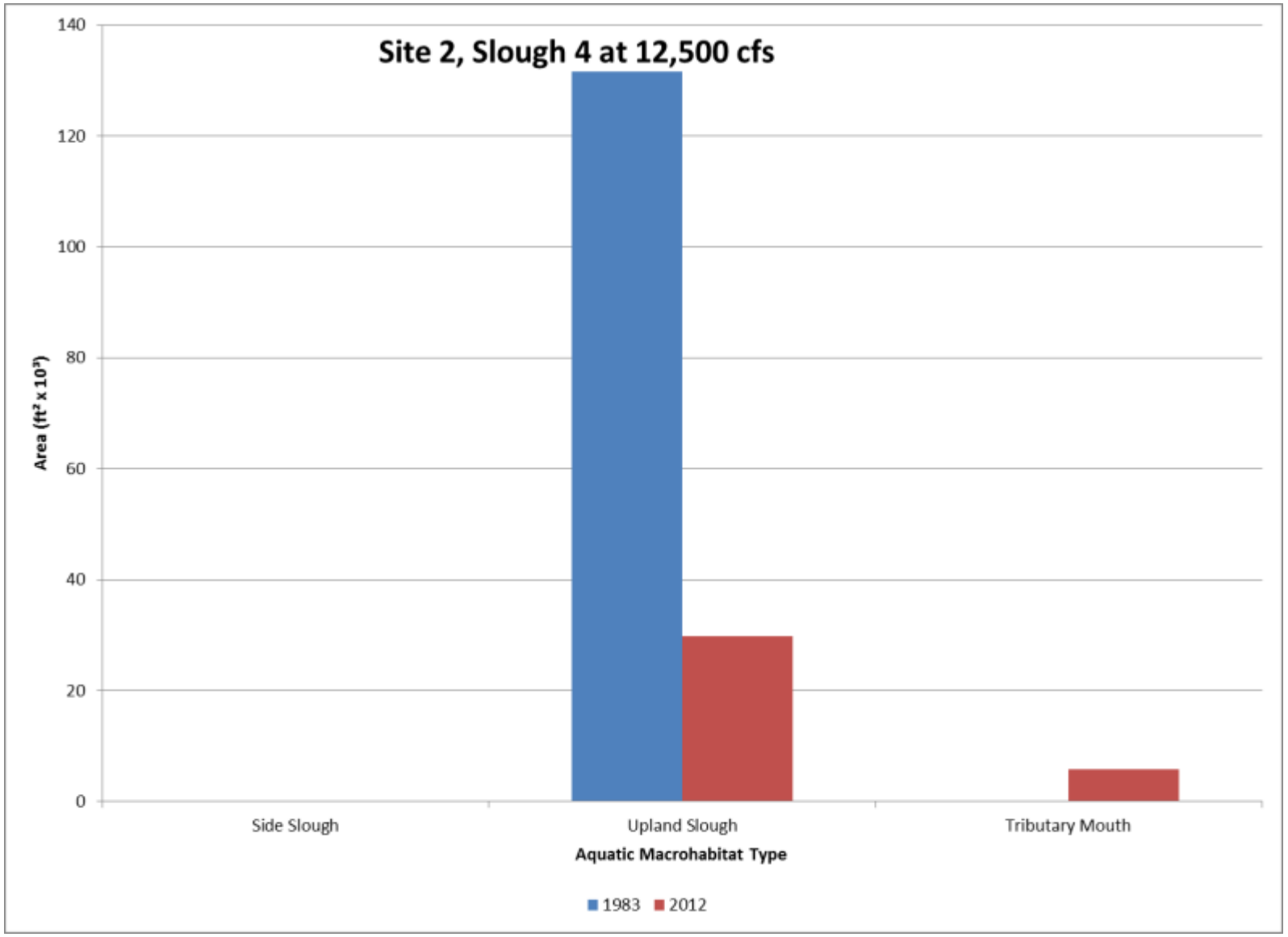

Figure 7-19. Comparison of side and upland slough and tributary mouth aquatic macrohabitat types from 1983 to 2012 at Slough 4.

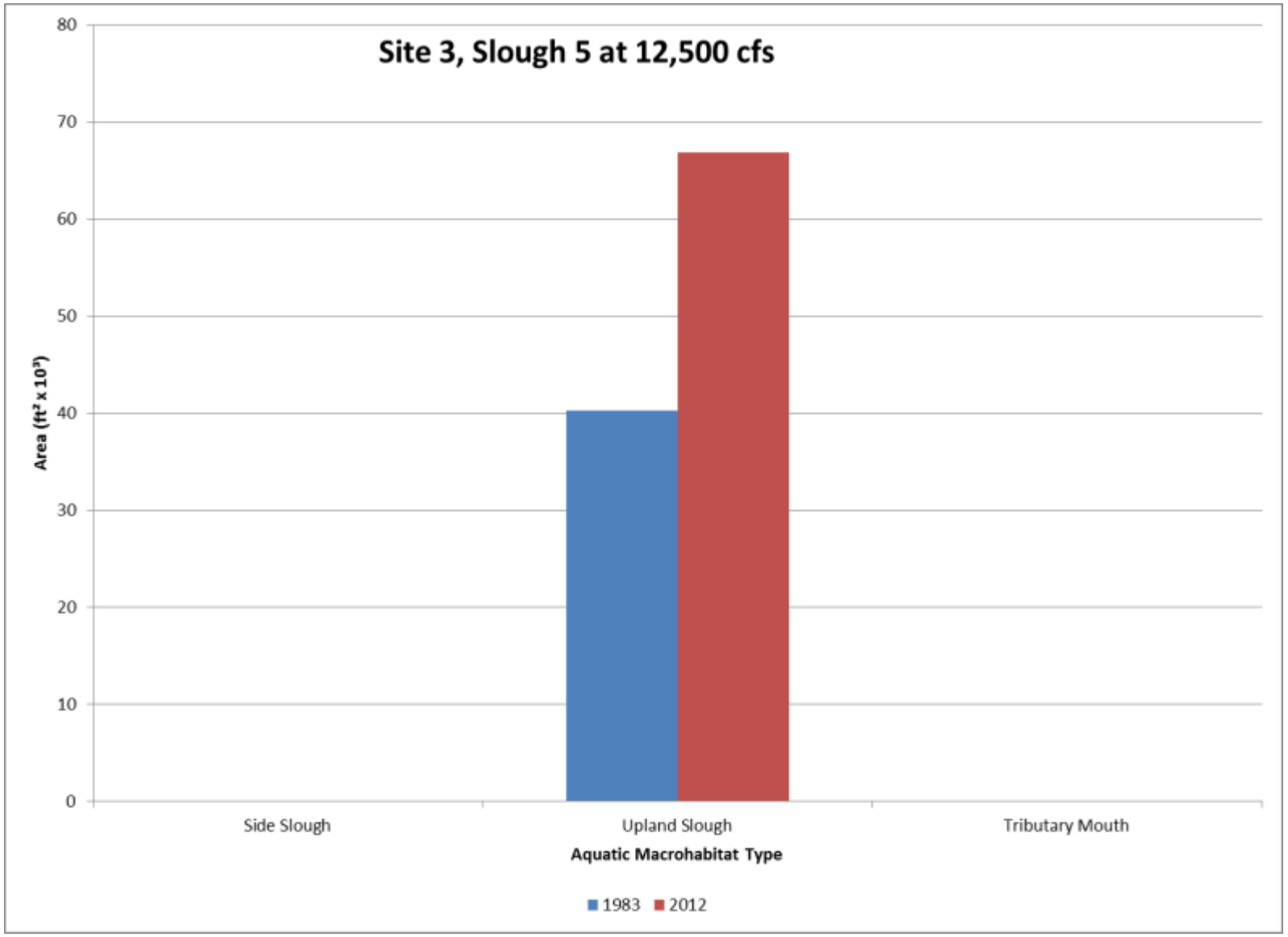

Figure 7-20. Comparison of side and upland slough and tributary mouth aquatic macrohabitat types from 1983 to 2012 at Slough 5.

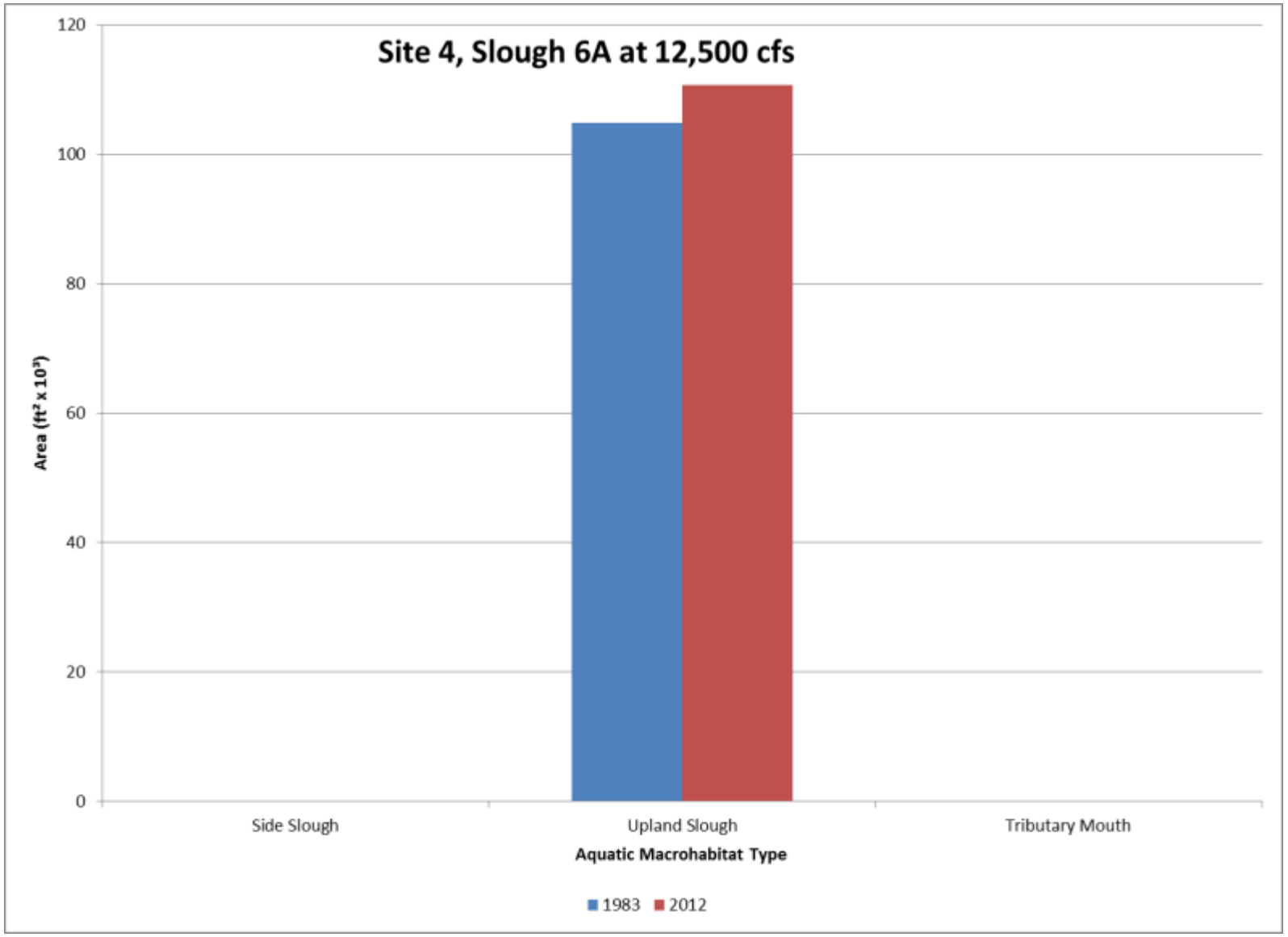

Figure 7-21. Comparison of side and upland slough and tributary mouth aquatic macrohabitat types from 1983 to 2012 at Slough 6A.

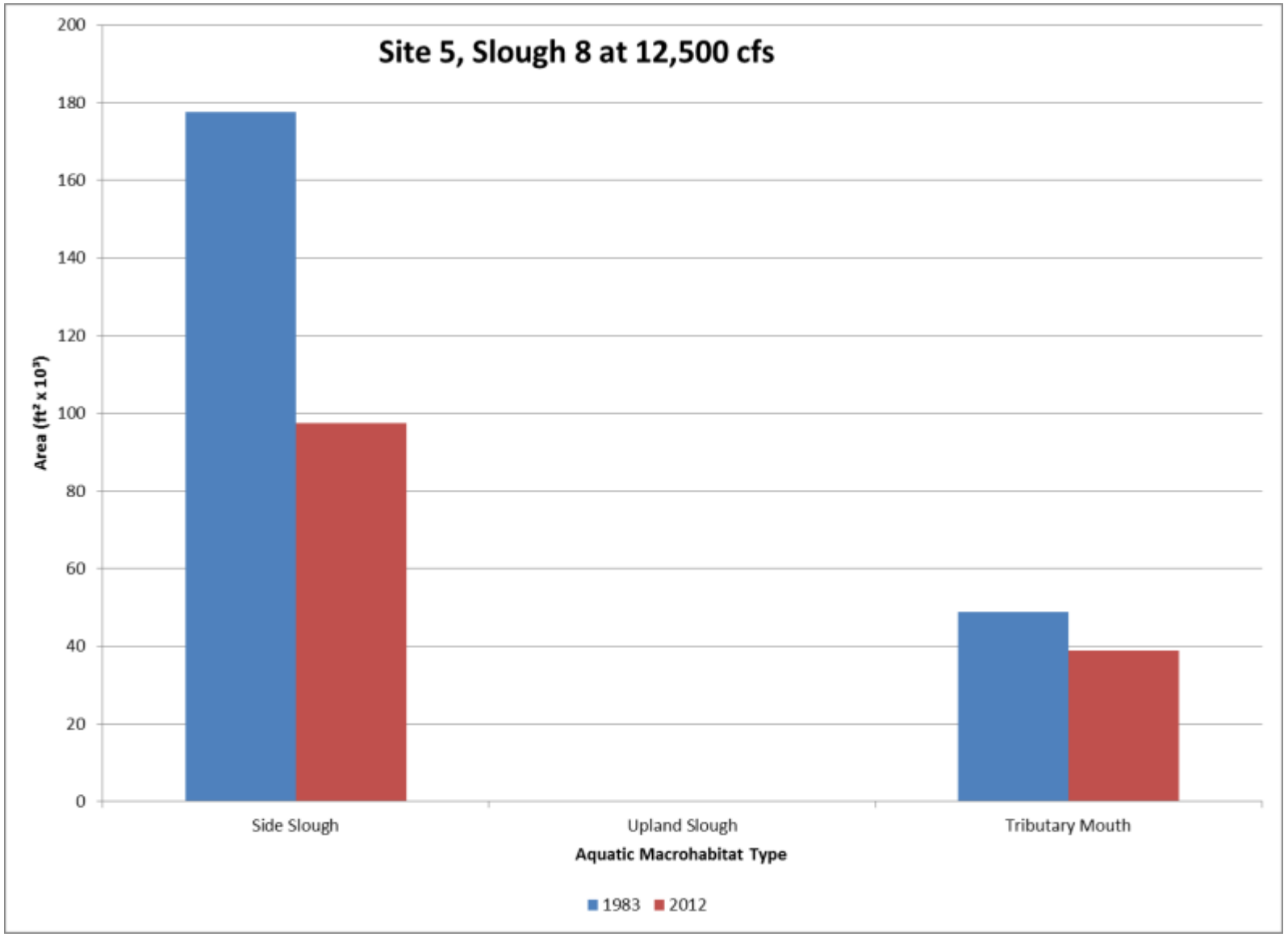

Figure 7-22. Comparison of side and upland slough and tributary mouth aquatic macrohabitat types from 1983 to 2012 at Slough 8.

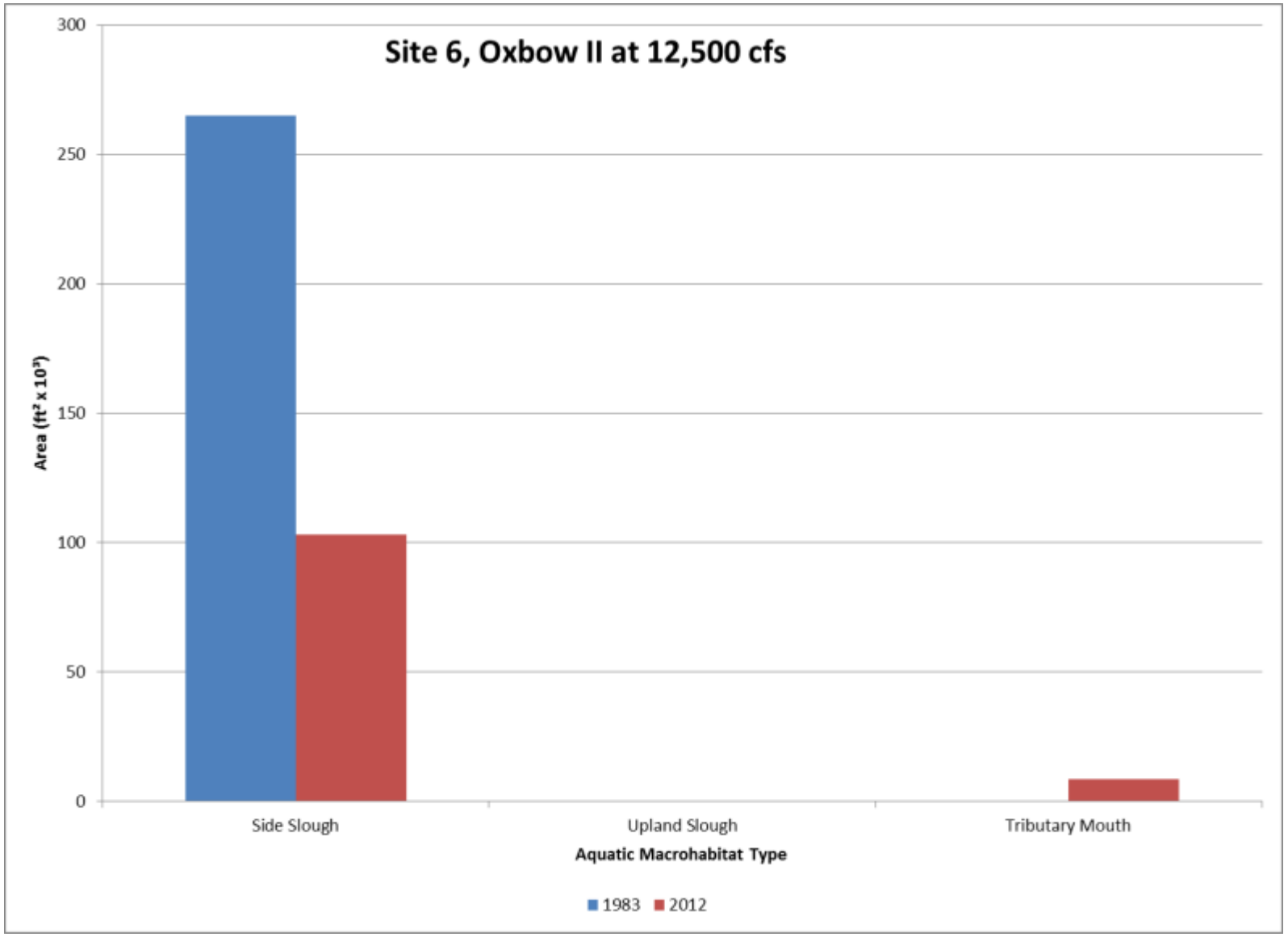

Figure 7-23. Comparison of side and upland slough and tributary mouth aquatic macrohabitat types from 1983 to 2012 at Oxbow II.

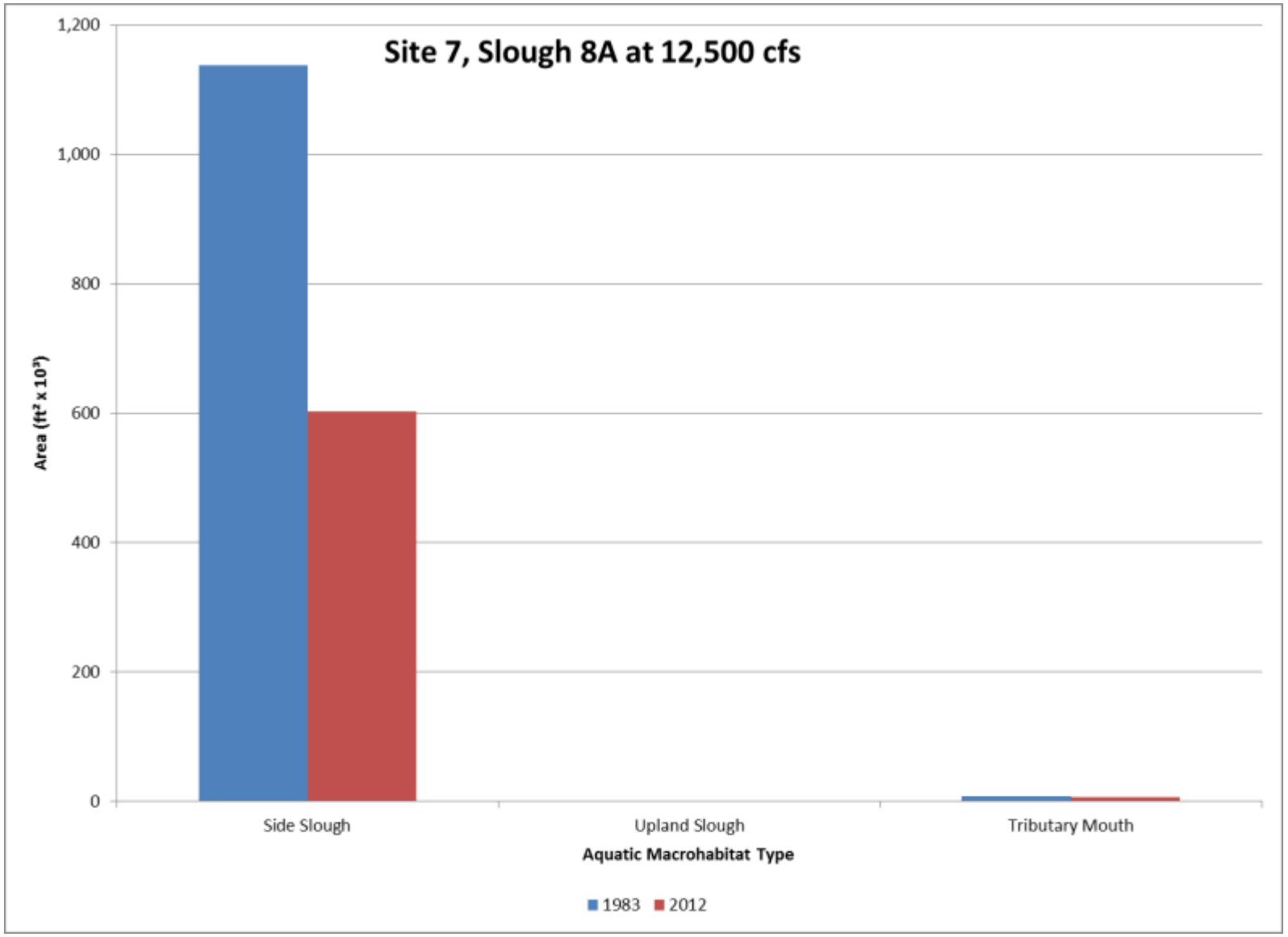

Figure 7-24. Comparison of side and upland slough and tributary mouth aquatic macrohabitat types from 1983 to 2012 at Slough 8A.

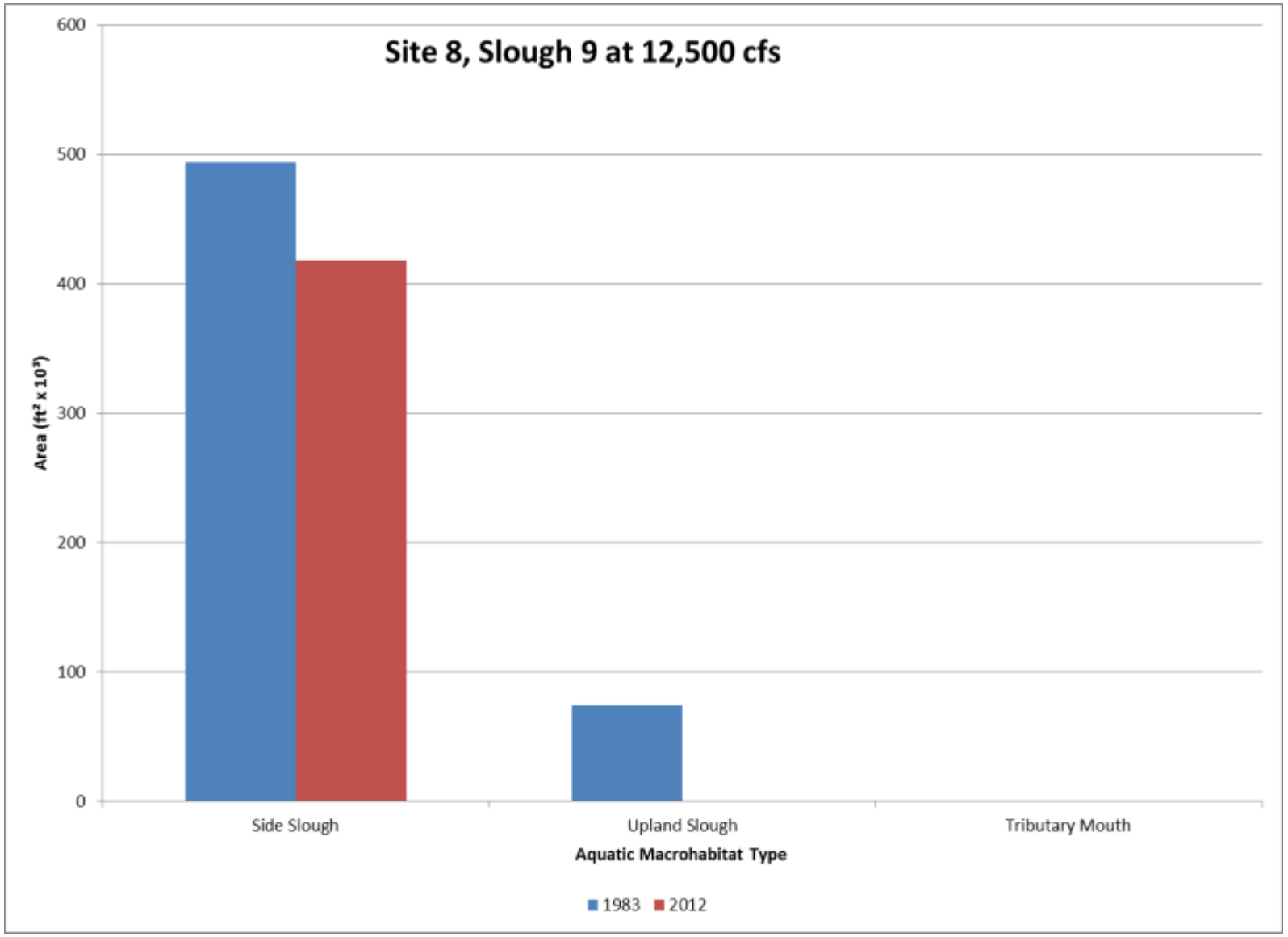

Figure 7-25. Comparison of side and upland slough and tributary mouth aquatic macrohabitat types from 1983 to 2012 at Slough 9.

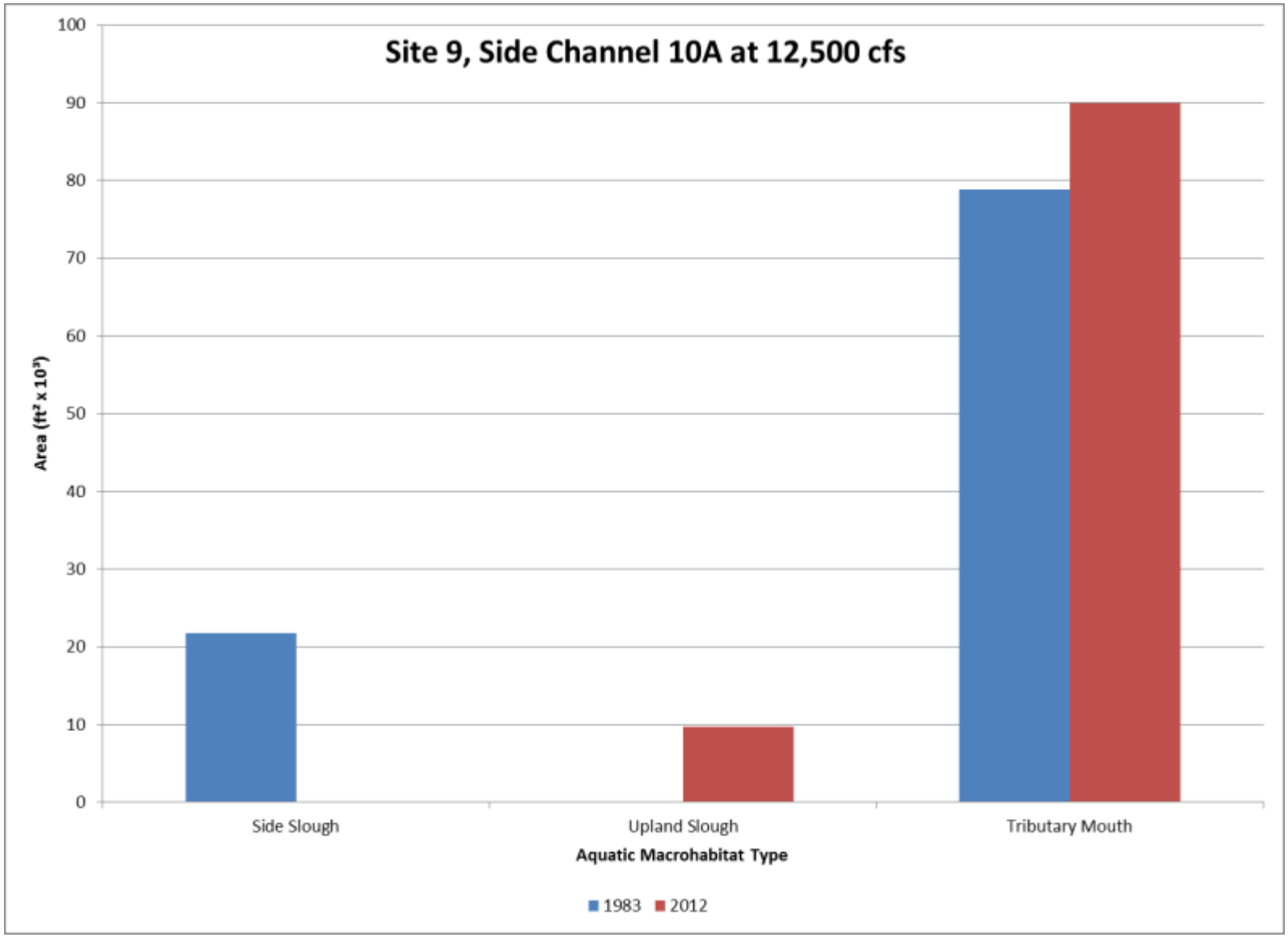

Figure 7-26. Comparison of side and upland slough and tributary mouth aquatic macrohabitat types from 1983 to 2012 at Side Channel 10A.

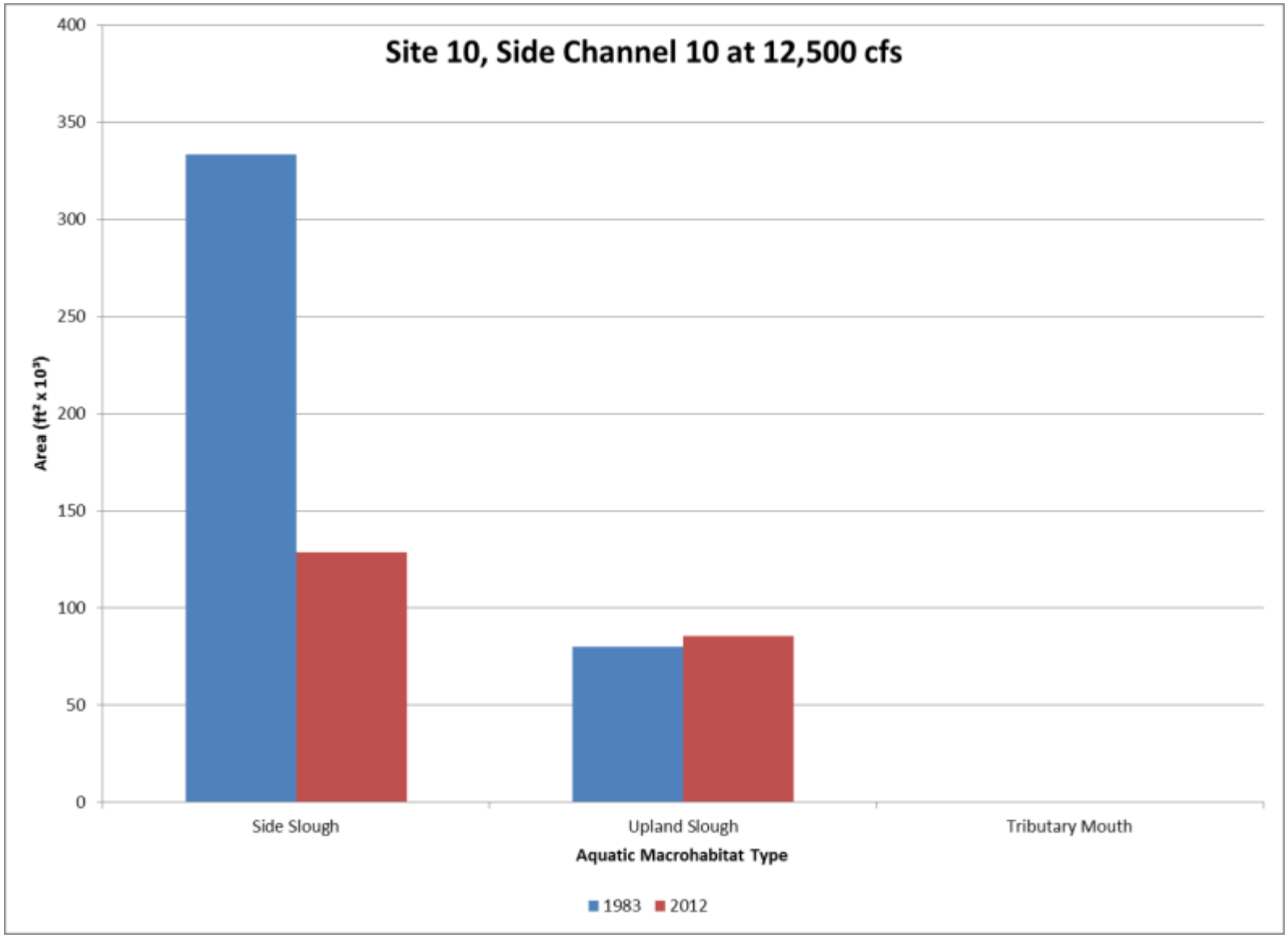

Figure 7-27. Comparison of side and upland slough and tributary mouth aquatic macrohabitat types from 1983 to 2012 at Side Channel 10.

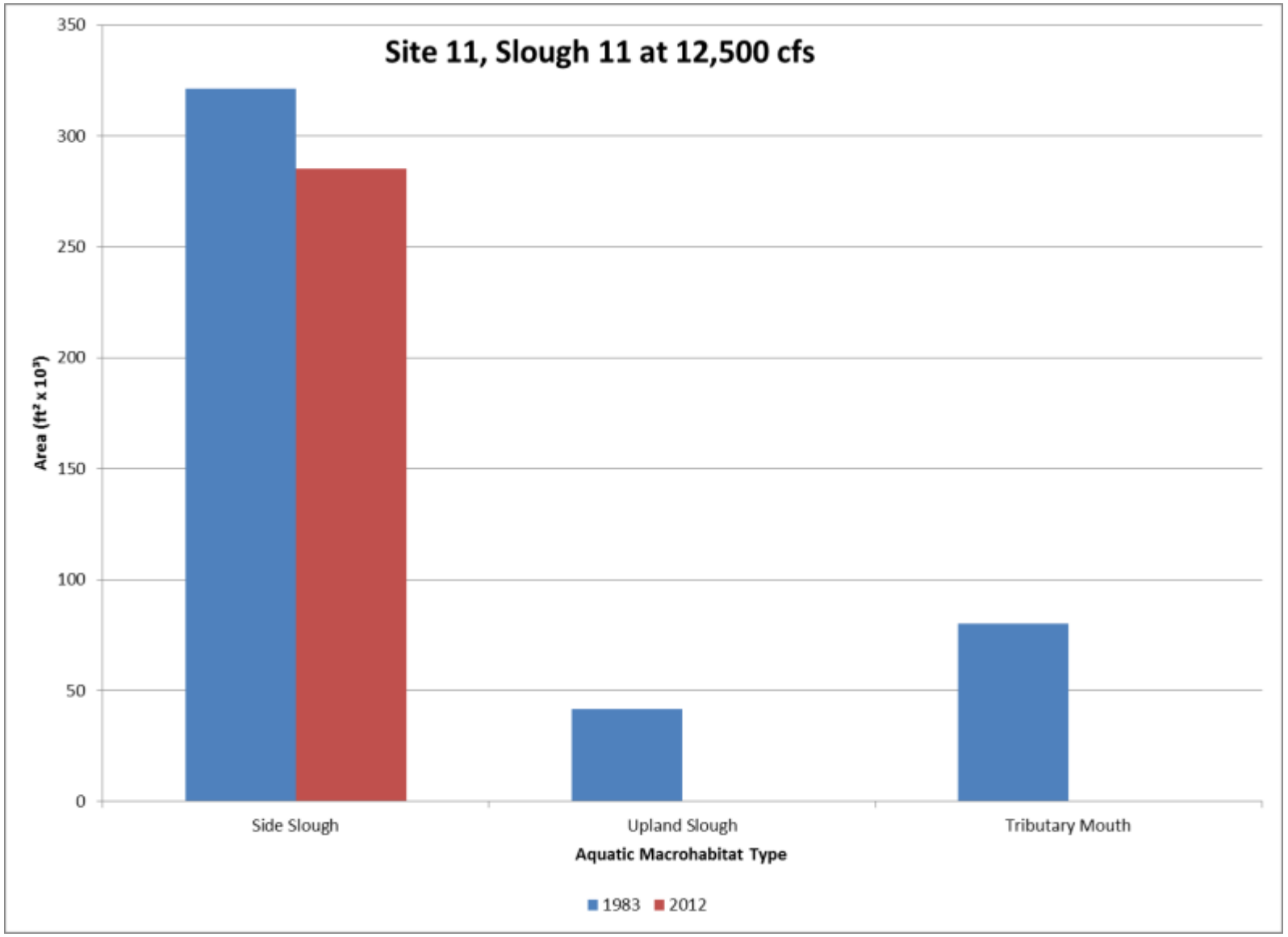

Figure 7-28. Comparison of side and upland slough and tributary mouth aquatic macrohabitat types from 1983 to 2012 at Slough 11.

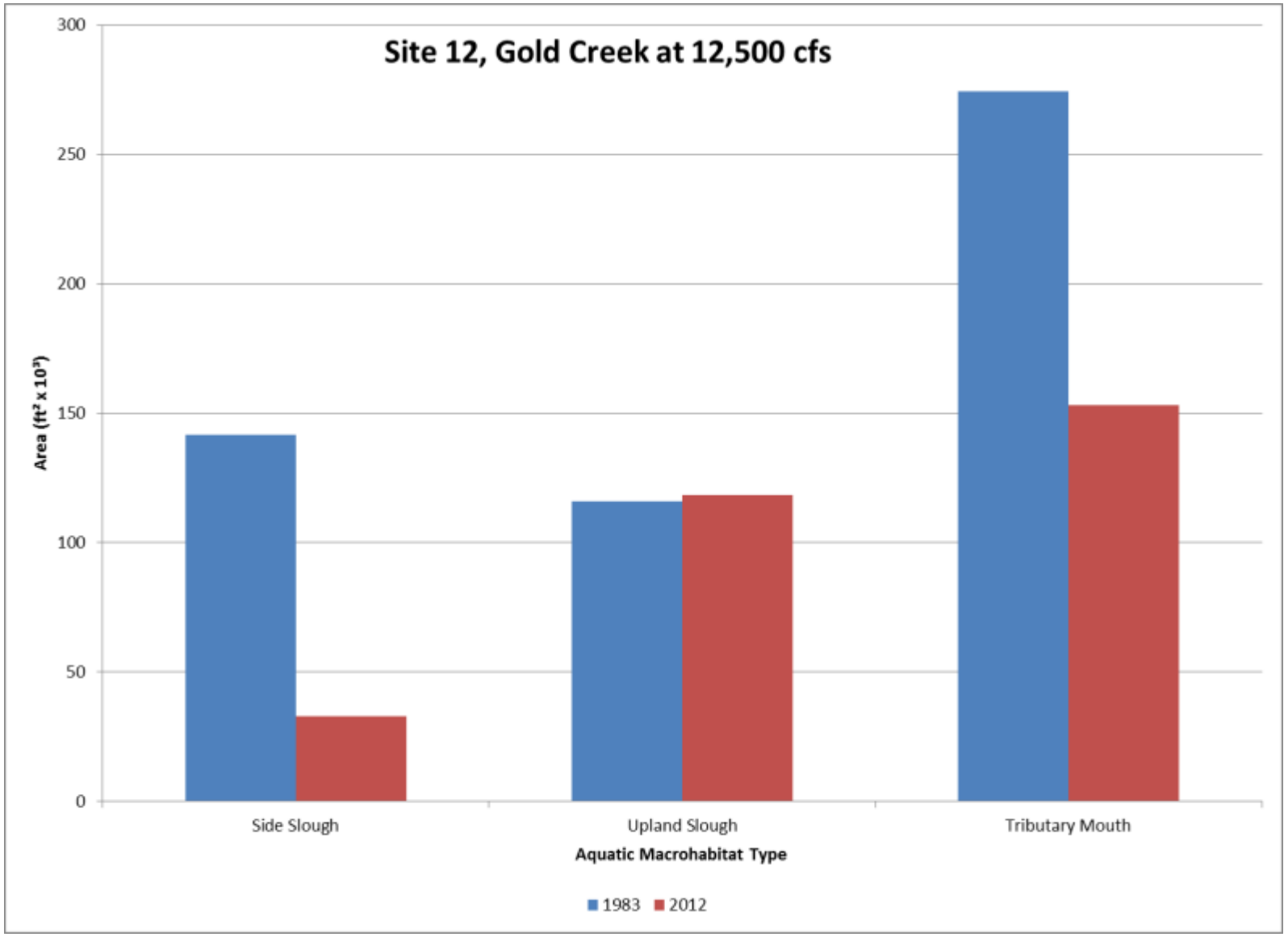

Figure 7-29. Comparison of side and upland slough and tributary mouth aquatic macrohabitat types from 1983 to 2012 at Gold Creek.

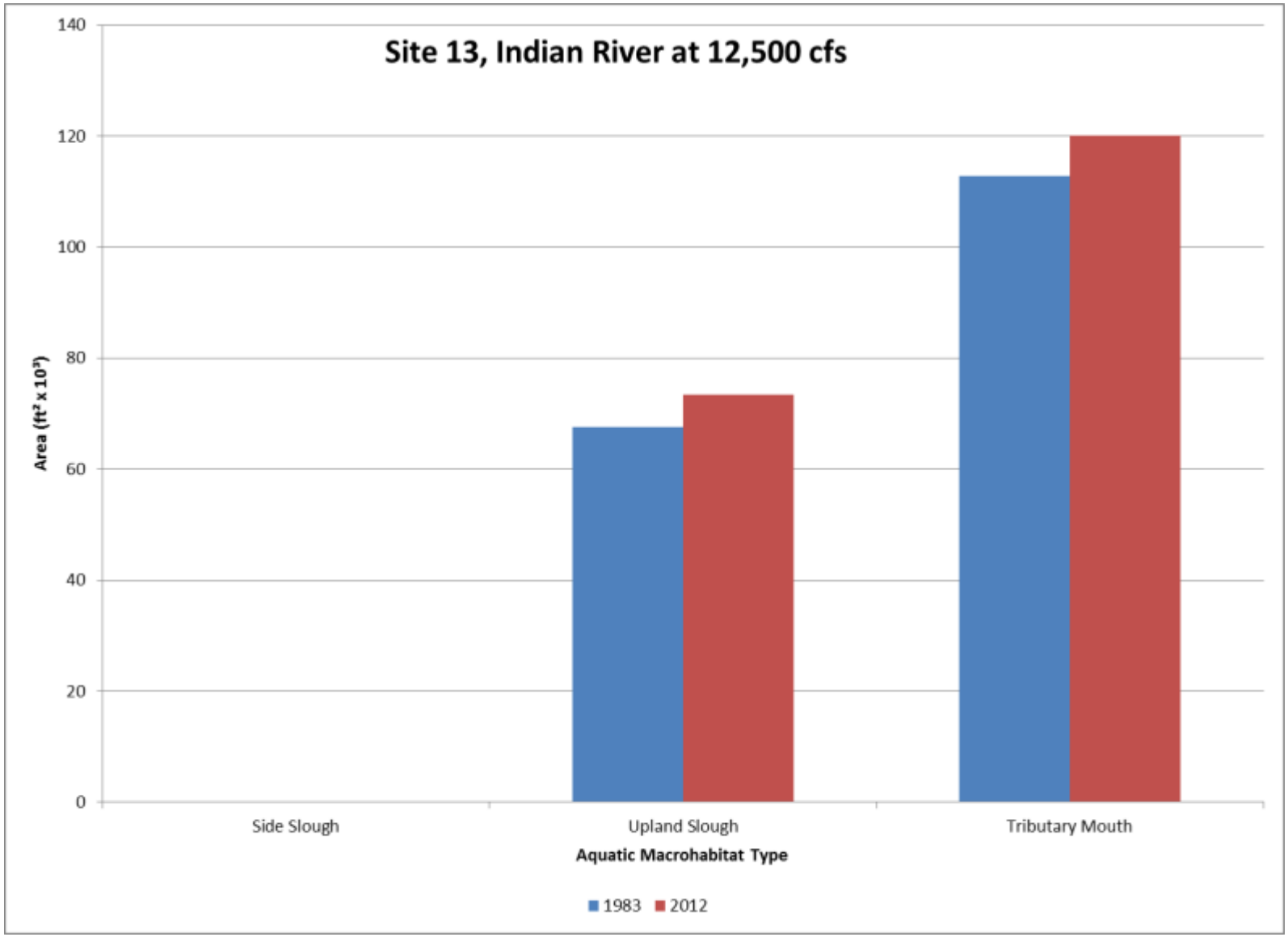

Figure 7-30. Comparison of side and upland slough and tributary mouth aquatic macrohabitat types from 1983 to 2012 at Indian River.

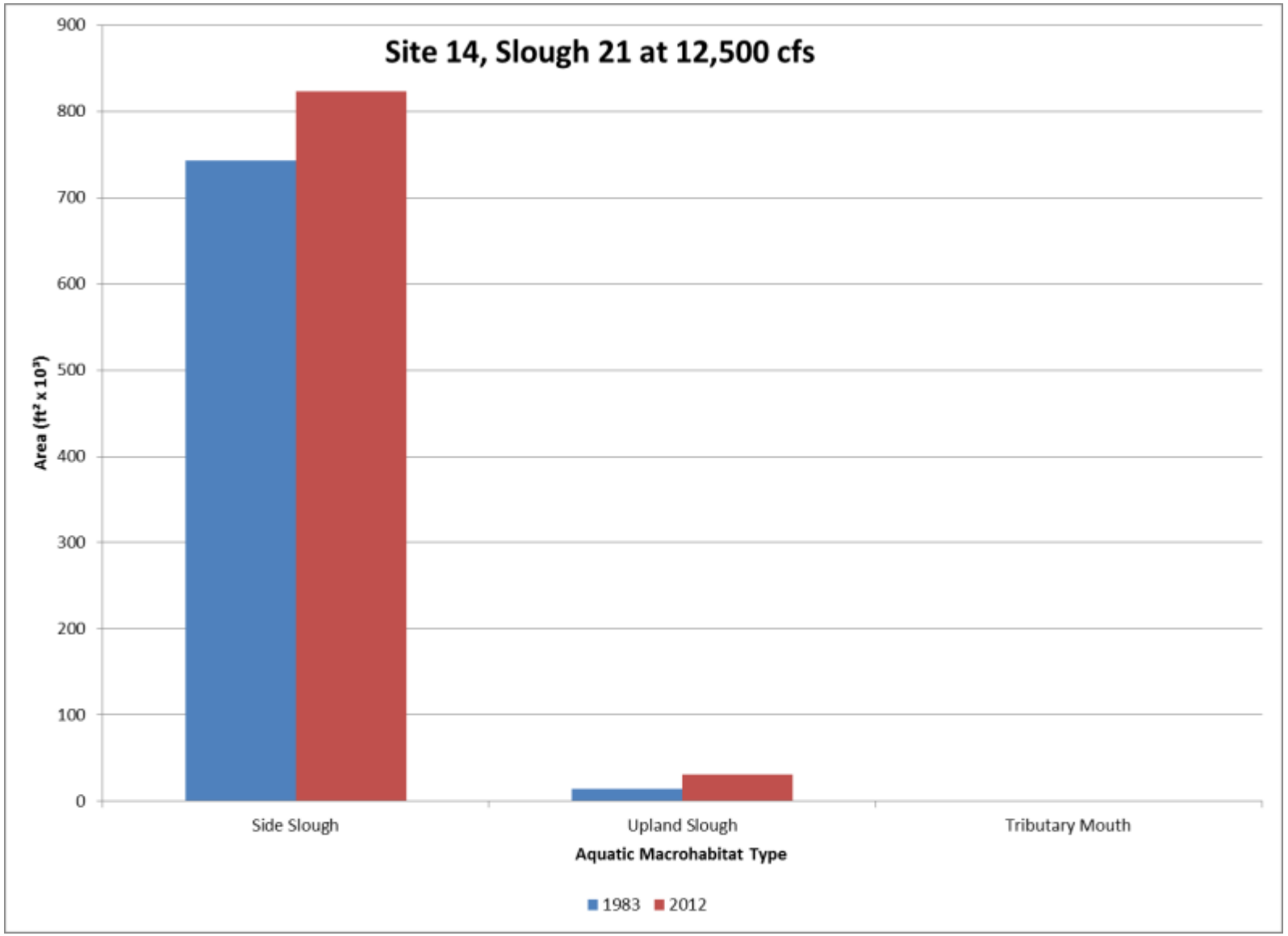

Figure 7-31. Comparison of side and upland slough and tributary mouth aquatic macrohabitat types from 1983 to 2012 at Slough 21.

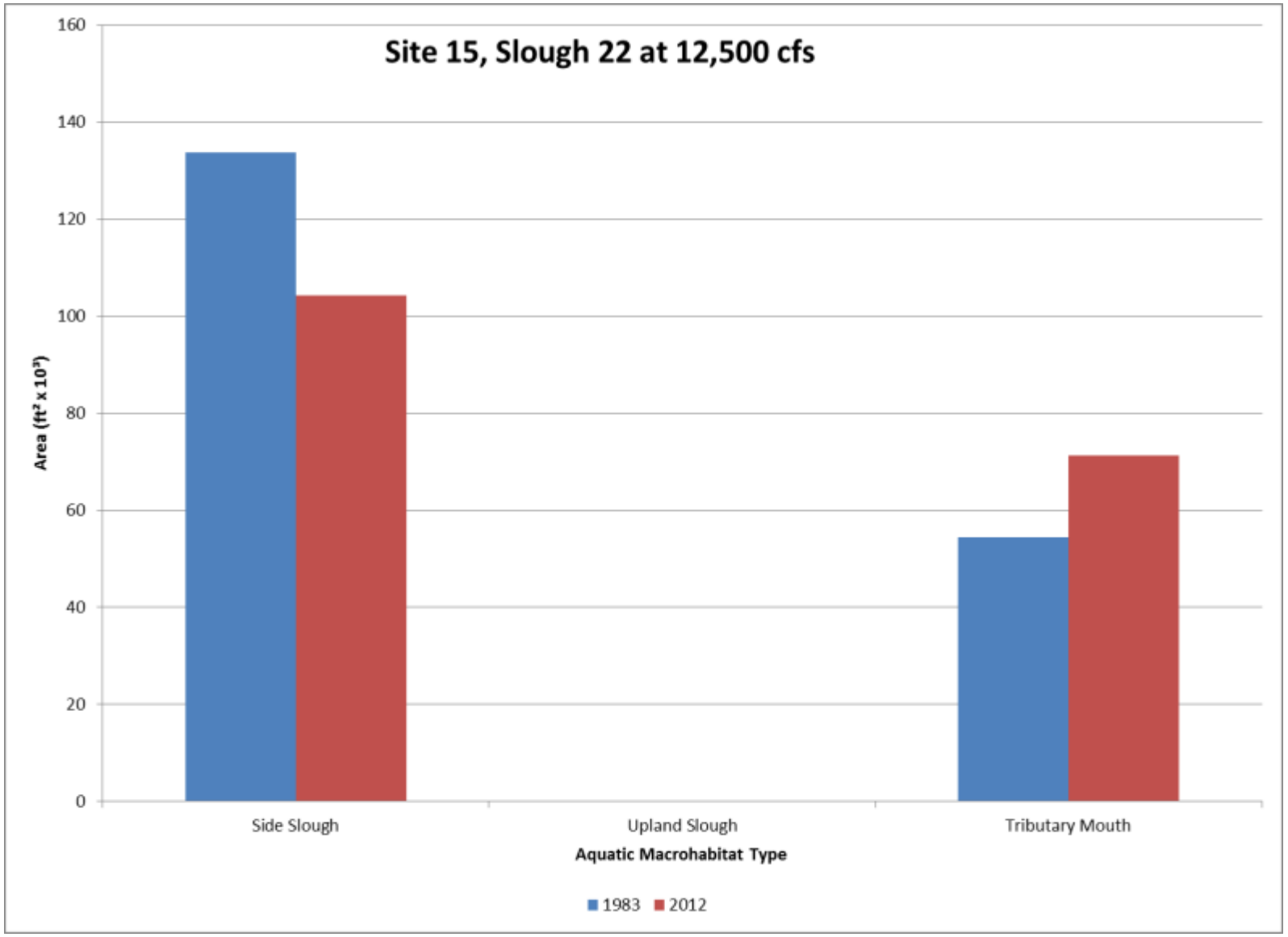

Figure 7-32. Comparison of side and upland slough and tributary mouth aquatic macrohabitat types from 1983 to 2012 at Slough 22.

Figure 7-33. Comparison of side and upland slough and tributary mouth aquatic macrohabitat types from 1983 to 2012 at Fat Canoe Island.

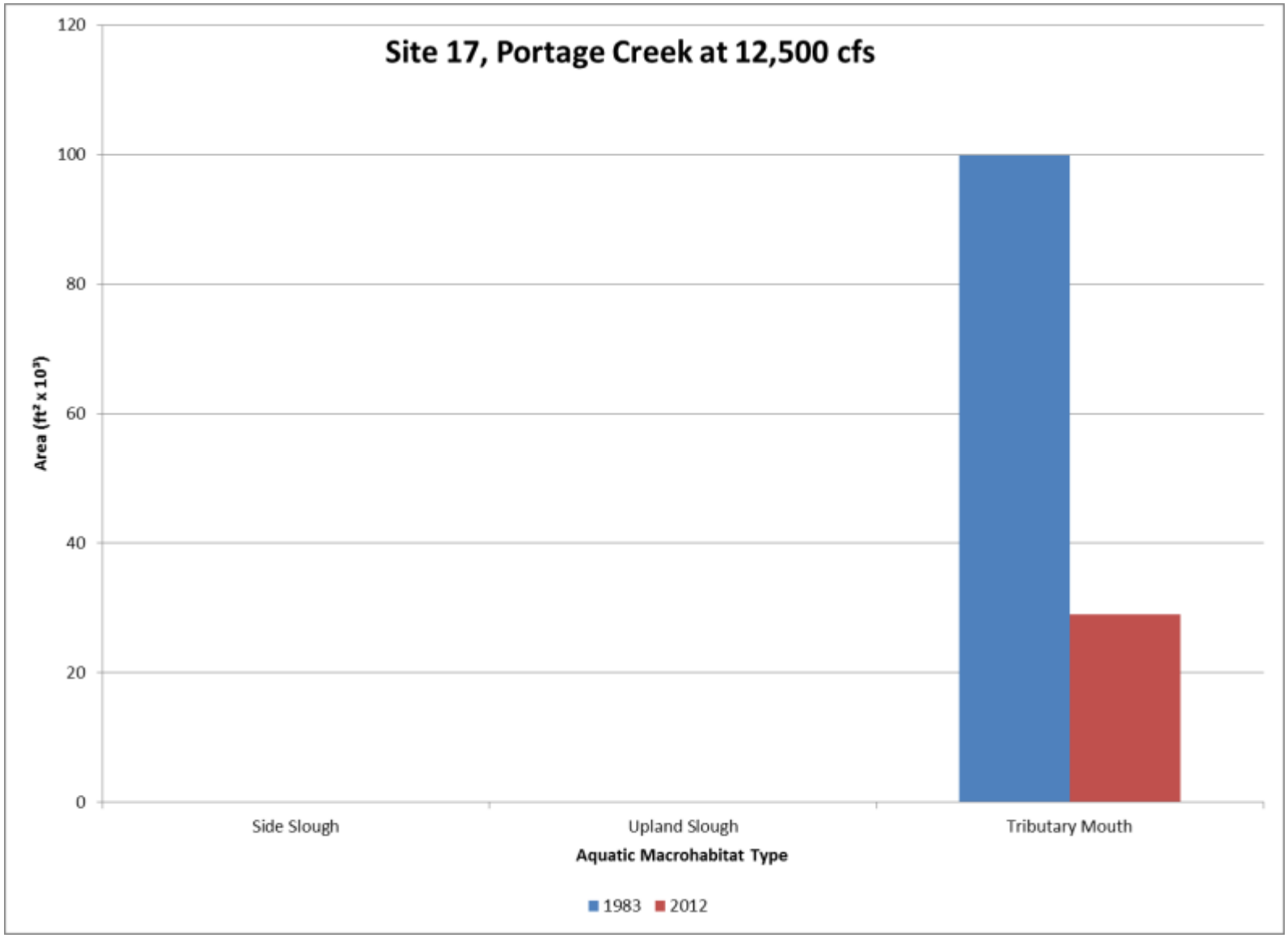

Figure 7-34. Comparison of Side andUpland Slough and Tributary Mouth aquatic macrohabitat types from 1983 to 2012 at Portage Creek.

APPENDIX 8. LOWER RIVER MACROHABITAT TYPE AREA BAR CHARTS

Susitna-Watana Hydroelectric Project (FERC No. 14241)

Mapping of Aquatic Macrohabitat Types at Selected Sites in the Middle and Lower Susitna River Segments from 1980s and 2012 Aerials

2012 Study Technical Memorandum

Prepared for
Alaska Energy Authority

Prepared by
Tetra Tech Inc.

February 2013

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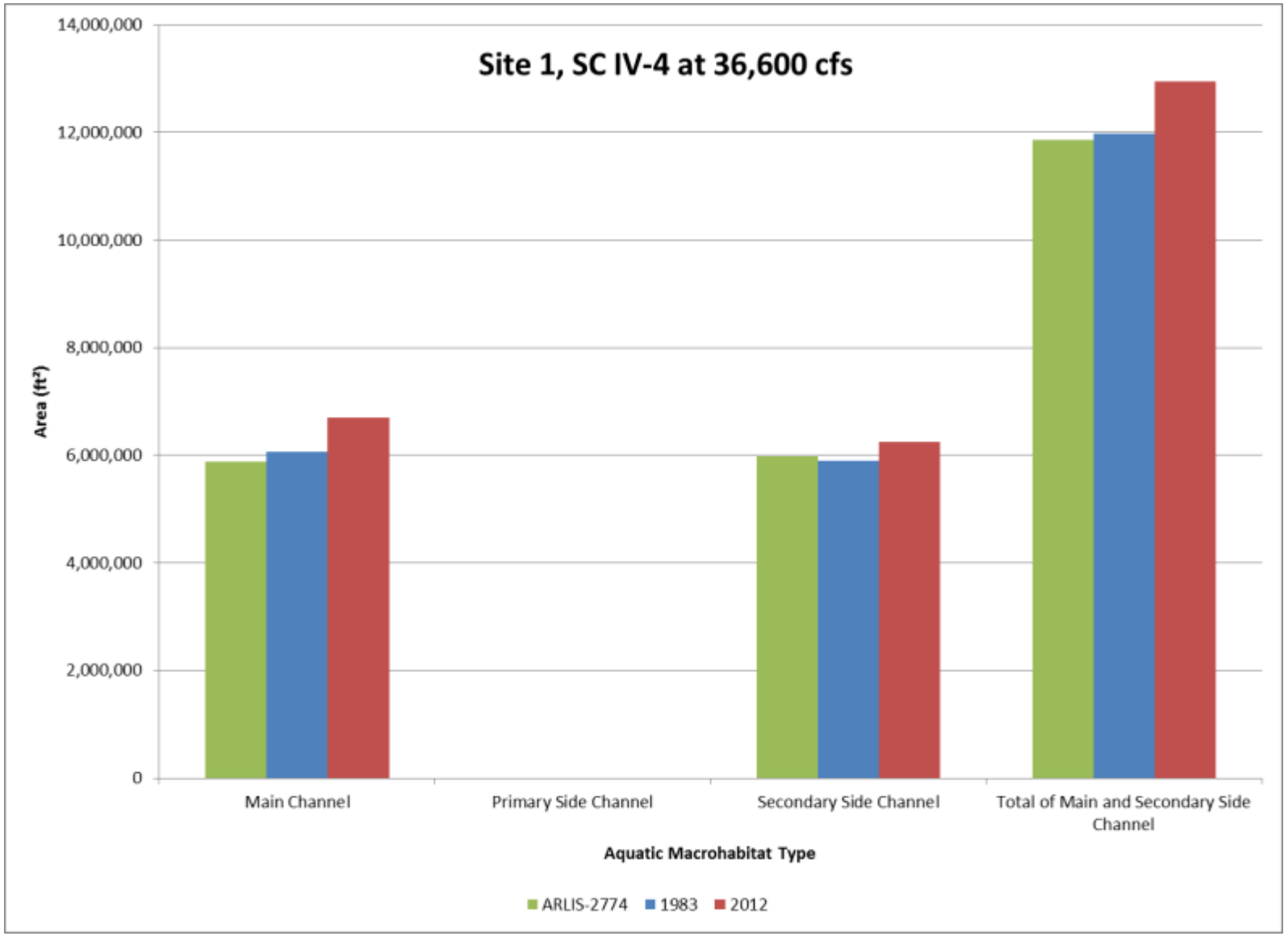

Figure 8-1. Comparison of aquatic macrohabitat types from 1983 to 2012 at SC IV-4.

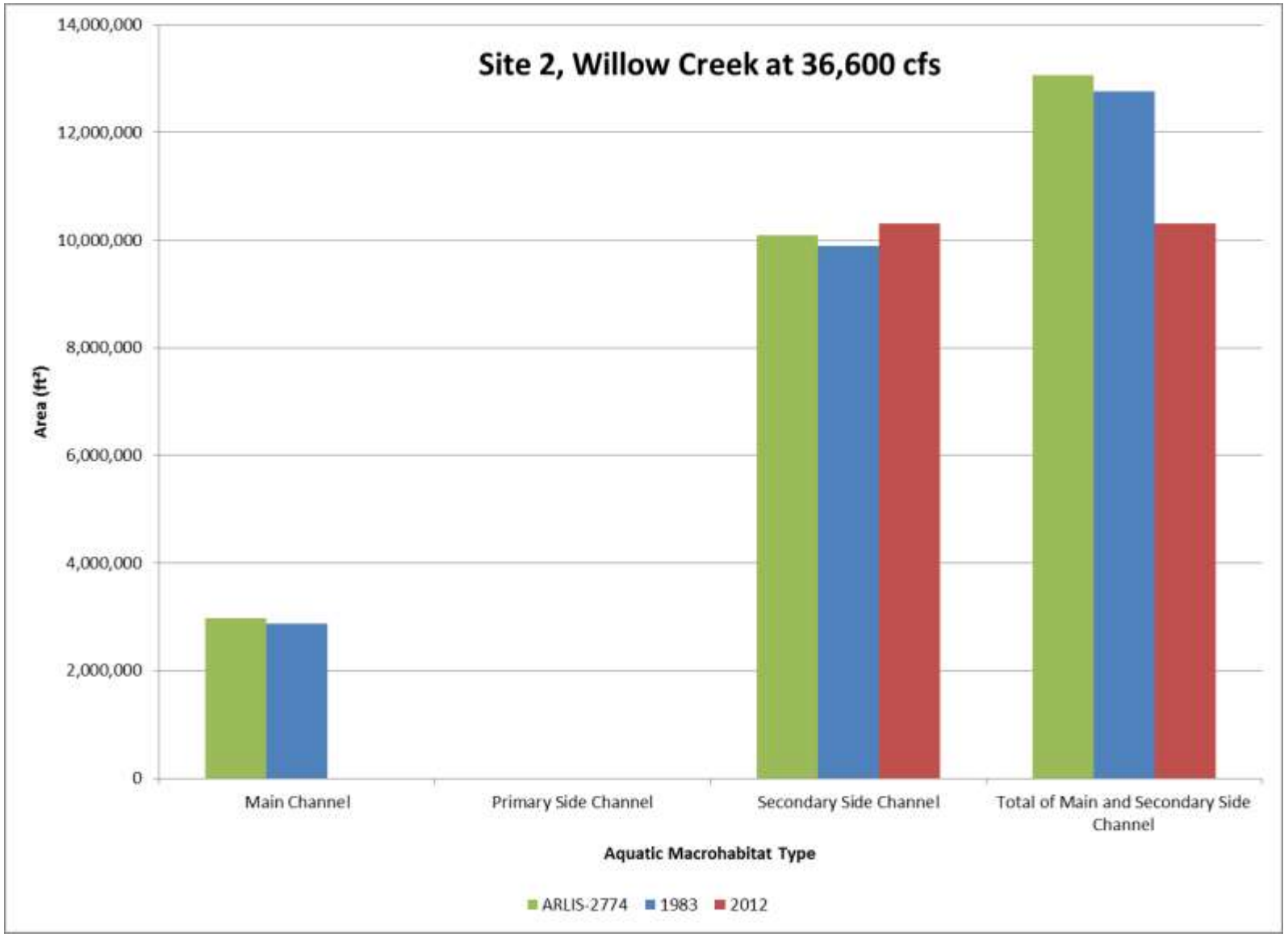

Figure 8-2. Comparison of aquatic macrohabitat types from 1983 to 2012 at Willow Creek.

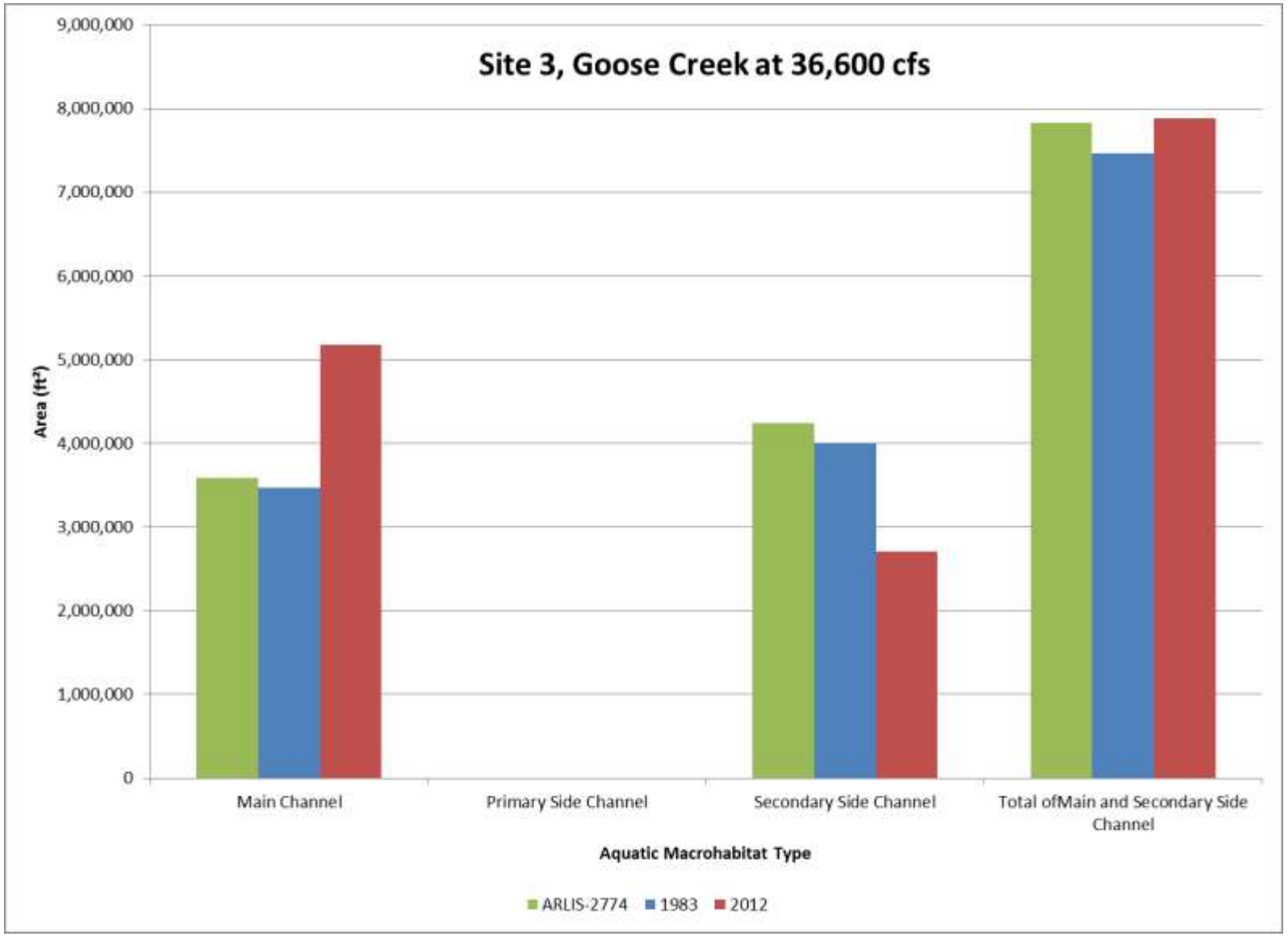

Figure 8-3. Comparison of aquatic macrohabitat types from 1983 to 2012 at Goose Creek.

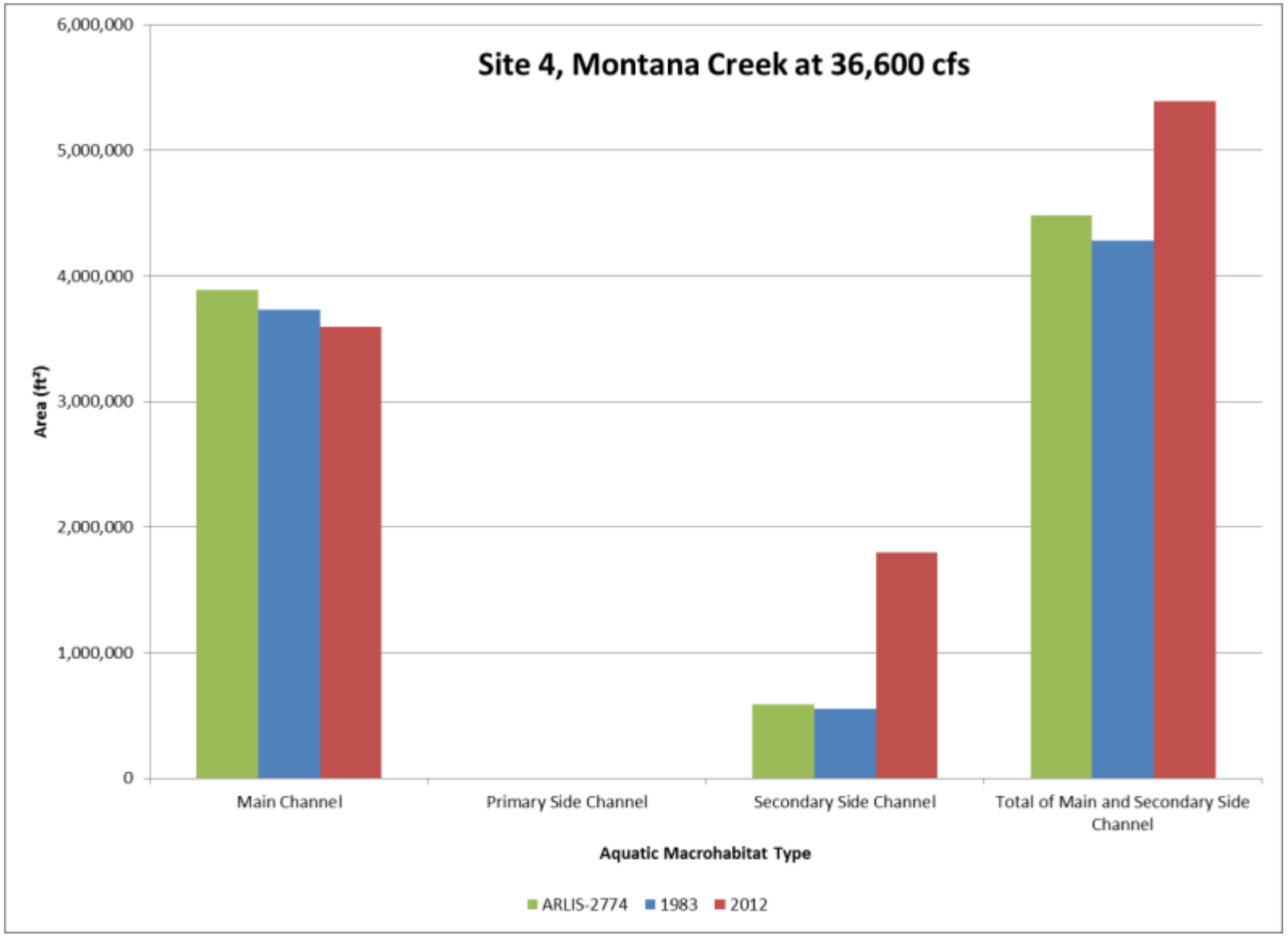

Figure 8-4. Comparison of aquatic macrohabitat types from 1983 to 2012 at Montana Creek.

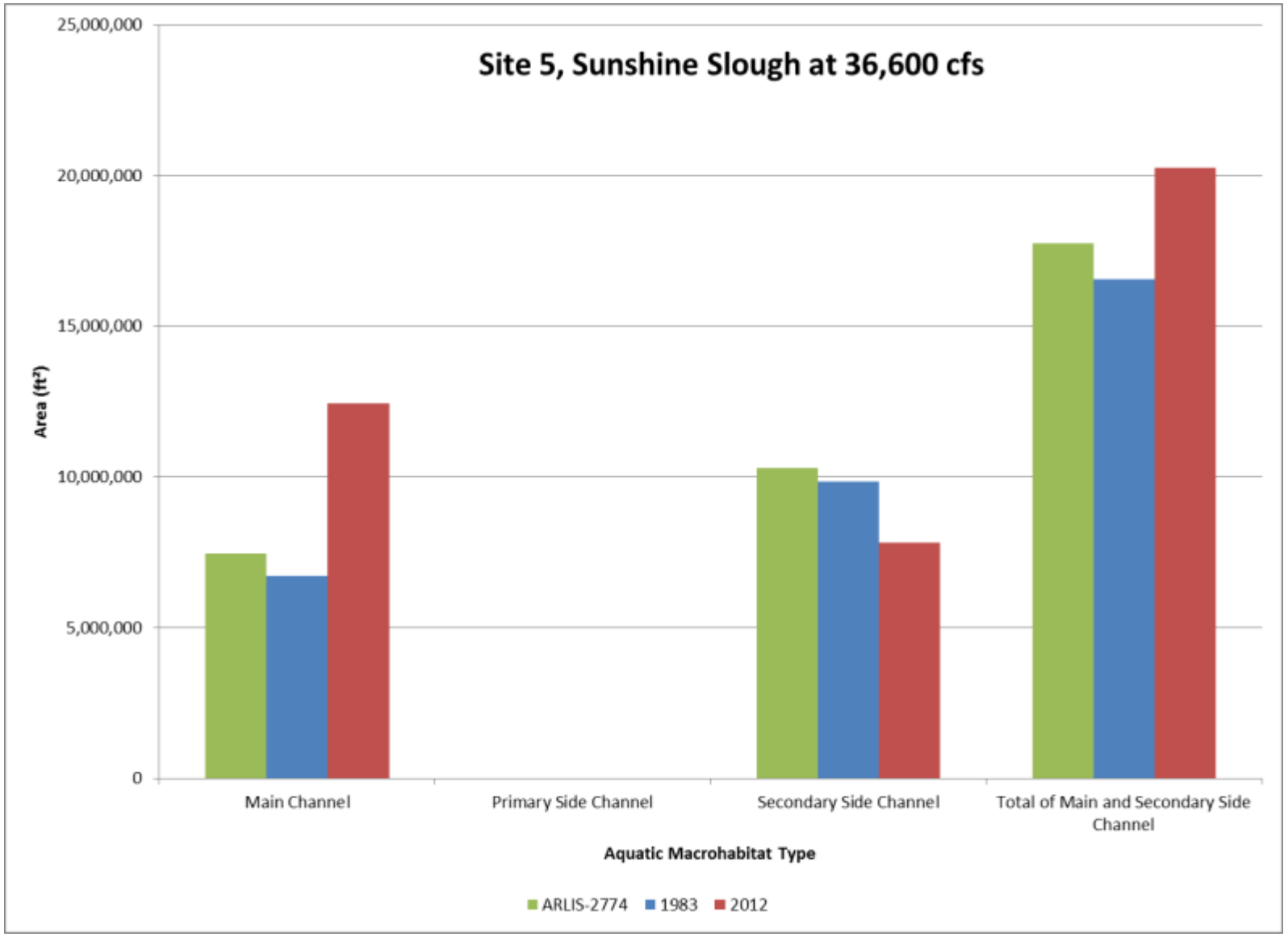

Figure 8-5. Comparison of aquatic macrohabitat types from 1983 to 2012 at Sunshine Slough.

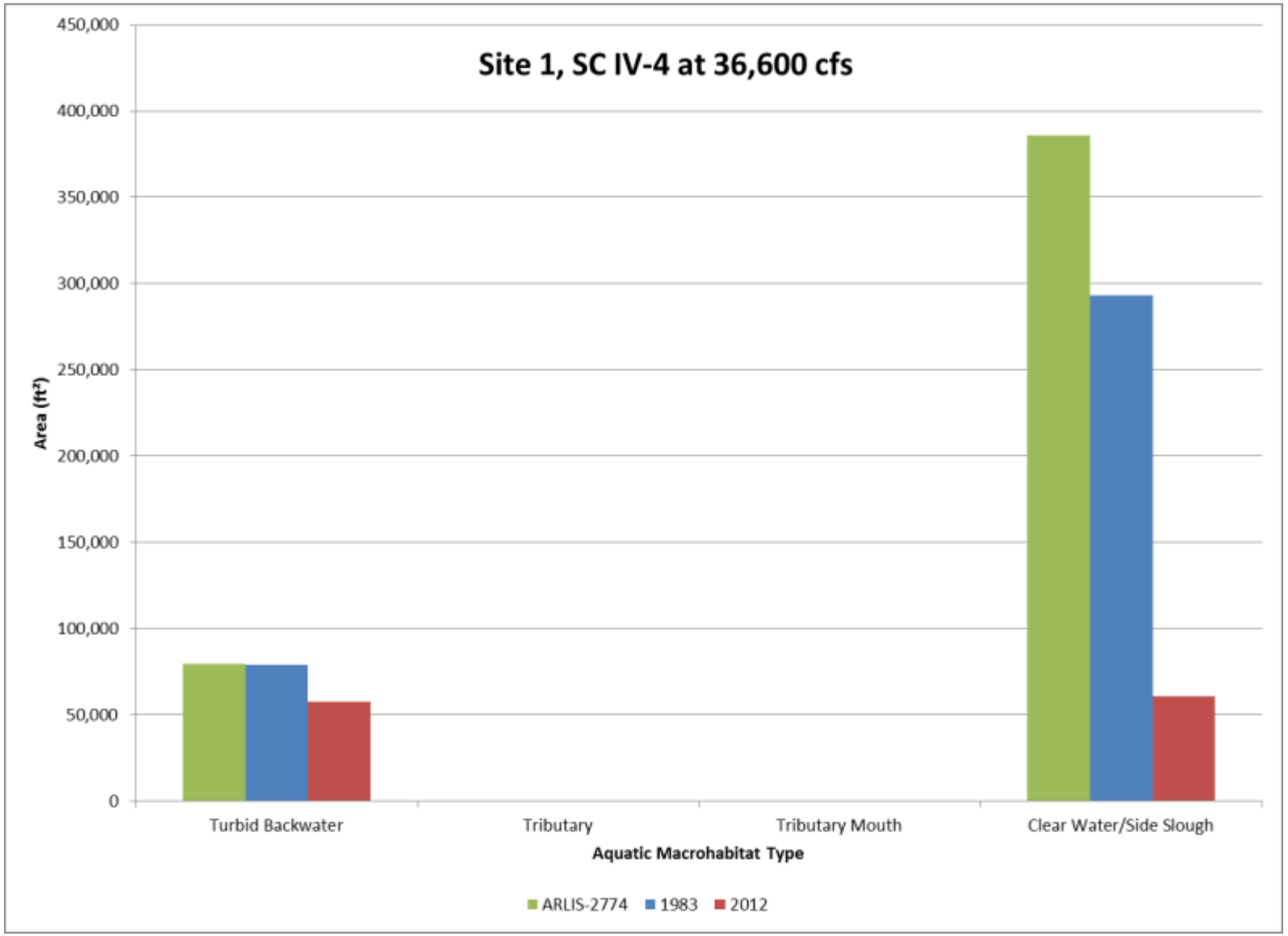

Figure 8-6. Comparison of aquatic macrohabitat types from 1983 to 2012 at SC IV-4.

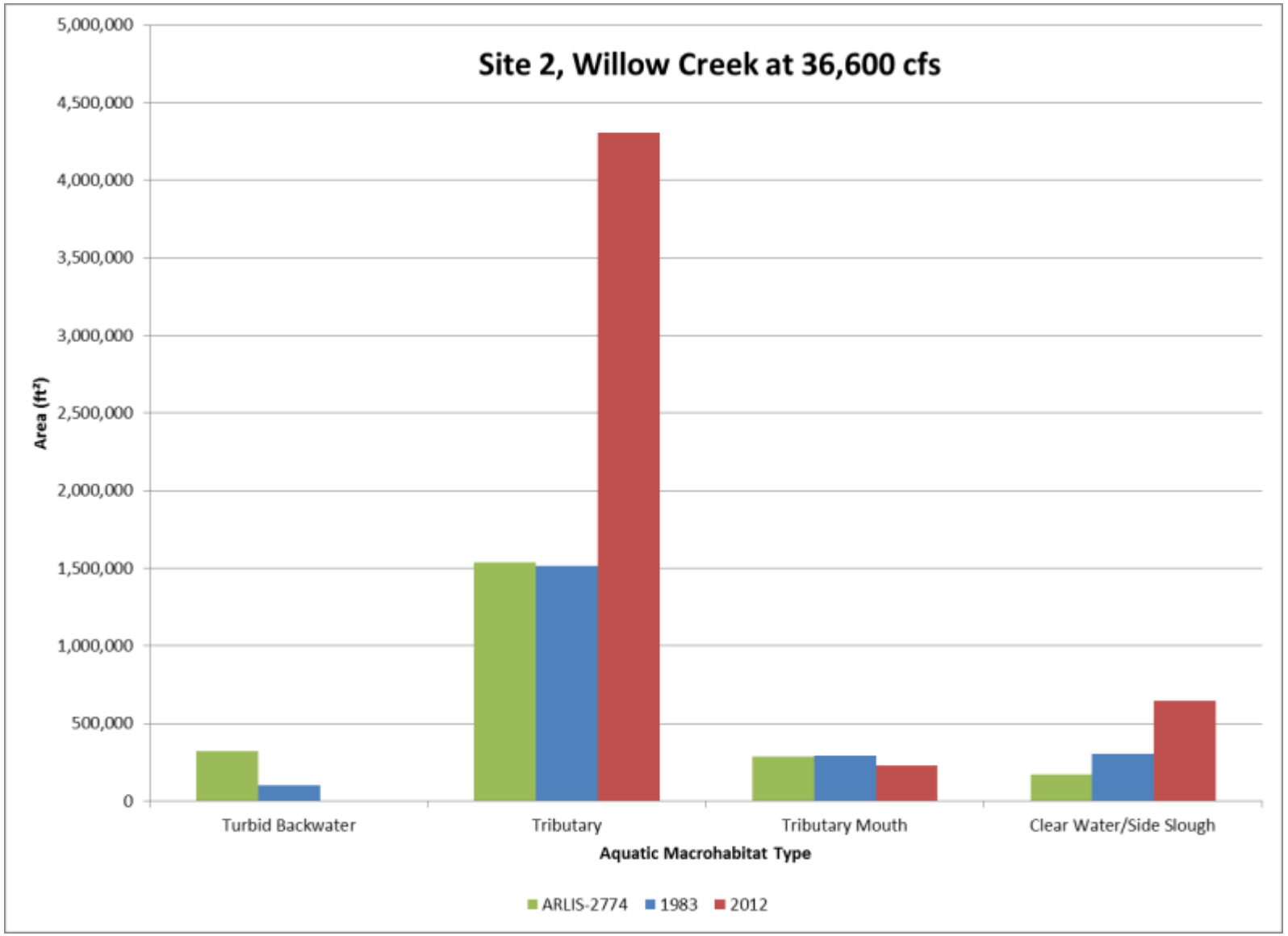

Figure 8-7. Comparison of aquatic macrohabitat types from 1983 to 2012 at Willow Creek.

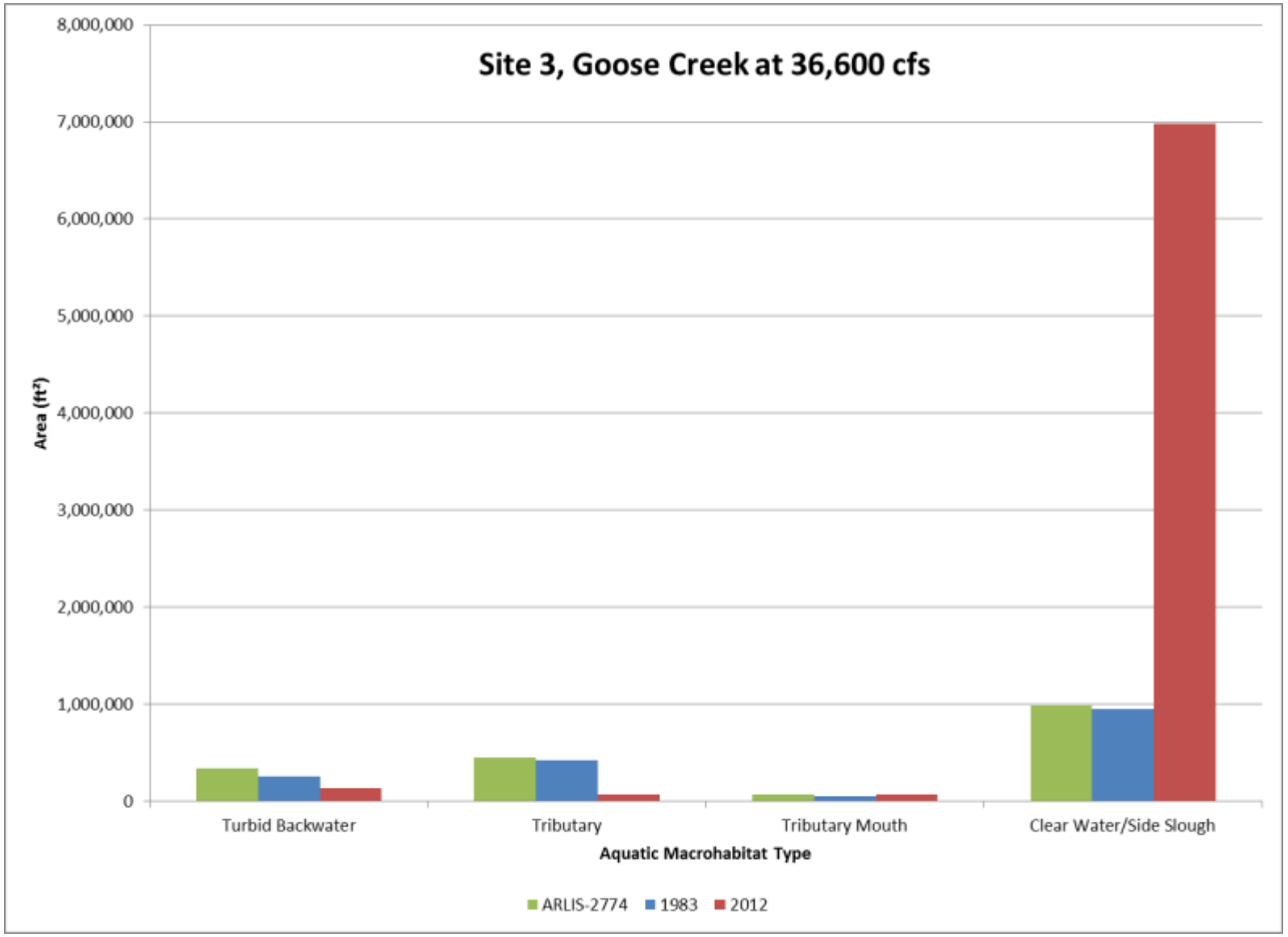

Figure 8-8. Comparison of aquatic macrohabitat types from 1983 to 2012 at Goose Creek.

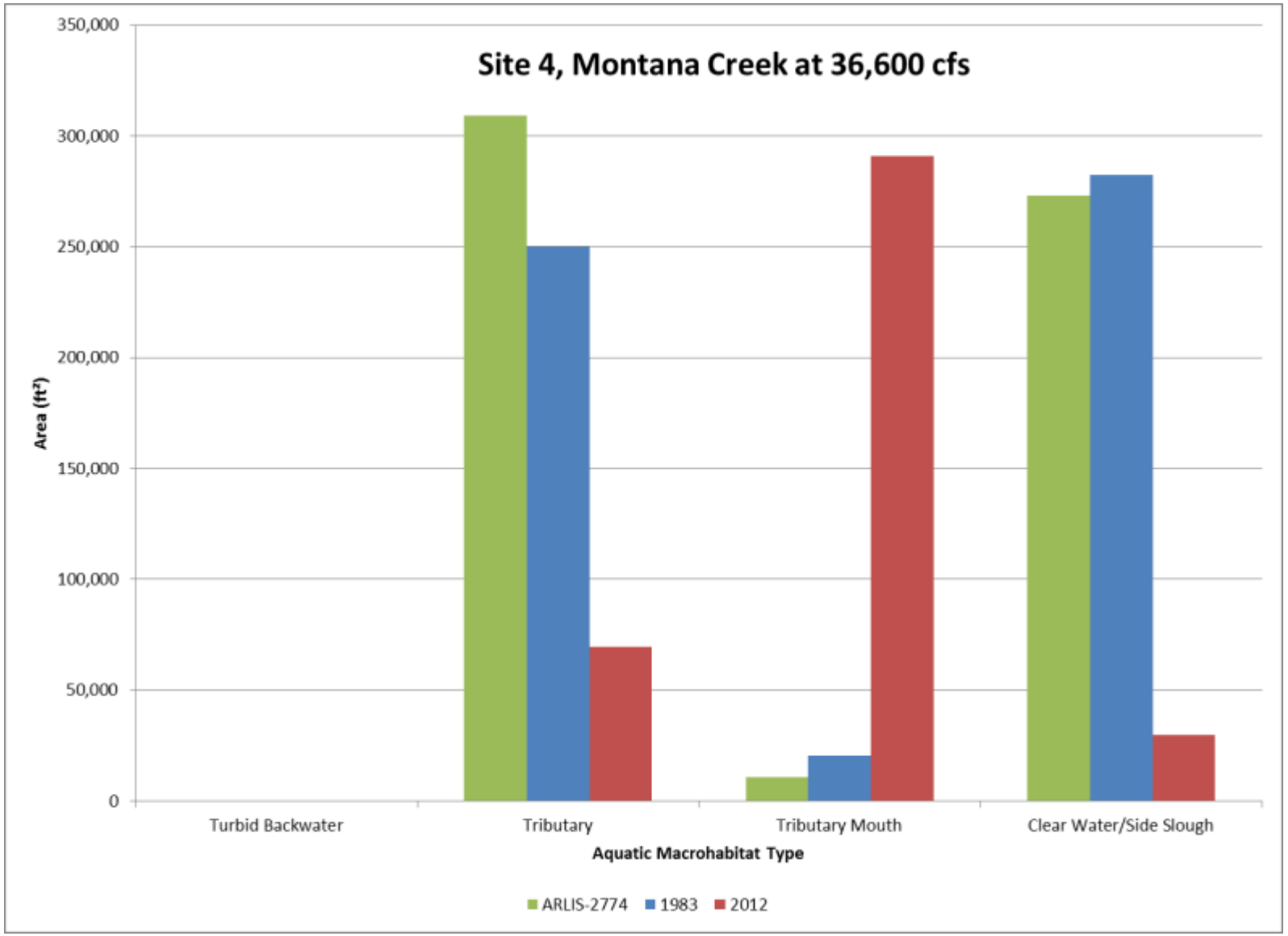

Figure 8-9. Comparison of aquatic macrohabitat types from 1983 to 2012 at Montana Creek.

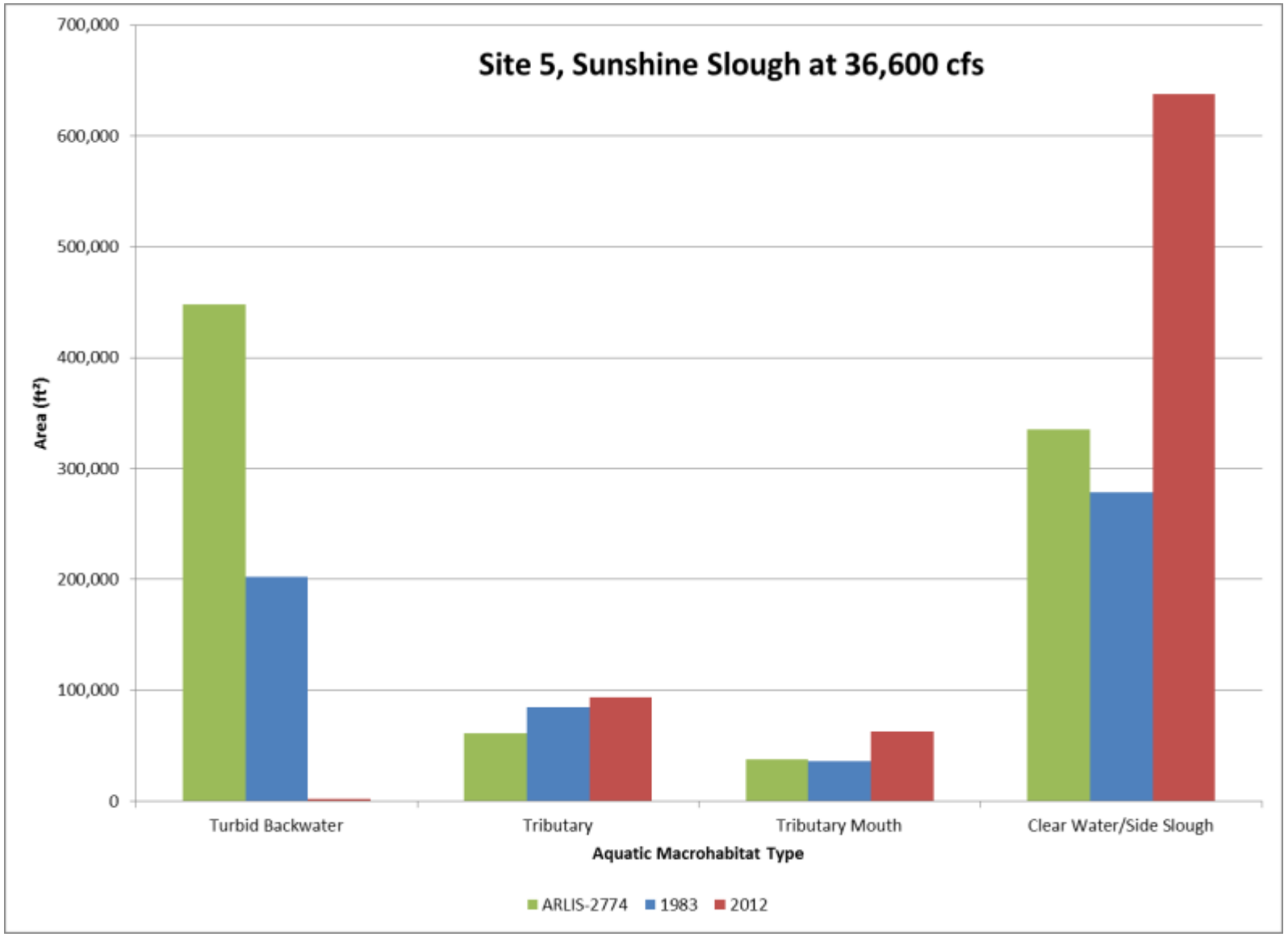

Figure 8-10. Comparison of aquatic macrohabitat types from 1983 to 2012 at Sunshine Slough.