

APPENDIX 7. MIDDLE RIVER SEGMENT GEOMORPHIC FEATURE  
AREAS

**Susitna-Watana Hydroelectric Project  
(FERC No. 14241)**

**Mapping of Geomorphic Features within 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.

March 2013

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Table 7-1. Delineated geomorphic feature areas in the Middle River in the 1980s.

Reach	Discharge	Main Channel (MC)	Side Channel (SC)	Side Slough (SS)	Upland Slough (US)	Tributary (TR)	Vegetated Island (VI)	Background (BG)	Exposed Main Channel (EXP MC)	Exposed Side Channel (EXP SC)	Exposed Side Slough (EXP SS)	Exposed Upland Slough (EXP US)	Exposed Tributary (EXP TR)	Another Other Water (AOW)	Main Channel Trib. Mouth (MC TM)	Side Channel Trib. Mouth (SC TM)	Tributary Trib. Mouth (TR TM)	Total Area
		ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>
MR-1	35,800-31,600	6,838	396	0	0	0	376	4,868	172	65	0	0	0	0	0	0	0	12,715
MR-2	35,800-31,600	49,467	3,393	94	32	827	8,375	100,430	1,780	1,251	43	0	249	213	372	0	0	166,525
MR-3	35,800-31,600	10,412	0	0	0	12	410	9,306	215	0	0	0	0	0	0	0	0	20,355
MR-4	35,800-31,600	20,693	26	0	0	63	45	21,896	175	9	0	0	0	0	5	0	4	42,916
MR-5	12,200	12,470	0	0	0	442	1,636	18,159	1,638	831	0	0	40	0	100	0	0	35,316
MR-6	12,200	66,698	24,547	4,490	648	543	66,124	132,309	17,788	21,207	10,083	52	913	523	578	76	17	346,596
MR-7	12,200	46,992	8,350	302	567	76	14,912	84,758	8,390	7,750	781	6	6	1,245	4	49	2	174,188
MR-8	12,200	19,820	3,366	600	795	250	9,844	184,631	7,071	2,408	477	0	0	595	0	0	0	229,858
Totals		233,390	40,078	5,486	2,042	2,213	101,722	556,357	37,229	33,521	11,383	58	1,207	2,577	1,058	125	23	1,028,469

Table 7-2. Delineated geomorphic feature areas in the Middle River in 2012.

Reach	Discharge (CFS)	Main Channel (MC)	Side Channel (SC)	Side Slough (SS)	Upland Slough (US)	Tributary (TR)	Vegetated Island (VI)	Background (BG)	Exposed Main Channel (EXP MC)	Exposed Side Channel (EXP SC)	Exposed Side Slough (EXP SS)	Exposed Upland Slough (EXP US)	Exposed Tributary (EXP TR)	Another Other Water (AOW)	Main Channel Trib. Mouth (MC TM)	Side Channel Trib. Mouth (SC TM)	Tributary Trib. Mouth (TR TM)	Total Area
		ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>
MR-1	17,000	5,964	222	0	0	0	222	4,643	1,276	388	0	0	0	0	0	0	0	12,715
MR-2	17,000	41,667	254	774	114	863	9,527	98,798	8,869	782	3,945	324	124	295	190	0	0	166,525
MR-3	17,000	8,790	6	30	11	10	368	8,969	1,907	3	262	0	0	0	0	0	0	20,356
MR-4	17,000	18,175	0	0	0	60	46	22,707	1,878	28	0	0	7	4	11	0	0	42,916
MR-5	17,000	13,151	136	0	0	462	2,073	18,267	976	203	0	0	20	0	29	0	0	35,316
MR-6	17000 / 12,900	84,175	12,415	2,499	531	482	73,743	137,341	15,922	14,950	3,161	35	292	592	396	66	0	346,600
MR-7	12,900	52,714	2,316	270	446	108	20,696	85,287	7,729	2,925	242	8	13	1,375	59	0	0	174,189
MR-8	12,900	23,175	1,490	258	972	285	9,874	184,160	6,262	905	89	22	0	1,081	57	0	0	228,631
Totals		247,813	16,839	3,833	2,074	2,270	116,549	560,171	44,817	20,184	7,698	389	456	3,347	743	66	0	1,027,248

APPENDIX 8. LOWER RIVER SEGMENT GEOMORPHIC FEATURE  
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Table 8-1. Delineated geomorphic features areas in the Lower River in the 1980s.

Reach	Discharge at Sunshine Gage	Main Channel (MC)	Side Channel Complex (SCC)	Bar Island Complex (BIC)	Vegetated Island Main Channel (VI MC)	Vegetated Island Side Channel Complex (VI SCC)	Vegetated Island Bar Island Complex (VI BIC)	Vegetated Island Side Channel (VI SC)	Vegetated Island Side Slough (VI SS)	Bar Attached Bar (BAB)	Side Channel (SC)	Upland Slough (US)	Side Slough (SS)	Tributary (TR)	Tributary Delta (TD)	Additional Open Water (AOW)	Background (BG)	Not Covered by Aerials in 1980 or 2012	Total Area
	cfs	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>
LR-1	38,100	73,434	22,858	163,389	77	32,781	16,328	44,541	7,793	0	5,579	615	1,190	634	0	277	215,358	75,770	660,625
LR-2	38,100-46,900	132,878	79,412	216,331	553	178,349	30,915	11,329	4,780	0	1,288	752	1,159	1,174	373	712	180,396	129,001	969,404
LR-3	46,900	112,019	120,577	247,828	0	489,845	35,297	65,728	321	0	3,253	2,631	680	13,171	0	2,981	637,191	161,399	1,892,921
LR-4	46,900	60,670	65,136	45,564	0	109,562	9,731	226,207	0	0	8,557	481	0	325	0	6,298	99,855	87,085	719,471
LR-5	46,900	86,976	0	61,382	36,952	25	6,930	1,483	0	0	853	1,508	29	3,567	0	2,896	319,299	31	521,931
LR-6	46,900	189,444	210,871	199,858	72,970	494,000	6,775	0	40,318	0	0	4,027	6,043	7,774	0	82,643	698,202	1,300,327	3,313,252
CL-1	38,100	7,696	3,956	36,703	0	11,382	21	2,380	0	0	1,971	1,234	0	0	0	420	23,201	83,819	172,785
YN-1	46,900	9,363	2	19,665	0	108	4,659	4,254	0	0	4,538	0	0	0	0	0	16,797	34,093	93,480
TK-1	38,100	3,933	1,615	934	5,580	5,185	27	8,963	927	2,463	674	68	636	0	0	384	40,135	81,811	153,336
Totals		676,414	504,428	991,655	116,132	1,321,236	110,683	364,886	54,138	2,463	26,714	11,317	9,737	26,645	373	96,611	2,230,435	1,953,337	8,497,205

Table 8-2. Delineated geomorphic features areas in the Lower River in 2012.

Reach	Discharge at Sunshine Gage	Main Channel (MC)	Side Channel Complex (SCC)	Bar Island Complex (BIC)	Vegetated Island Main Channel (VI MC)	Vegetated Island Side Channel Complex (VI SCC)	Vegetated Island Bar Island Complex (VI BIC)	Vegetated Island Side Channel (VI SC)	Vegetated Island Side Slough (VI SS)	Bar Attached Bar (BAB)	Side Channel (SC)	Upland Slough (US)	Side Slough (SS)	Tributary (TR)	Tributary Delta (TD)	Additional Open Water (AOW)	Background (BG)	Not Covered by Aerials in 1980 or 2012	Total Area
	cfs	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>	ft <sup>2</sup> x 10 <sup>3</sup>
LR-1	38,100	71,135	18,218	148,951	1,245	42,902	29,960	25,693	11,745	0	3,207	730	1,911	590	0	681	232,365	75,770	665,104
LR-2	38,100-46,900	142,407	84,228	130,472	2,917	195,102	22,480	62,789	5,734	0	7,846	1,061	2,057	1,105	351	581	181,272	129,000	969,403
LR-3	46,900	126,610	160,038	155,122	2,029	547,959	23,415	59,624	2,029	0	5,343	2,451	1,225	15,374	0	2,236	628,065	161,400	1,892,921
LR-4	46,900	94,451	55,676	12,423	1,820	124,246	3,121	219,690	0	0	9,294	1,248	0	520	0	8,928	100,591	87,082	719,090
LR-5	46,900	129,912	926	16,816	45,716	319	1,444	1,623	0	0	4,811	1,664	0	4,737	0	4,877	309,652	18	522,517
LR-6	46,900	298,210	106,821	142,664	247,264	411,584	10,348	9,770	2,336	0	7,410	3,700	4,524	8,715	0	97,186	662,393	1,300,327	3,313,252
CL-1	38,100	4,464	10,570	27,999	0	12,421	0	9,443	0	0	629	279	139	0	0	0	20,726	83,819	170,489
YN-1	46,900	9,144	0	0	2,766	0	0	6,941	7,184	0	16,426	0	1,691	0	0	0	15,017	34,093	93,262
TK-1	38,100	4,914	1,275	0	16,097	3,103	0	1,190	0	2,613	769	164	10	315	0	258	39,861	81,811	152,381
Totals		881,247	437,754	634,447	319,854	1,337,637	90,767	396,763	29,029	2,613	55,734	11,297	11,558	31,356	351	114,746	2,189,942	1,953,321	8,498,418

Notes:

- LR = Lower River
- CL = Chulitna River
- YN = Yentna River
- TK = Talkeetna River

APPENDIX 9. MIDDLE RIVER GEOMORPHIC FEATURE AREA BAR  
CHARTS BY GEOMORPHIC REACH

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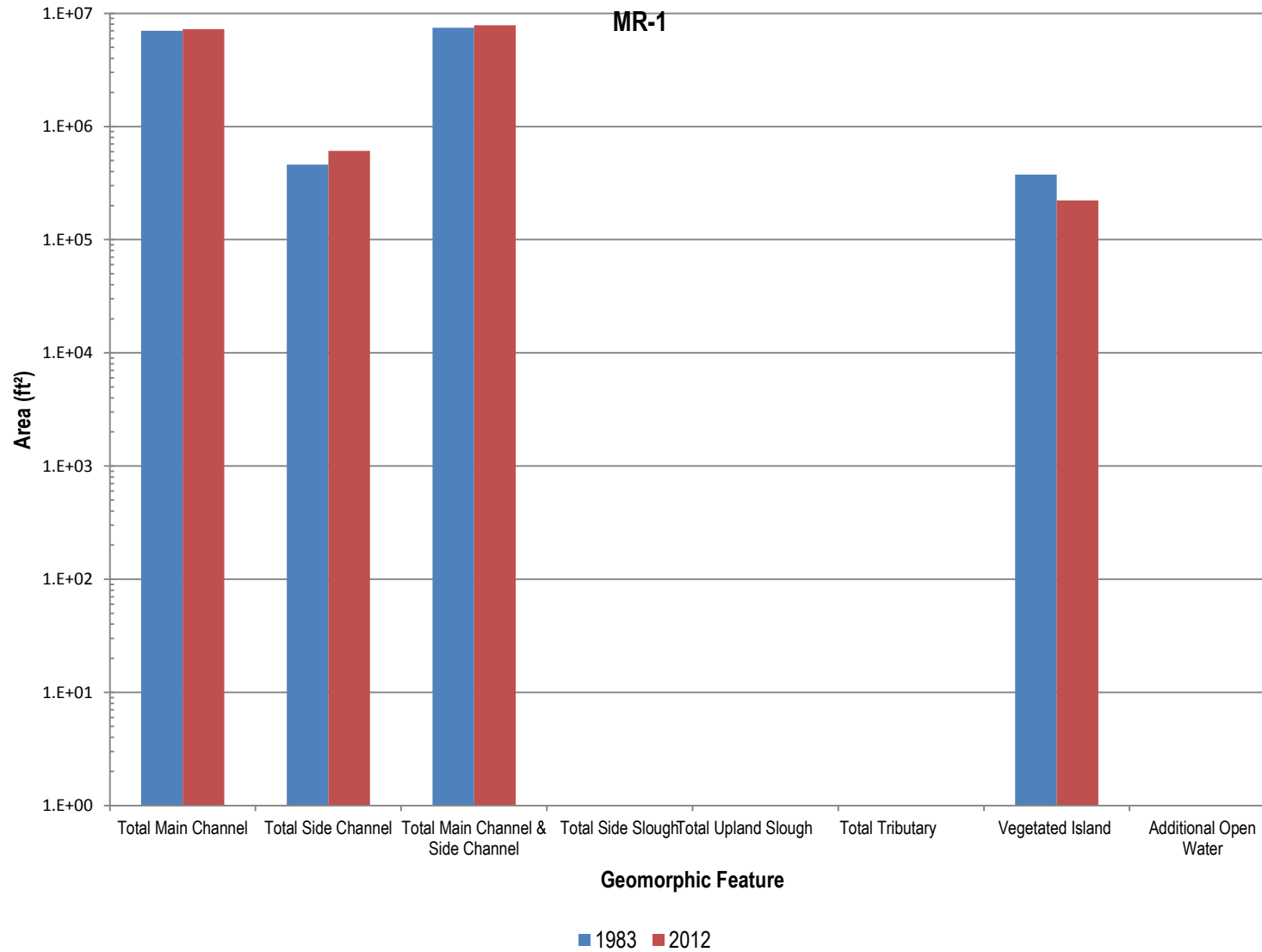


Figure 9-1: Middle River Geomorphic Reach 1 comparison of 1980s and 2012 mapped geomorphic feature areas (sq. ft.) on a logarithmic axis.

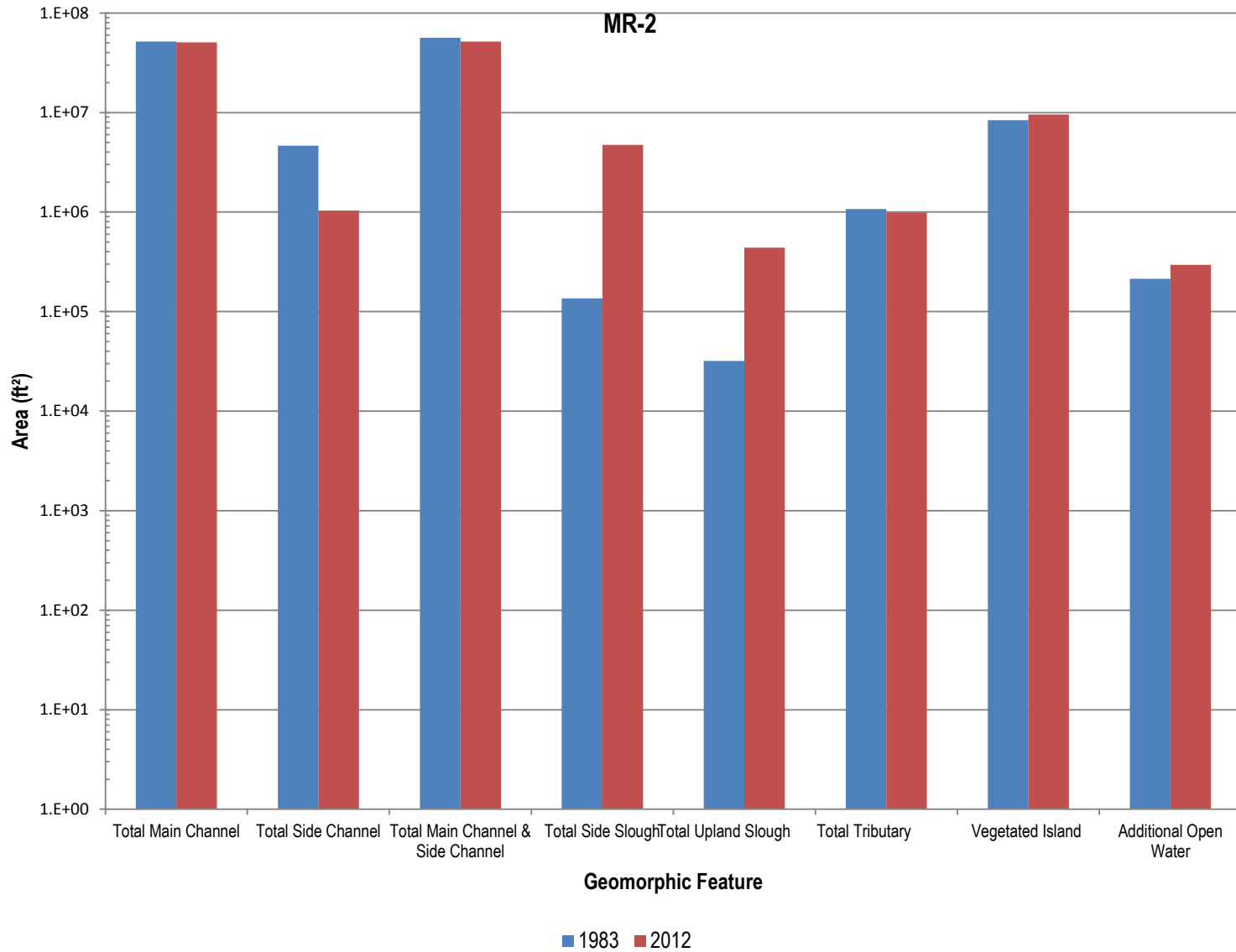


Figure 9-2: Middle River Geomorphic Reach 2 comparison of 1980s and 2012 mapped geomorphic feature areas (sq. ft.) on a logarithmic axis.

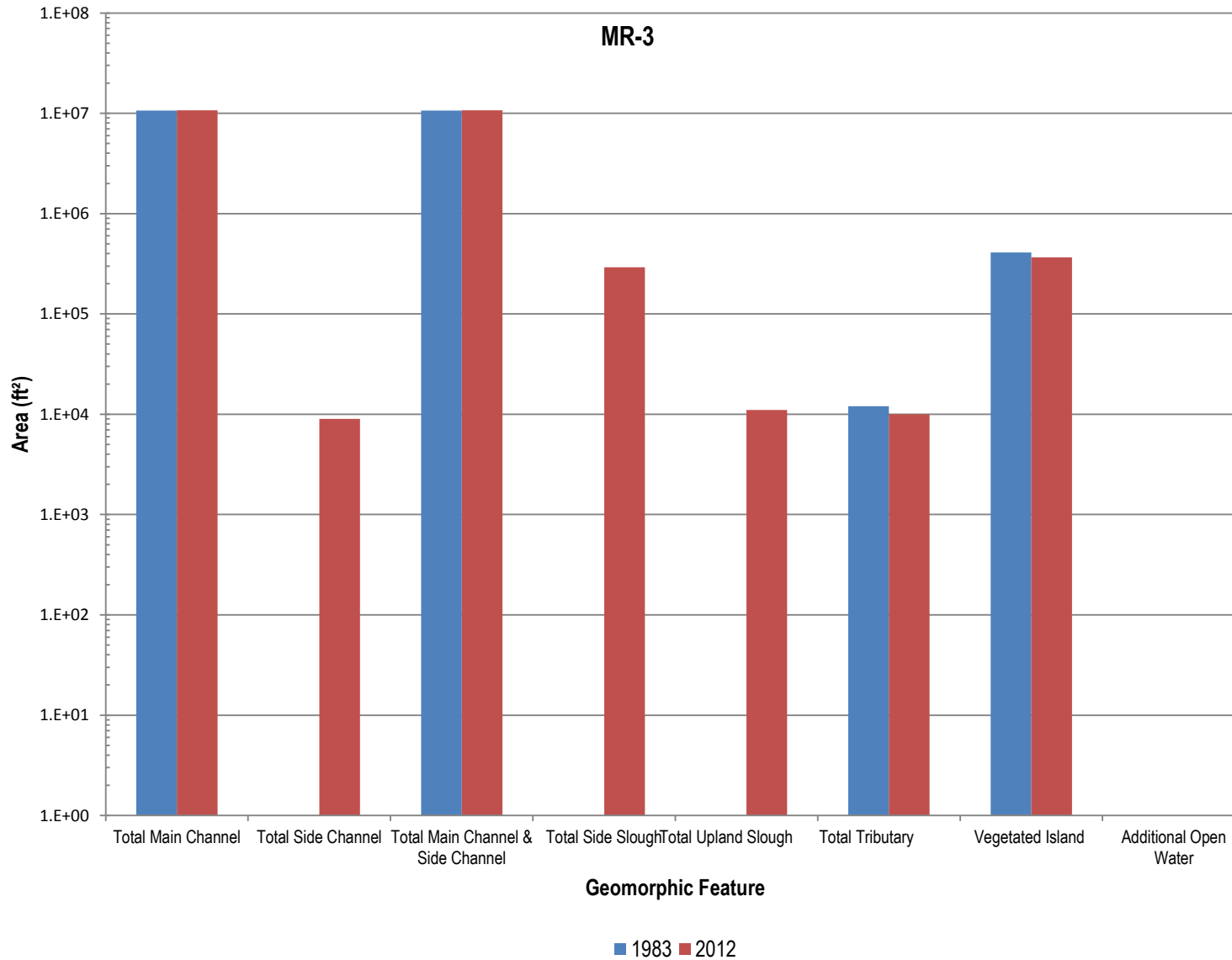


Figure 9-3: Middle River Geomorphic Reach 3 comparison of 1980s and 2012 mapped geomorphic feature areas (sq. ft.) on a logarithmic axis.

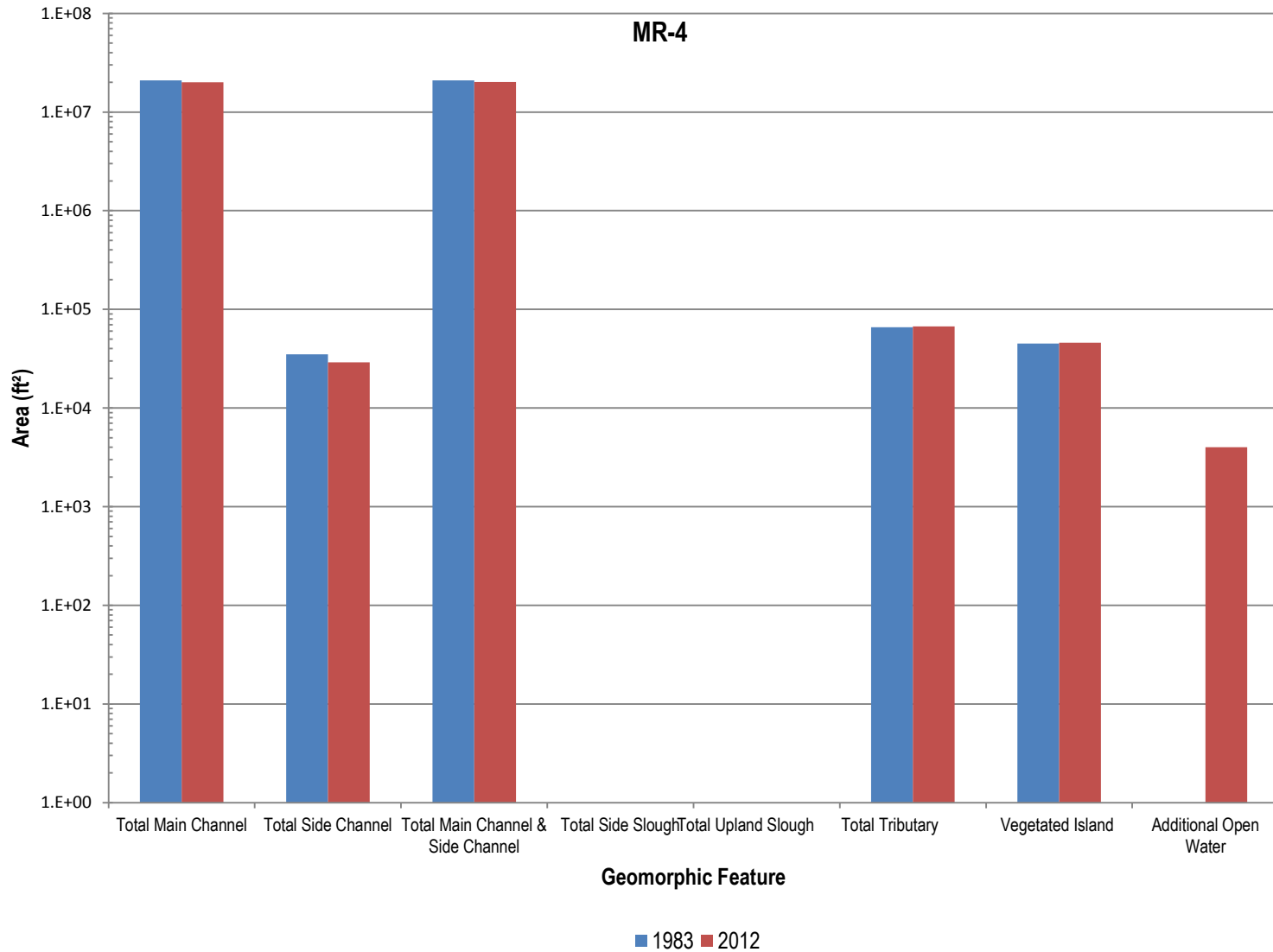


Figure 9-4: Middle River Geomorphic Reach 4 comparison of 1980s and 2012 mapped geomorphic feature areas (sq. ft.) on a logarithmic axis.

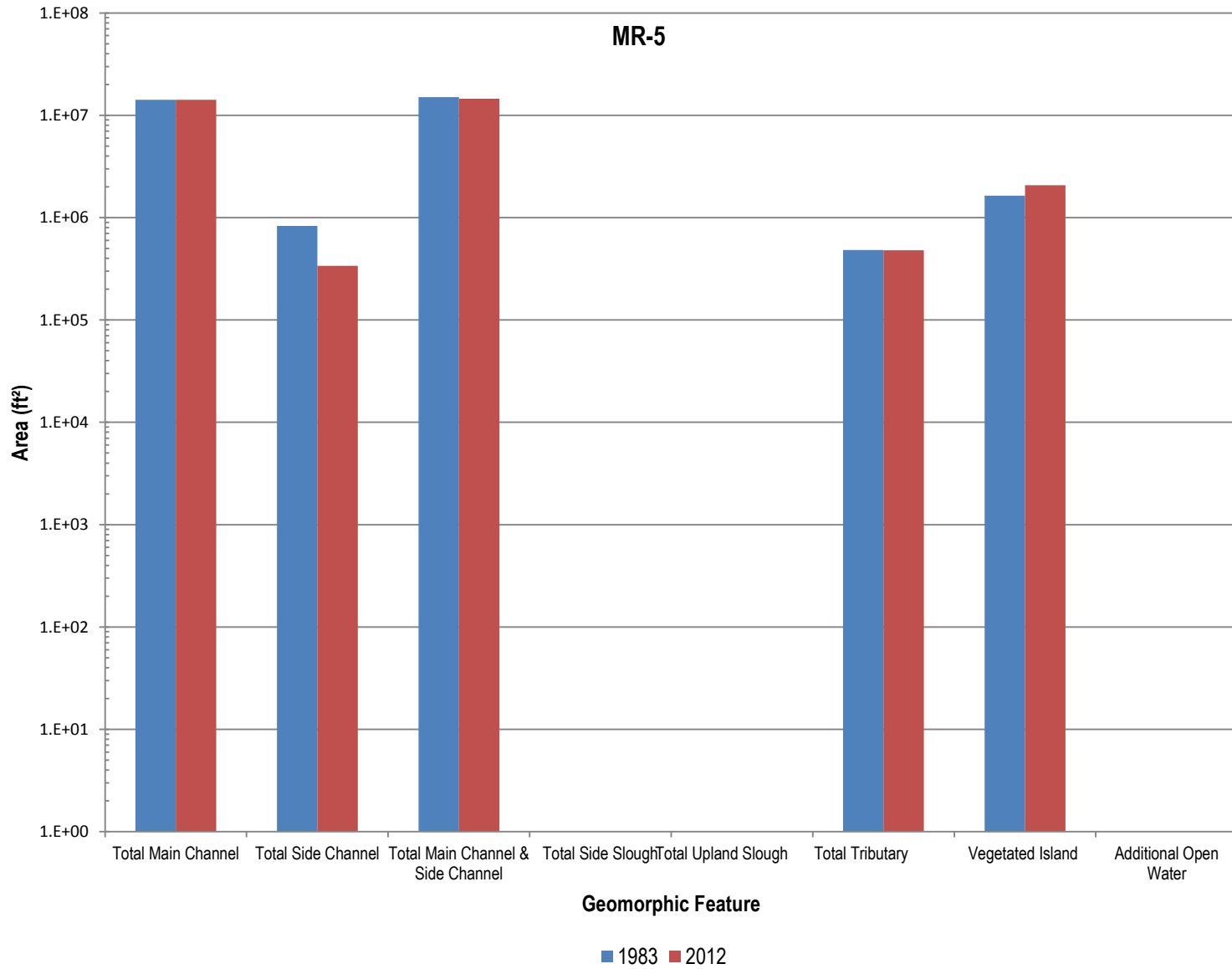


Figure 9-5: Middle River Geomorphic Reach 5 comparison of 1980s and 2012 mapped geomorphic feature areas (sq. ft.) on a logarithmic axis.

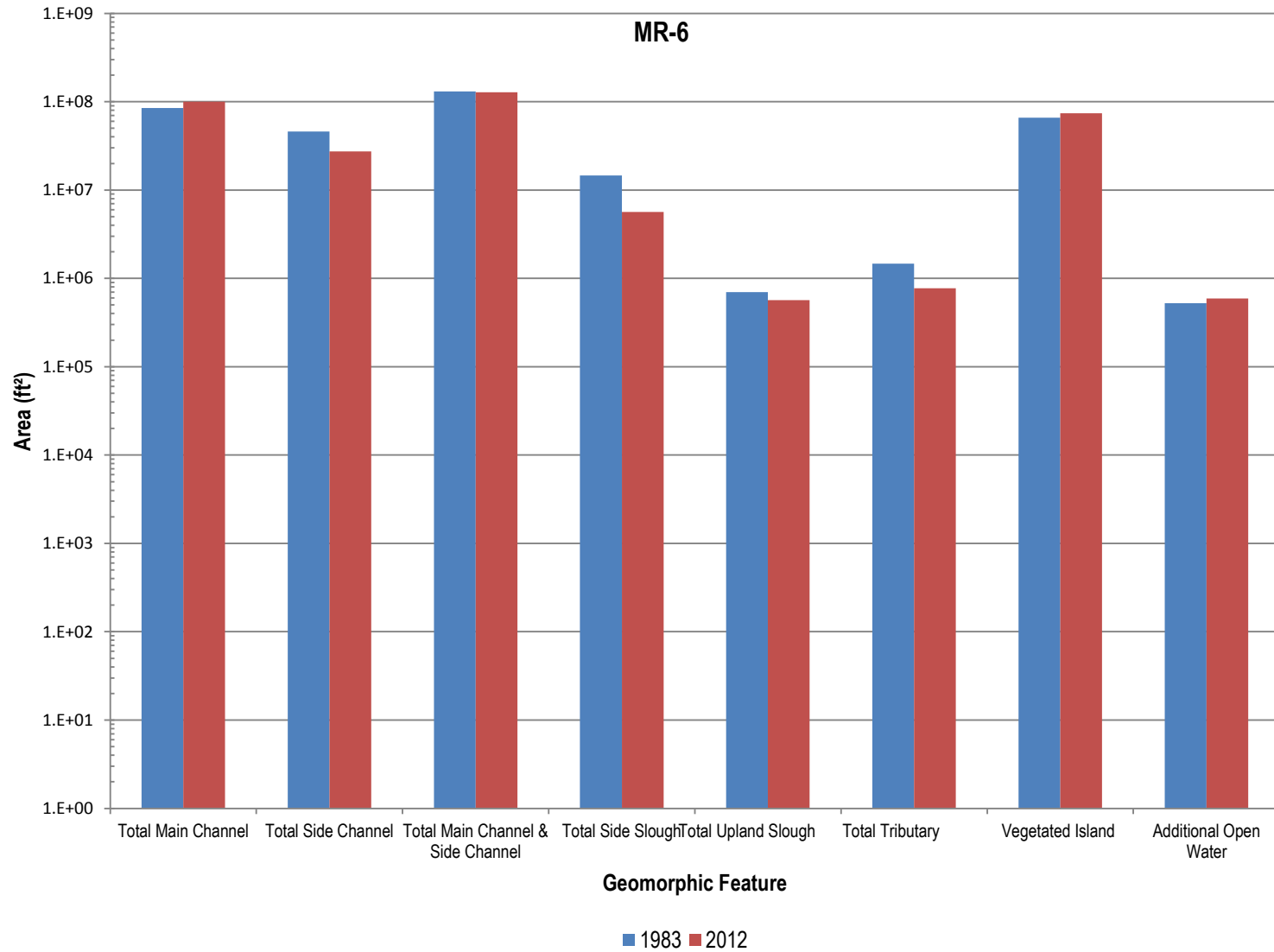


Figure 9-6: Middle River Geomorphic Reach 6 comparison of 1980s and 2012 mapped geomorphic feature areas (sq. ft.) on a logarithmic axis.

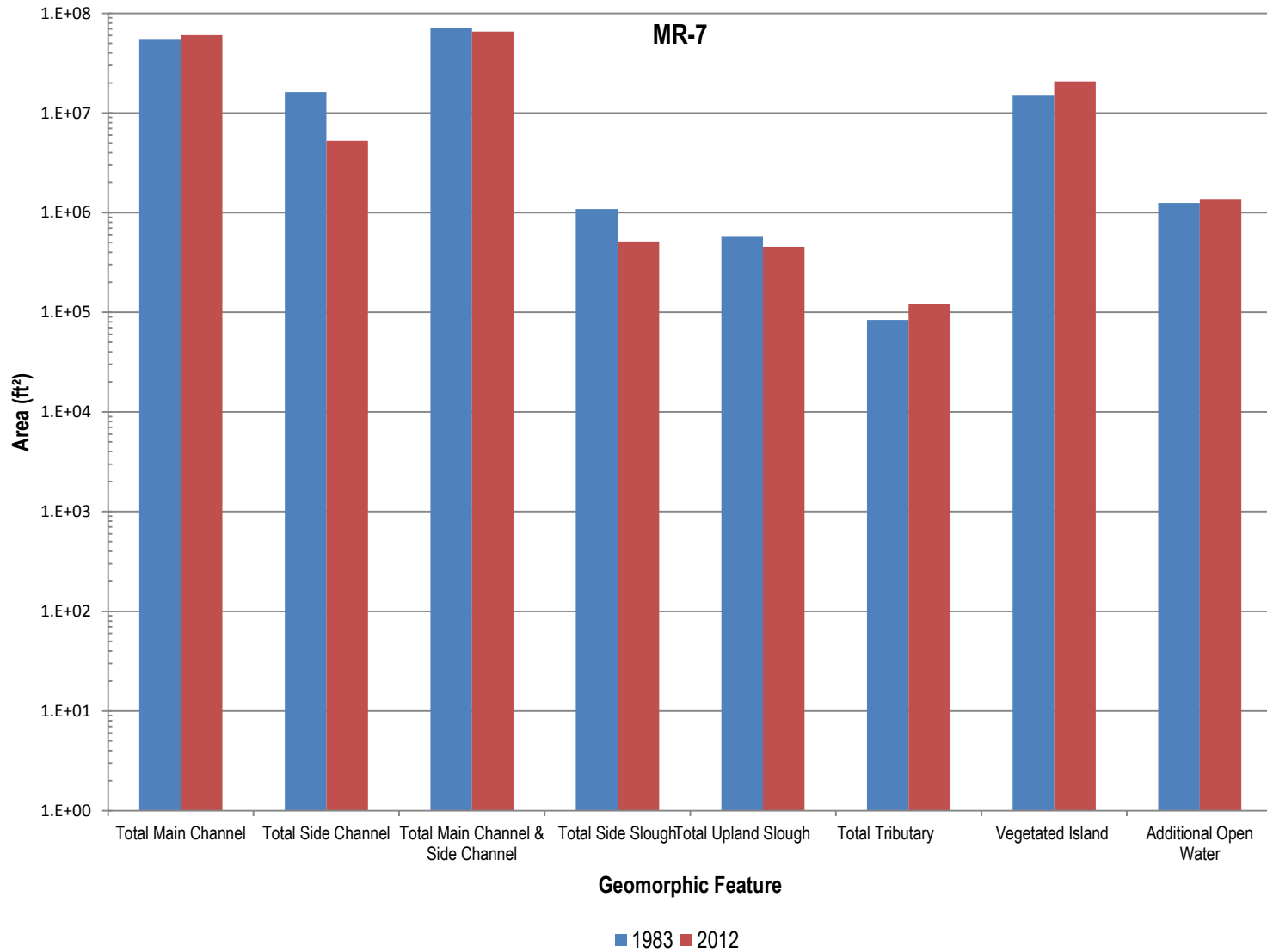


Figure 9-7: Middle River Geomorphic Reach 7 comparison of 1980s and 2012 mapped geomorphic feature areas (sq. ft.) on a logarithmic axis.

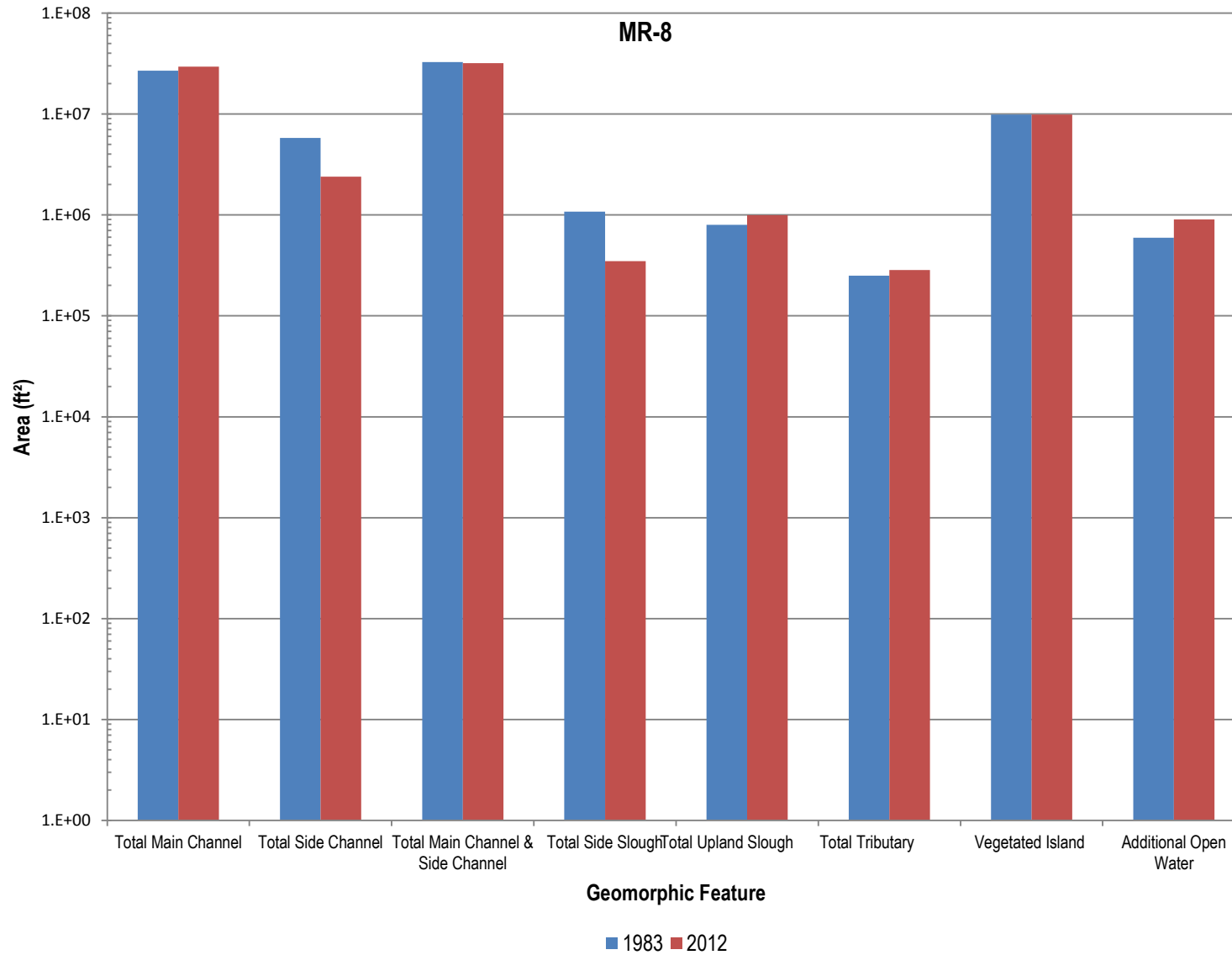


Figure 9-8: Middle River Geomorphic Reach 8 comparison of 1980s and 2012 mapped geomorphic feature areas (sq. ft.) on a logarithmic axis.



APPENDIX 10. LOWER RIVER GEOMORPHIC FEATURE AREA BAR  
CHARTS BY GEOMORPHIC REACH

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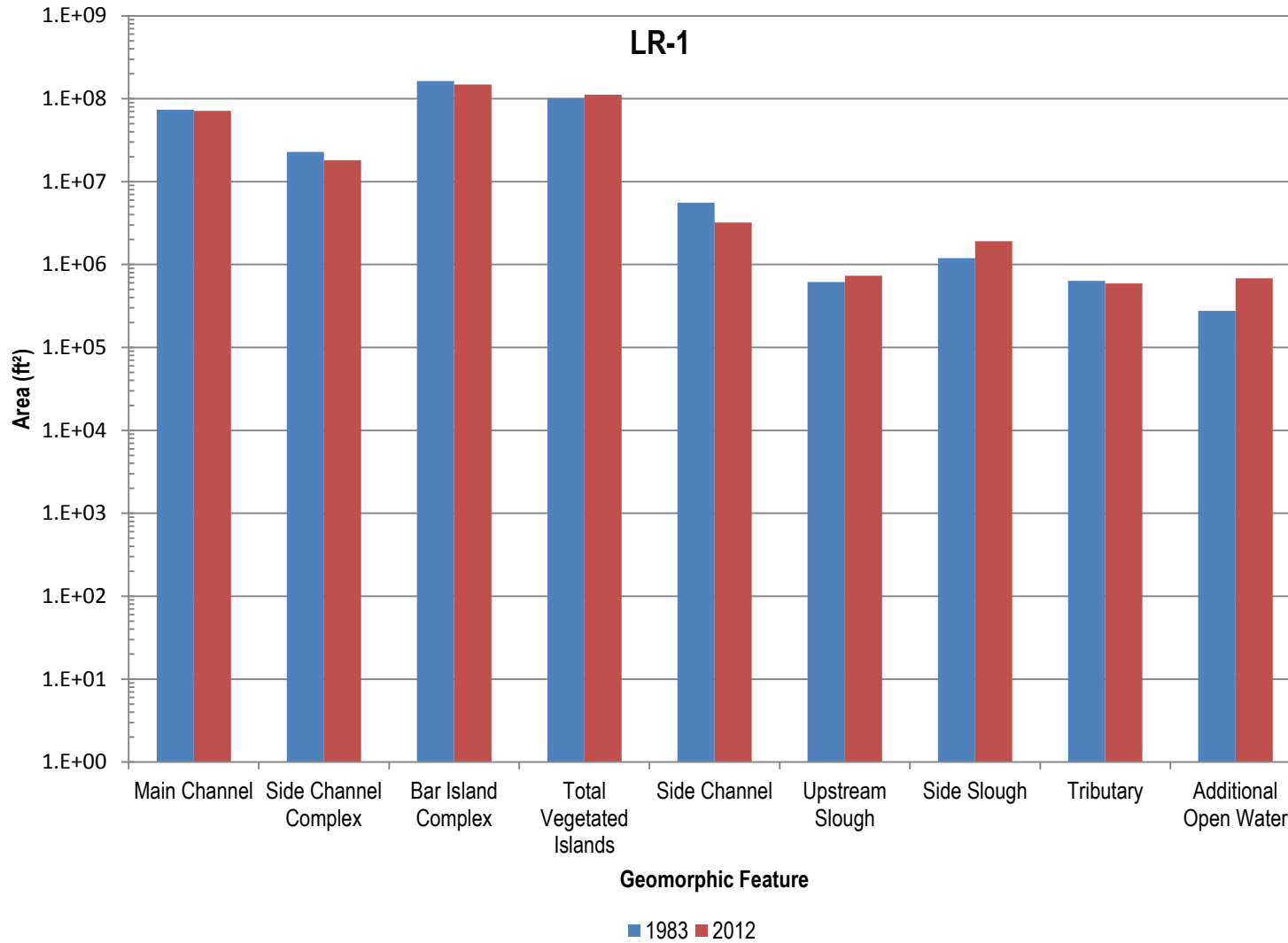


Figure 10-1: Lower River Geomorphic Reach 1 comparison of 1980s and 2012 mapped geomorphic feature areas (sq. ft.) on a logarithmic axis.

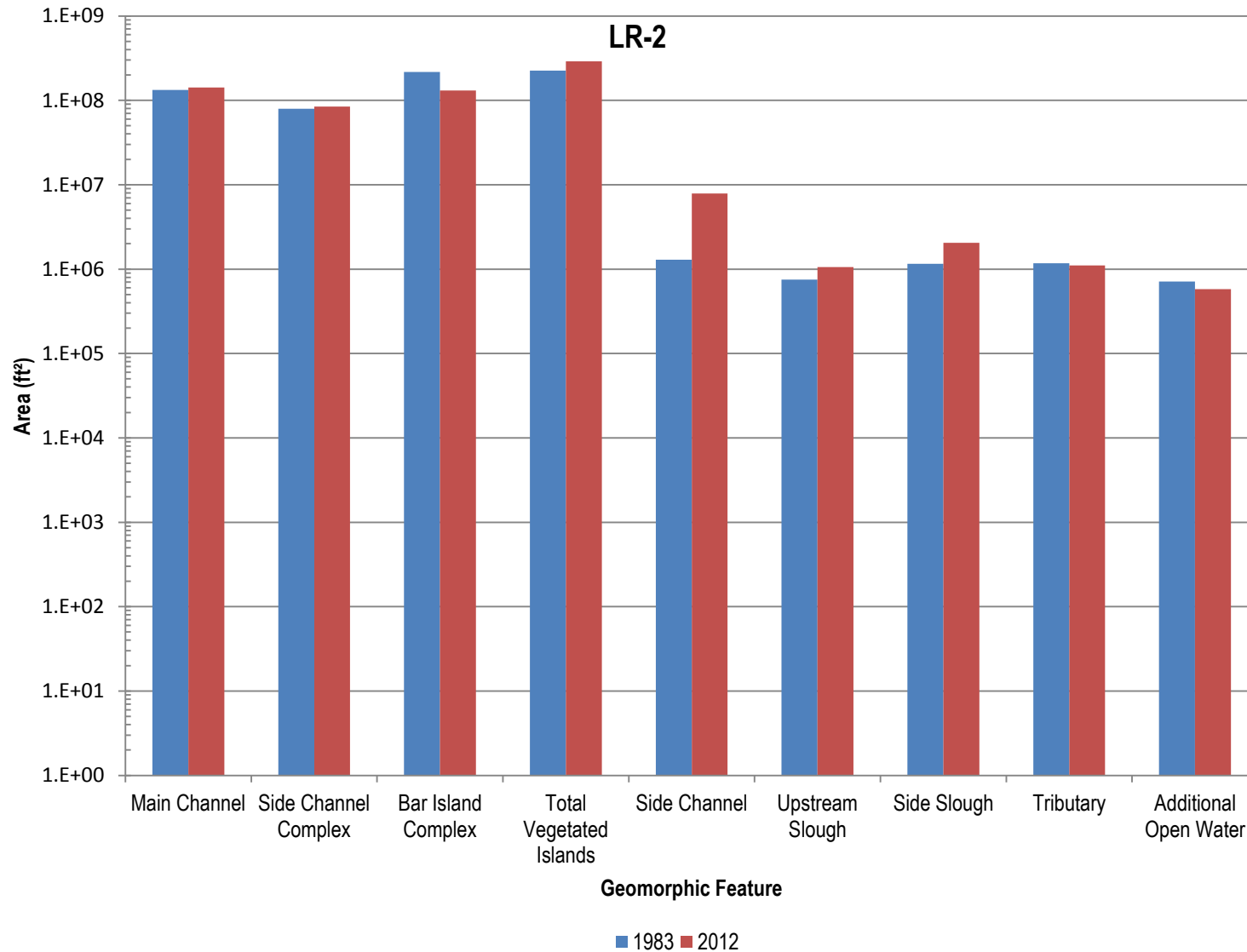


Figure 10-2: Lower River Geomorphic Reach 2 comparison of 1980s and 2012 mapped geomorphic feature areas (sq. ft.) on a logarithmic axis.

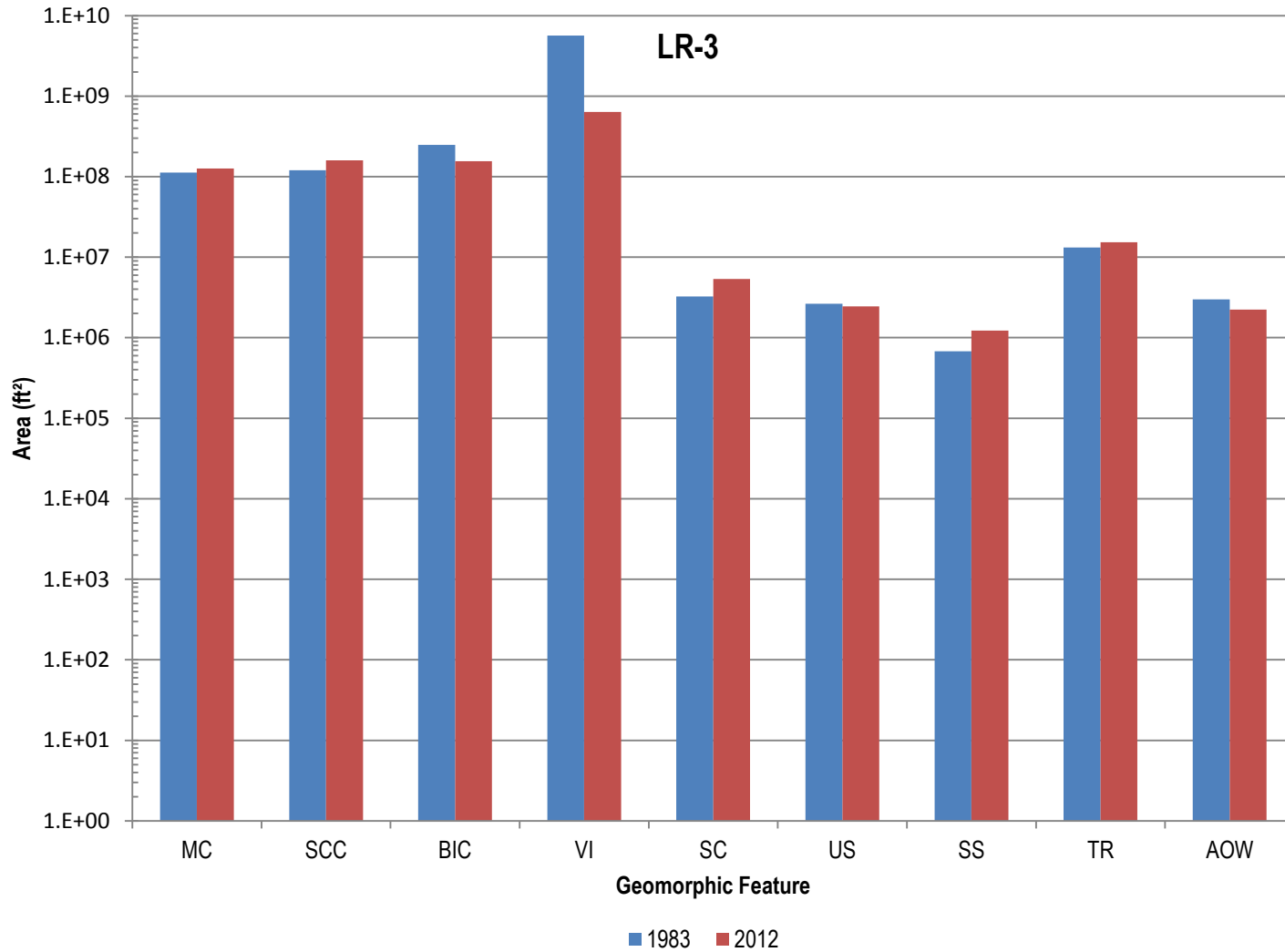


Figure 10-3: Lower River Geomorphic Reach 3 comparison of 1980s and 2012 mapped geomorphic feature areas (sq. ft.) on a logarithmic axis.

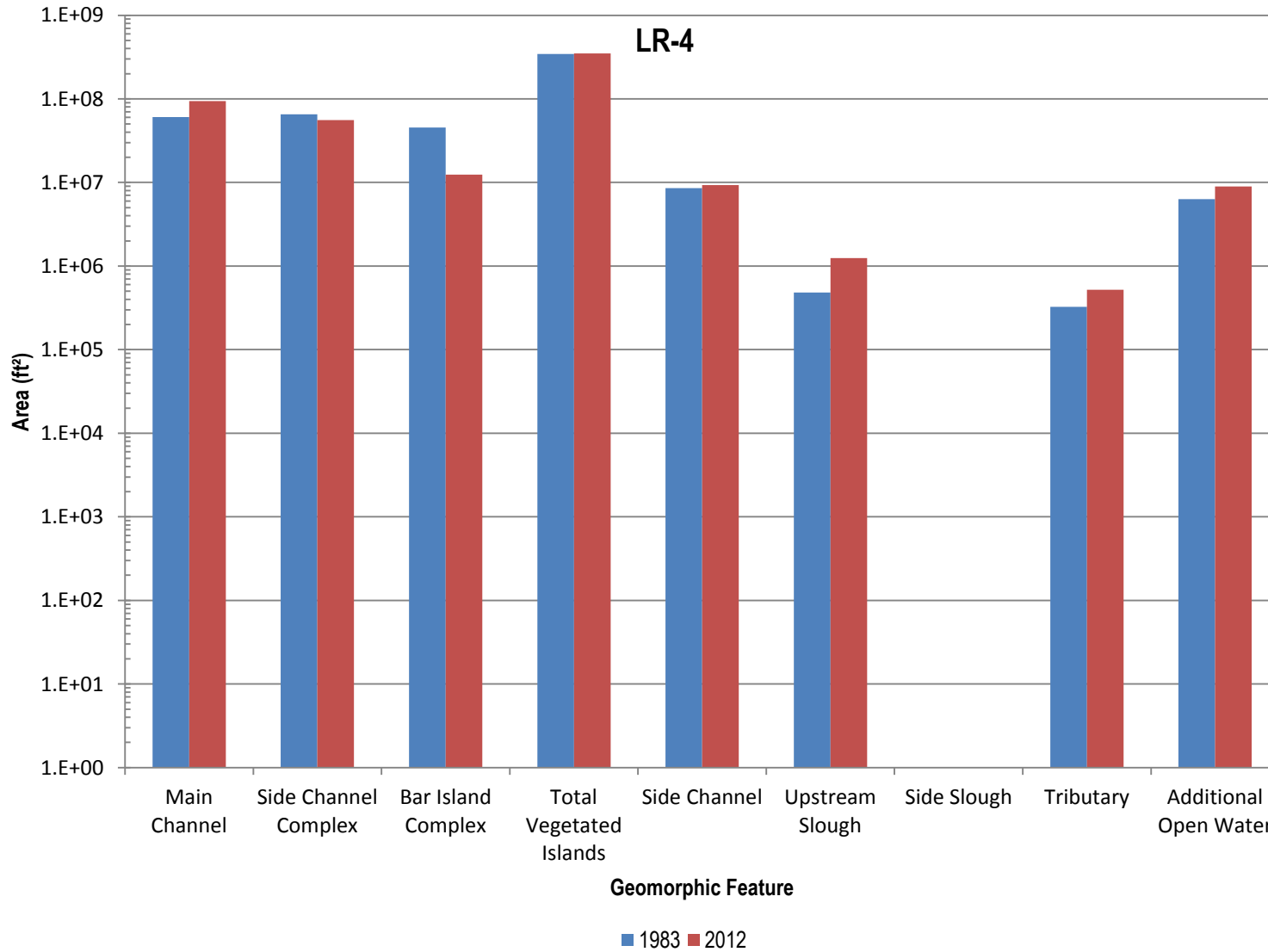


Figure 10-4: Lower River Geomorphic Reach 4 comparison of 1980s and 2012 mapped geomorphic feature areas (sq. ft.) on a logarithmic axis.

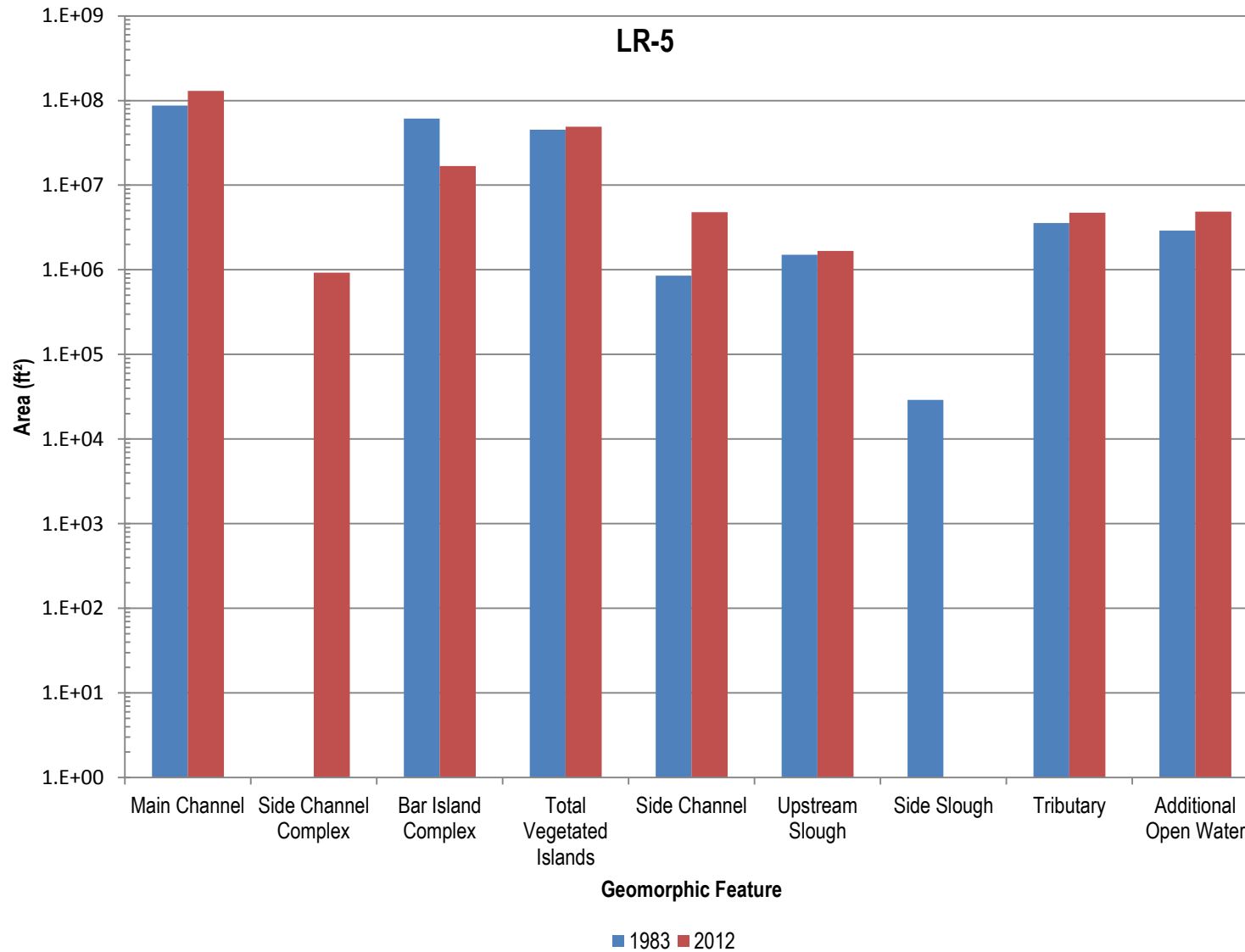


Figure 10-5: Lower River Geomorphic Reach 5 comparison of 1980s and 2012 mapped geomorphic feature areas (sq. ft.) on a logarithmic axis.

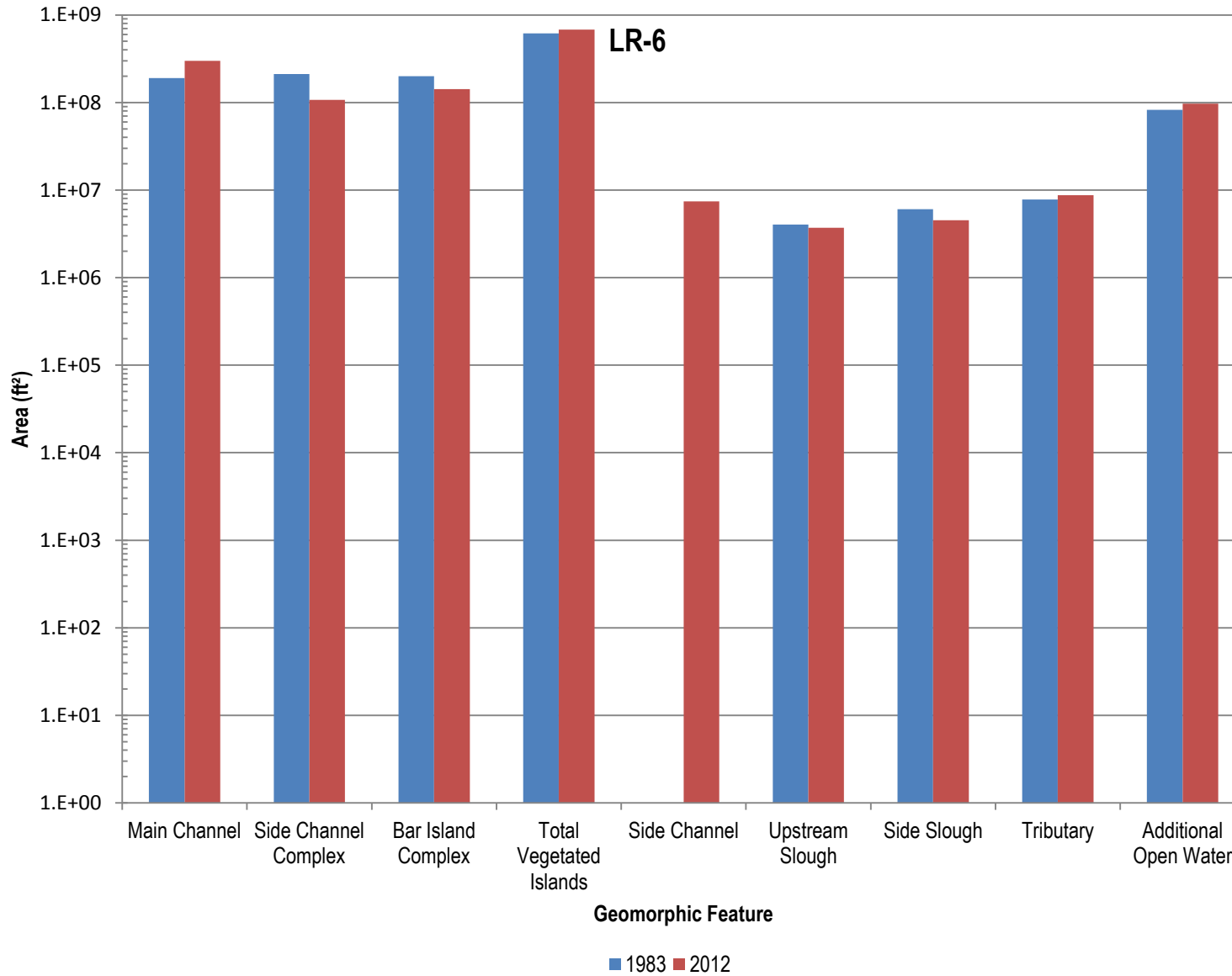


Figure 10-6: Lower River Geomorph Reach 6 comparison of 1980s and 2012 mapped geomorphic feature areas (sq. ft.) on a logarithmic axis.



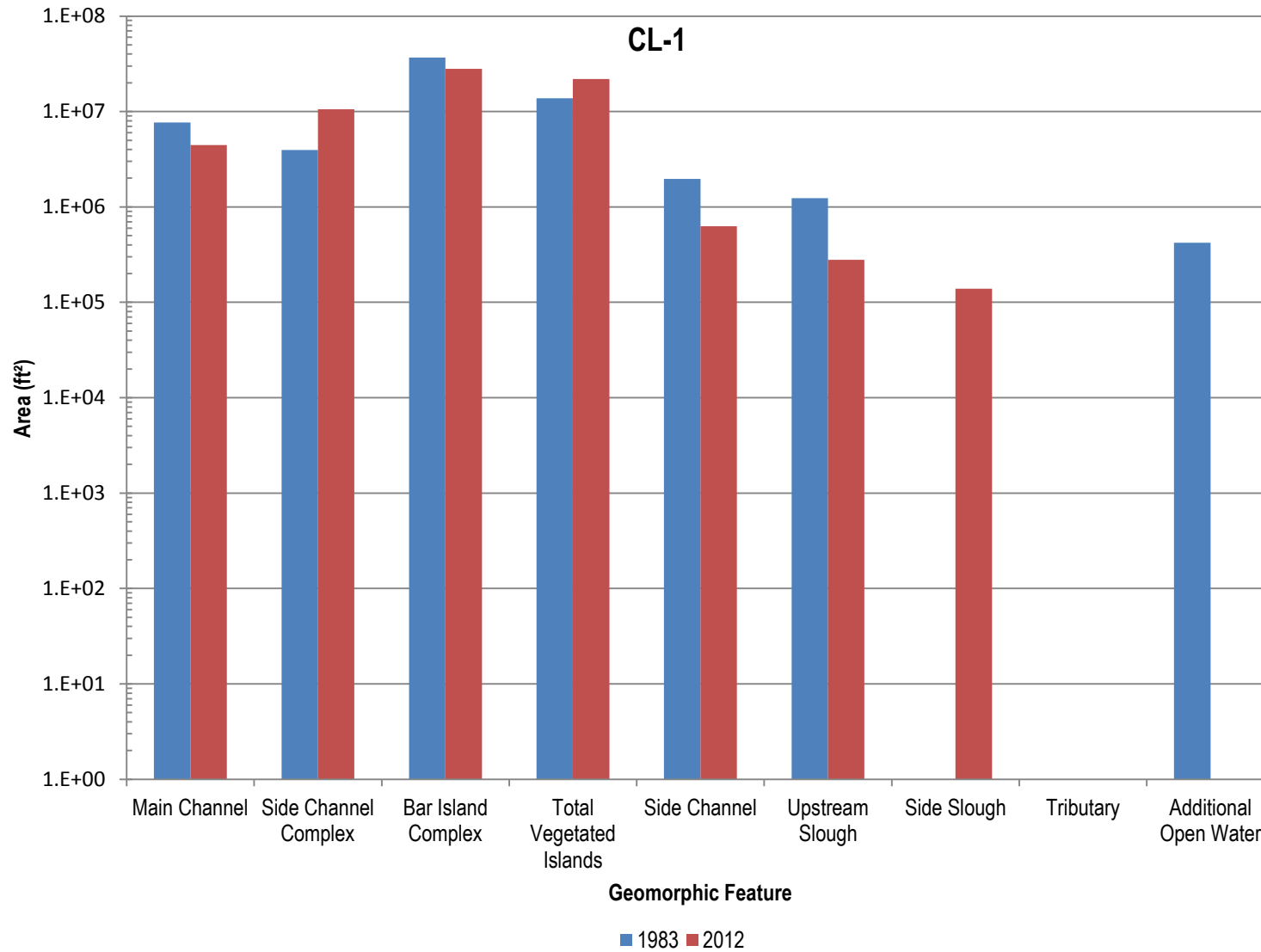


Figure 10-7: Chulitna River comparison of 1980s and 2012 mapped geomorphic feature areas (sq. ft.) on a logarithmic axis.

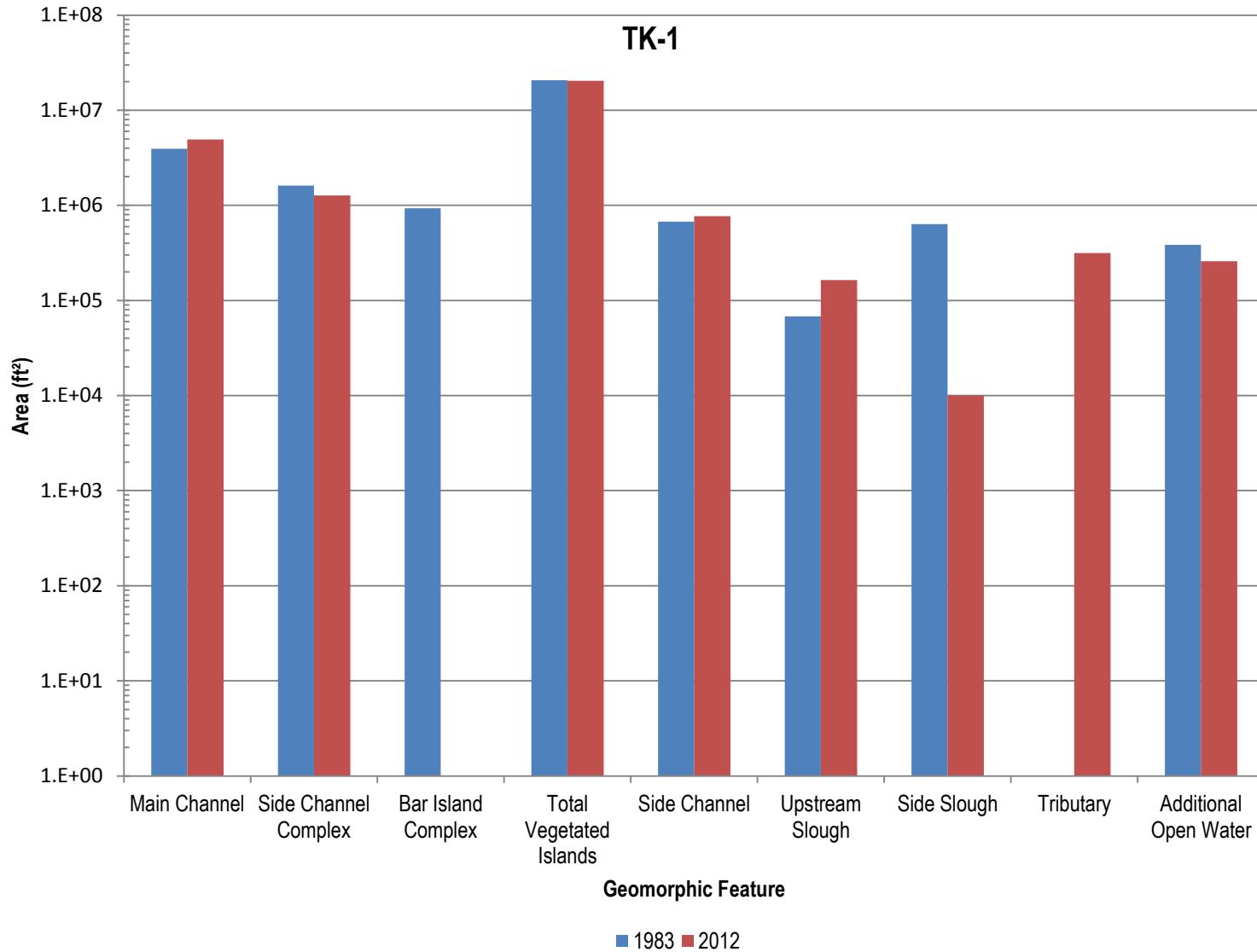


Figure 10-8: Talkeetna River comparison of 1980s and 2012 mapped geomorphic feature areas (sq. ft.) on a logarithmic axis.

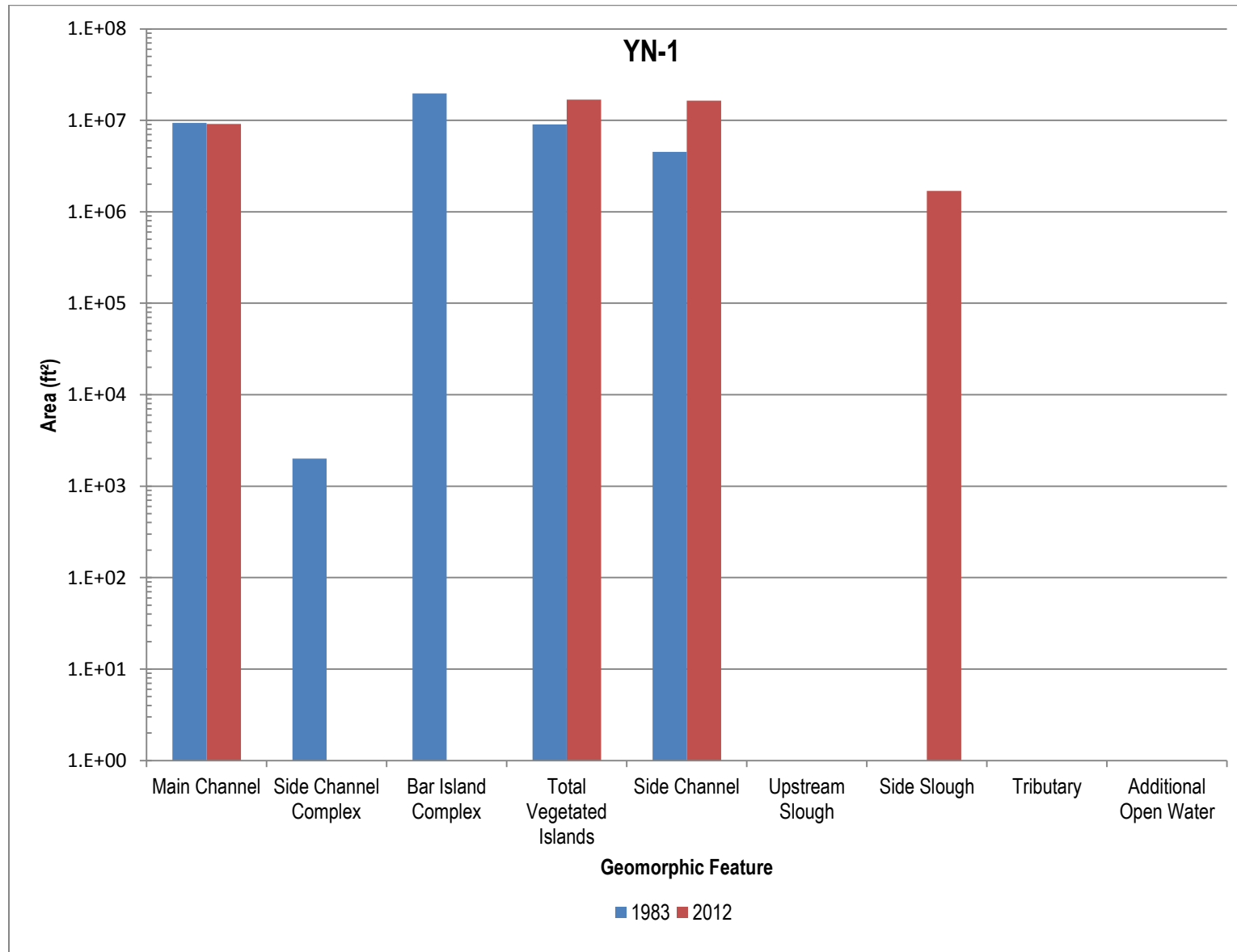


Figure 10-7: Yentna River comparison of 1980s and 2012 mapped geomorphic feature areas (sq. ft.) on a logarithmic axis.