



EA ENGINEERING,
SCIENCE, AND
TECHNOLOGY, INC.

Western Regional Operations
41 Lafayette Circle
Lafayette, California 94549
(415) 283-7077

*Rec'd 31 JAN 86
BISHOP*

28 January 1986

Mr. Darrell M. Wong
California Department of Fish and Game
301 West Line Street
Bishop, California 93514

Dear Darrell:

Enclosed are tables of the weighted usable area for adult, juvenile, fry, and spawners of rainbow and brown trout for the eleven reaches we studied on Bishop Creek. This WUA is expressed as square feet WUA per 1,000 linear feet of stream, and results are presented for IFG4 one-flow hydraulic simulations for each of the three flows we measured on Bishop Creek. Also included are plots of the data.

Sincerely yours,

J. Emil Morhardt, Ph.D.
Vice President

JEM/sls

Enclosures

cc: Mr. Brian McGurdy

Guide to the WUA Tables = All WUA expressed as Ft²/1000 ft based on the Final curves provided to EA by M. Acetuno

BRN WUA 91
 ↑
 Brown Trout
 ↑
 WUA 9 to 11
 ↑
 Reach 11

18 cfs

COPY (BRMURS) DART PHN

1	3	5	8	10	12	15	18	20	22	25	30	35	40	45	50	55	60	65	70
27	117	208	345	426	492	586	666	712	751	823	898	948	998	1062	991	997	998	978	961
84	245	386	547	632	688	759	869	825	839	842	885	909	921	933	936	936	922	904	884
96	1047	1057	1074	1064	1036	988	939	922	889	848	776	718	677	642	614	578	543	531	514
4	12	13	13	9	8	7	6	6	6	6	5	6	6	6	7	6	7	7	8
28	118	208	325	428	496	583	653	714	762	823	908	938	962	973	973	978	995	994	986
83	244	379	559	631	684	766	816	824	831	835	861	913	934	937	941	959	978	1000	1000
85	1000	1142	1162	1146	1115	1065	1004	984	958	912	833	782	727	681	638	611	601	578	572
5	10	8	5	4	3	3	4	4	4	2	2	2	3	4	4	5	6	8	9
32	121	206	332	425	491	575	648	689	725	777	867	924	964	1026	1074	1097	1095	1111	1119
81	237	390	568	631	679	731	777	803	831	859	941	1007	1054	1076	1099	1120	1153	1171	1227
1047	1288	1324	1319	1287	1254	1197	1125	1103	1074	1013	926	863	796	764	738	707	696	723	739
5	9	4	3	3	1	0	0	1	1	2	2	3	5	7	7	8	9	10	12
348	770	1156	1700	2126	2528	3059	3539	3986	4053	4302	4888	7129	7752	9131	10469	11105	12021	12705	13527
644	1193	1612	2162	2477	2743	3032	3382	3494	3663	3915	4367	4871	5378	5883	6498	7916	8682	9165	9809
1306	1423	1637	2068	2295	2489	2789	3066	3268	3464	3751	4271	4728	5134	5579	6925	7780	8324	9078	9557
16	52	77	114	141	169	202	242	261	274	311	362	406	433	454	497	521	523	658	900
365	792	1199	1778	2234	2656	3700	3958	4223	4589	5638	7498	7815	8226	11099	12446	12800	13305	13491	
662	1229	1655	2205	2539	2819	3166	3477	3696	3883	4179	4700	5233	5774	6208	6990	8542	8878	9175	10335
1422	1564	1794	2243	2494	2682	2975	3277	3466	3658	3959	4445	4983	5362	5897	7623	7966	8309	9426	10776
18	53	80	118	138	160	186	214	235	251	274	311	332	342	353	372	380	393	425	470
397	861	1294	1894	2355	2780	3338	3810	4077	4337	4720	6718	8198	9972	11071	11101	11122	11148	11707	12170
698	1303	1732	2283	2609	2894	3236	3560	3785	3982	4294	4815	5367	5900	6578	7888	8996	10622	11110	11570
1571	1825	2044	2362	2568	2746	2994	3264	3458	3634	3931	4431	4985	5398	6646	7780	9016	10214	10795	10833
15	53	76	114	134	156	180	197	210	227	244	274	305	327	350	371	392	394	413	432
71	179	288	381	445	501	557	600	627	648	673	726	776	809	807	765	752	746	748	743
208	364	428	534	573	588	606	619	628	658	663	620	620	653	531	519	521	524	530	486
758	618	654	685	682	590	683	617	623	637	638	640	651	612	574	557	539	519	495	453
0	0	0	1	4	4	5	5	5	5	6	6	8	7	7	7	7	7	7	6
71	173	261	354	387	431	478	511	528	536	566	585	604	625	648	667	688	697	694	694
209	358	426	583	541	552	562	566	568	582	603	605	571	531	498	489	490	488	487	459
924	752	763	738	713	699	687	652	617	586	559	514	489	452	428	411	389	363	352	327
0	0	0	2	3	3	4	4	4	4	6	6	6	6	6	7	7	8	9	8
76	163	249	337	376	408	449	484	494	506	532	557	580	594	613	617	610	683	604	605
211	356	415	586	545	567	574	573	565	571	563	536	536	474	434	416	413	401	394	380
989	866	898	821	739	684	612	568	540	520	474	427	387	342	300	272	256	235	222	208
0	0	0	2	3	4	4	5	5	5	5	5	5	6	7	8	8	8	8	7

Flows (cfs)
 ← Adult WUA
 ← Juvenile WUA
 ← Fry WUA
 ← spawning WUA
 WUA from the one-flow simulation based on the highest flow measured
 The intermediate flow
 The lowest flow

Reach 09

Reach 10

Reach 11

Bishop Creek Rainbow Trout WOA (4+ 71000+) Leaches 7-11

COPY RBTWJA91.DAT PRN

1	3	5	8	10	12	15	18	20	22	25	30	35	40	45	50	55	60	65	70
148	319	433	608	721	828	958	1098	1179	1258	1349	1450	1496	1530	1527	1523	1514	1497	1463	1419
422	928	1258	1612	1756	1803	1777	1750	1753	1749	1734	1646	1559	1432	1372	1272	1157	1082	1024	969
1297	1953	2344	2443	2363	2299	2255	2180	2106	2029	1897	1680	1494	1381	1276	1209	1110	1022	942	874
0	0	0	0	1	1	2	4	5	5	7	8	10	10	10	9	9	9	10	10
149	317	428	611	725	825	976	1120	1200	1267	1316	1382	1428	1474	1477	1471	1464	1456	1438	1431
423	919	1249	1591	1762	1826	1786	1724	1724	1724	1711	1635	1538	1434	1343	1252	1167	1124	1115	1109
1317	1963	2334	2399	2357	2362	2235	2099	2019	1946	1858	1738	1559	1418	1326	1250	1165	1068	1017	977
0	0	0	0	0	1	1	2	2	3	3	3	3	4	5	7	10	12	12	13
167	326	439	582	685	767	908	1039	1129	1197	1265	1373	1454	1508	1551	1611	1634	1633	1615	1596
413	882	1169	1457	1576	1598	1599	1628	1653	1650	1659	1634	1581	1542	1513	1493	1437	1385	1350	1337
1312	1898	2245	2377	2337	2325	2283	2203	2132	2041	1923	1782	1740	1726	1706	1645	1651	1606	1519	1420
0	0	0	0	0	0	0	2	1	2	2	4	6	9	10	11	12	13	20	58
508	845	1222	1770	2158	2530	3056	3563	3890	4193	4625	5287	7218	7876	9089	10150	10623	11343	12025	12730
425	1023	1701	2558	3132	3614	4117	4523	5043	5973	7940	10877	12739	13835	14870	16375	17794	19018	21411	24458
1538	2326	2595	3093	3357	3575	3830	4032	4186	4298	4459	4756	6007	7034	8111	9161	9996	10501	11202	11816
12	22	32	46	65	84	108	171	221	257	314	407	504	568	711	1067	1136	1185	1204	1220
514	847	1222	1807	2233	2642	3170	3615	3900	4175	4595	5603	7124	7572	8889	11026	11580	11990	12554	12920
428	1018	1659	2494	3005	3507	4195	4774	5420	6082	7024	9405	13355	15768	16353	17630	20961	26387	34343	43257
1541	2318	2617	3130	3420	3639	3950	4245	4447	4604	4833	5249	7088	7408	7909	10531	11386	11585	12001	12130
12	22	33	49	64	80	135	177	207	223	275	364	425	463	530	649	680	917	1198	1309
542	898	1321	1898	2313	2727	3250	3714	4009	4301	4718	6331	7682	9296	10322	10485	10640	10789	11486	11979
451	1051	1662	2546	3107	3655	4284	5081	5816	6811	9012	13118	14597	15065	15333	16563	19348	24977	32724	40886
1543	2353	2629	3192	3520	3718	4002	4290	4457	4623	4864	5868	7094	8919	10269	10434	10439	10484	10651	11098
12	21	31	48	60	74	127	190	208	227	271	351	419	463	521	599	623	639	666	688
67	156	240	398	479	547	614	660	680	713	743	781	803	847	881	915	955	1002	1028	1048
306	546	681	759	769	762	794	812	801	780	757	689	648	618	607	602	573	537	517	503
784	1065	1112	1043	1023	1004	974	923	905	885	850	864	900	903	906	900	900	901	905	919
0	0	0	0	0	0	0	0	0	1	0	1	2	2	3	4	5	6	7	6
66	151	230	347	410	467	526	556	574	593	605	633	679	692	732	756	785	817	836	866
295	499	618	667	661	666	667	664	659	665	657	634	602	581	590	579	550	525	495	477
768	1017	1077	1014	978	948	936	918	911	915	909	938	964	937	896	862	846	860	877	874
0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	2	2	3	3	3
62	151	214	321	373	423	496	549	576	596	642	684	736	771	801	816	822	824	830	835
285	464	570	632	618	621	647	658	662	661	622	573	525	494	462	442	400	366	356	343
766	965	1027	963	967	960	937	929	918	928	916	843	756	687	637	649	657	653	621	600
0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	2	3	3	3	3

←

Reach 0

Reach 0

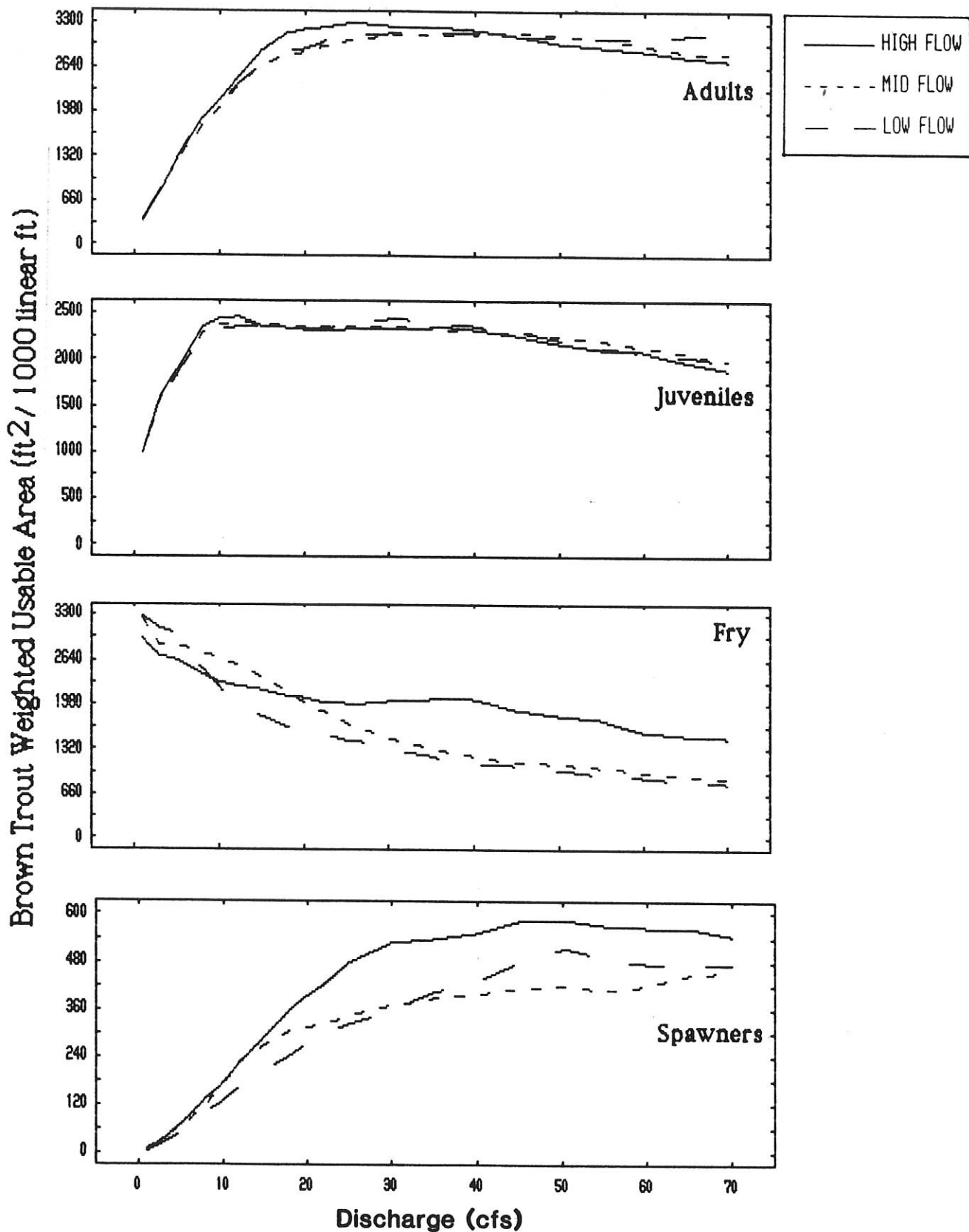
Reach 0

Bishop Creek Brown Trout WUA ($ft^2/1000ft$) Reaches 9-11

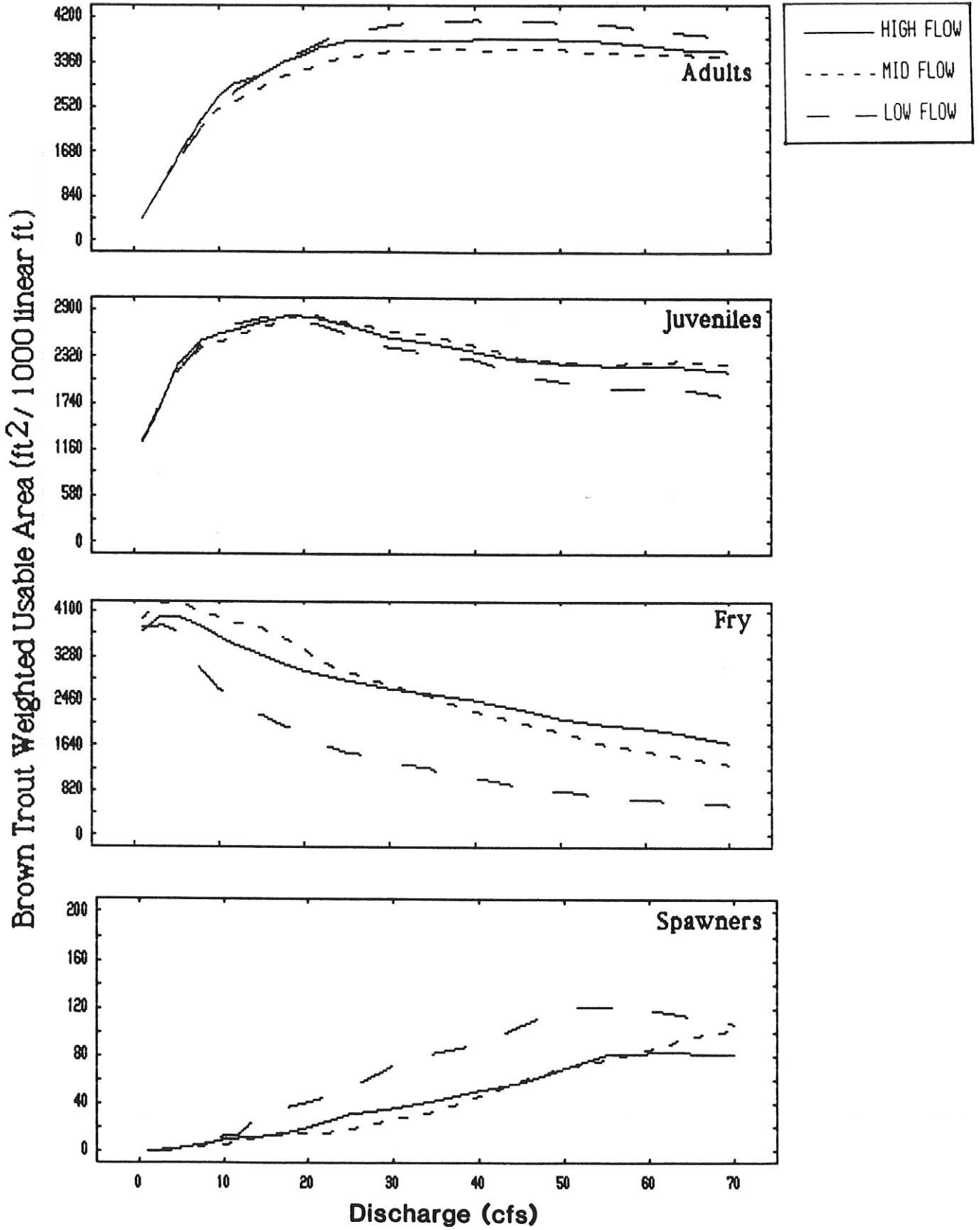
COPY BRNMUA91.DAT PRN

1	3	5	8	10	12	15	18	20	22	25	30	35	40	45	50	55	60	65	70	← Q
27	117	208	345	426	492	586	666	712	751	823	898	948	990	1002	991	997	990	970	961A	} High velocity
84	245	386	547	632	688	759	809	825	839	842	885	909	921	933	929	936	935	922	904J	
906	1047	1057	1074	1064	1036	980	939	922	889	840	776	718	677	642	614	578	543	531	514F	
4	12	13	13	9	8	7	6	6	6	6	5	6	6	6	7	6	7	7	85	} Reach 9
28	118	208	335	428	496	583	653	714	762	823	908	930	962	973	973	978	995	994	986A	
83	244	379	559	631	684	766	816	824	831	835	881	913	934	937	941	959	978	1000	1000J	
895	1000	1142	1162	1146	1115	1055	1004	984	950	912	833	782	727	681	638	611	601	578	572F	} low velo
5	10	8	5	4	3	3	3	4	4	2	2	2	3	4	4	5	6	8	95	
32	121	206	332	425	491	575	648	689	725	777	867	924	984	1026	1074	1097	1095	1111	1119A	
81	237	380	560	631	679	731	777	803	831	859	941	1007	1054	1076	1099	1120	1153	1171	1227J	} Reach 10
1047	1288	1324	1319	1287	1254	1197	1125	1103	1074	1013	926	863	796	764	738	707	696	723	739F	
5	9	4	3	3	1	0	0	1	1	2	2	3	5	7	7	8	9	10	125	
348	770	1156	1700	2126	2528	3059	3539	3806	4053	4382	4888	7129	7752	9131	10469	11105	12021	12705	13527	} Reach 11
644	1193	1612	2162	2477	2743	3032	3302	3494	3663	3915	4367	4871	5378	5883	6498	7916	8602	9165	9809	
1306	1423	1637	2060	2295	2489	2789	3066	3260	3464	3751	4271	4728	5134	5579	6925	7780	8324	9078	9557	
16	52	77	114	141	169	202	242	261	274	311	362	406	433	454	497	521	523	650	900	} Reach 11
365	792	1199	1778	2234	2656	3226	3700	3968	4223	4589	5638	7490	7815	9226	11899	12446	12800	13385	13491	
662	1229	1655	2205	2539	2819	3166	3477	3696	3883	4179	4700	5233	5774	6288	6990	8542	8878	9175	10335	
1422	1564	1794	2243	2494	2682	2975	3277	3466	3668	3959	4445	4903	5362	5897	7623	7966	8309	9426	10776	} Reach 11
18	53	80	118	138	160	186	214	235	251	274	311	332	342	353	372	380	393	425	470	
397	861	1294	1894	2355	2780	3338	3810	4077	4337	4720	6718	8198	9972	11071	11101	11122	11148	11787	12170	
688	1303	1732	2283	2609	2894	3236	3560	3785	3982	4294	4815	5367	5900	6578	7888	8996	10022	11110	11570	} Reach 11
1571	1825	2044	2362	2560	2746	2994	3264	3450	3634	3931	4431	4905	5398	6646	7780	9016	10214	10795	10833	
15	53	76	114	134	156	180	197	210	227	244	274	305	327	350	371	392	394	413	432	
71	179	288	381	445	501	557	600	627	648	673	726	776	809	807	765	752	746	748	743	} Reach 11
208	364	426	534	573	588	606	619	628	658	663	620	563	531	519	521	524	530	524	488	
758	618	654	605	602	590	603	617	623	637	638	640	651	612	574	557	539	519	495	453	
0	0	1	4	4	4	5	5	5	5	6	6	8	7	7	8	7	7	7	6	} Reach 11
71	173	261	354	387	431	478	511	528	536	566	585	604	625	648	667	688	697	694	694	
209	358	426	503	541	552	562	566	560	582	603	605	571	531	498	489	490	488	487	459	
924	752	763	730	713	699	687	652	617	586	559	514	489	452	428	411	389	363	352	327	} Reach 11
0	0	0	2	3	3	4	4	4	4	6	6	6	6	7	7	8	9	9	8	
76	163	249	337	376	408	449	484	494	506	532	557	580	594	613	617	610	603	604	605	
211	356	415	506	545	567	574	573	565	571	563	536	502	474	434	416	413	401	394	380	} Reach 11
989	866	898	821	739	684	612	560	540	520	474	427	387	342	300	272	256	235	222	208	
0	0	2	3	4	4	4	5	5	5	5	5	5	6	7	8	8	8	7	8	

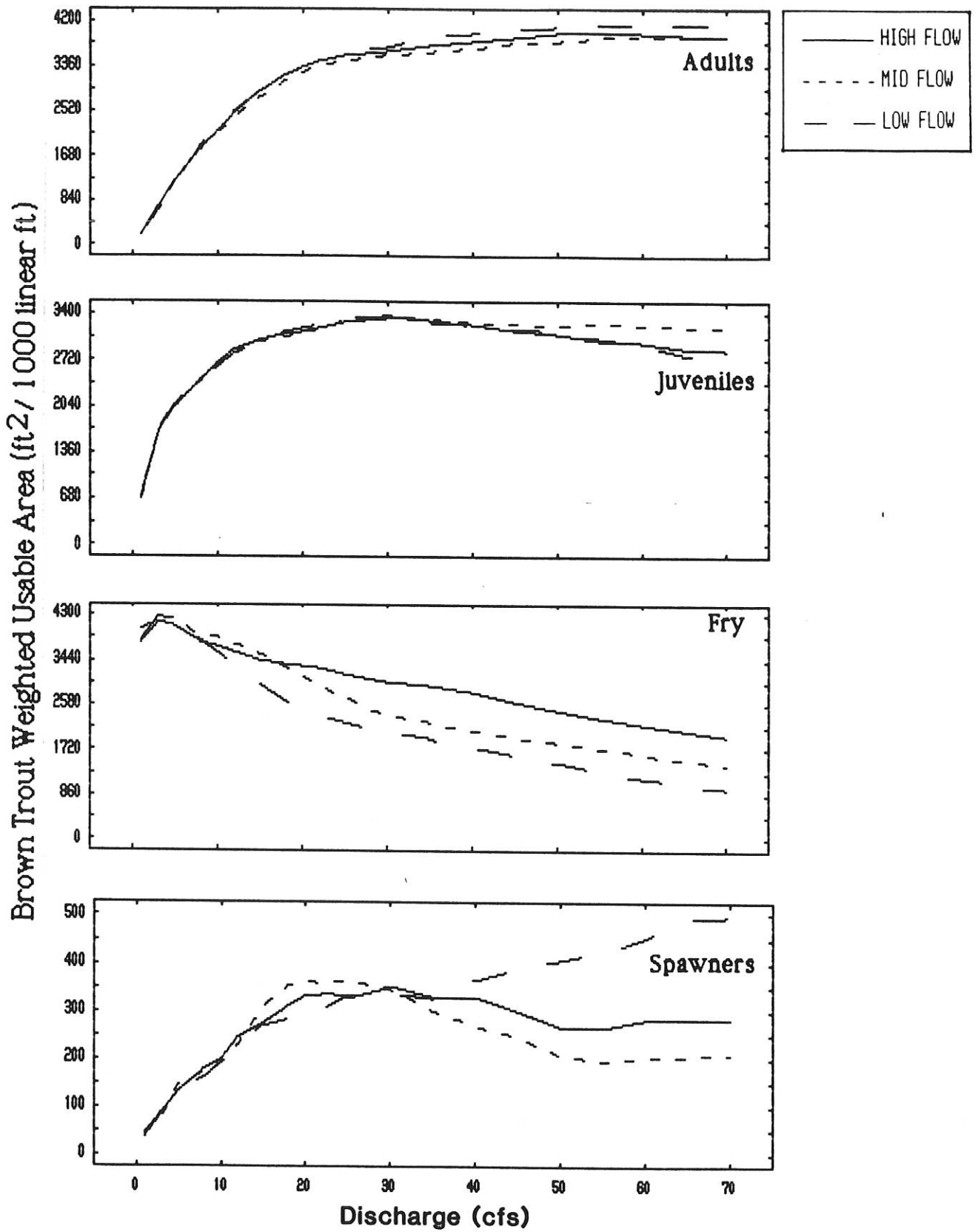
Reach 01: Below Plant No. 5



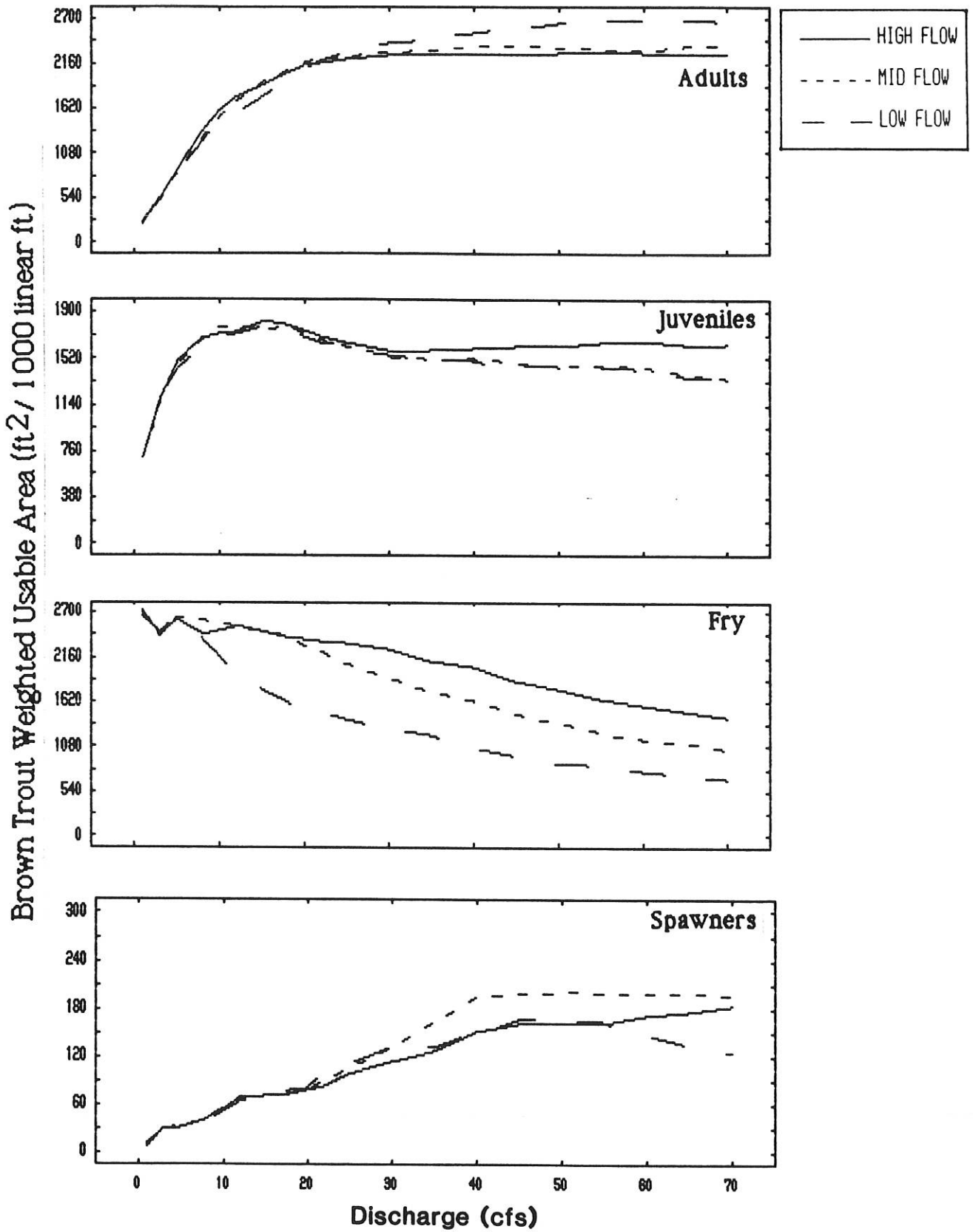
Reach 02: Below Plant No. 4



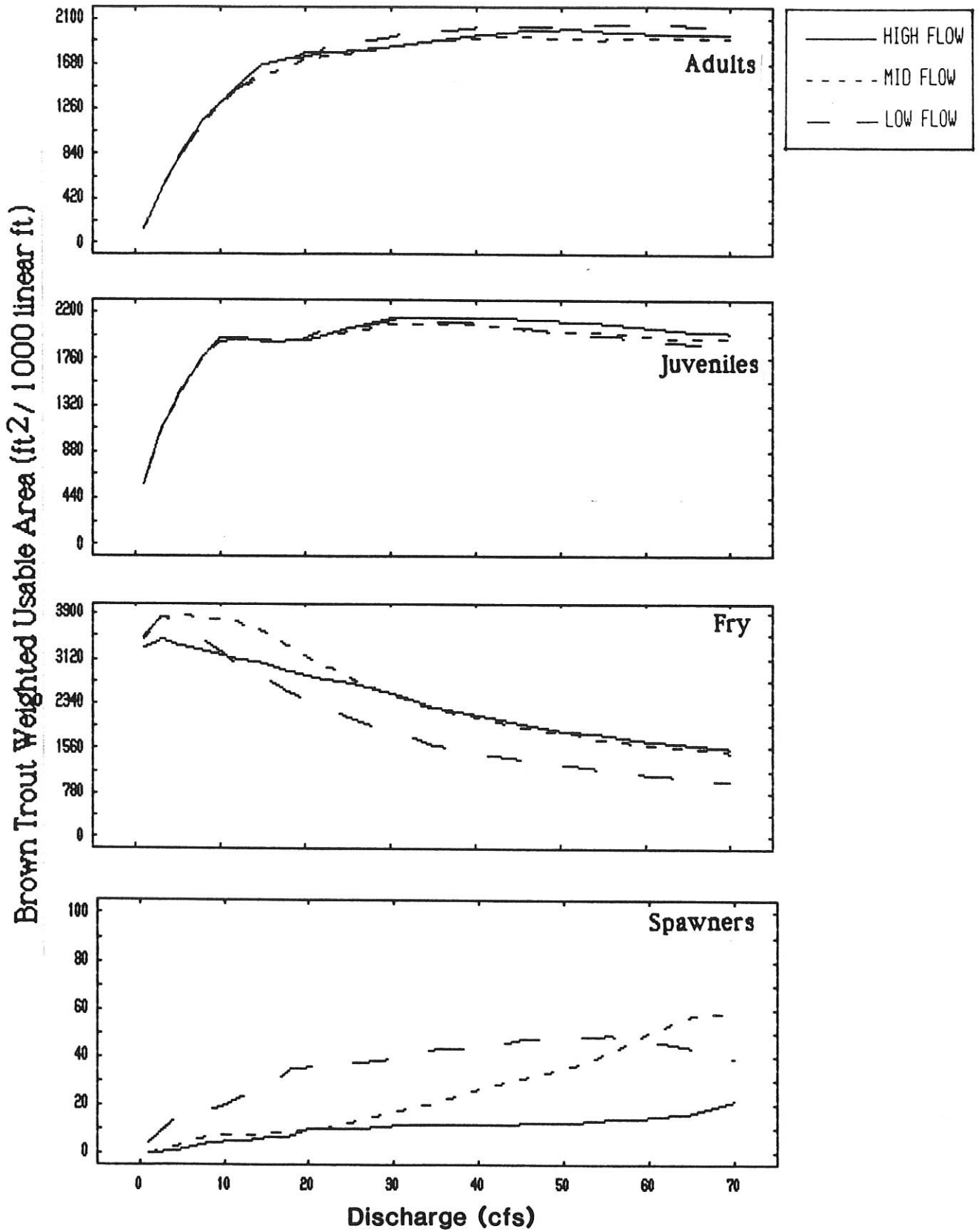
Reach 03: Below Coyote Ck. Confluence



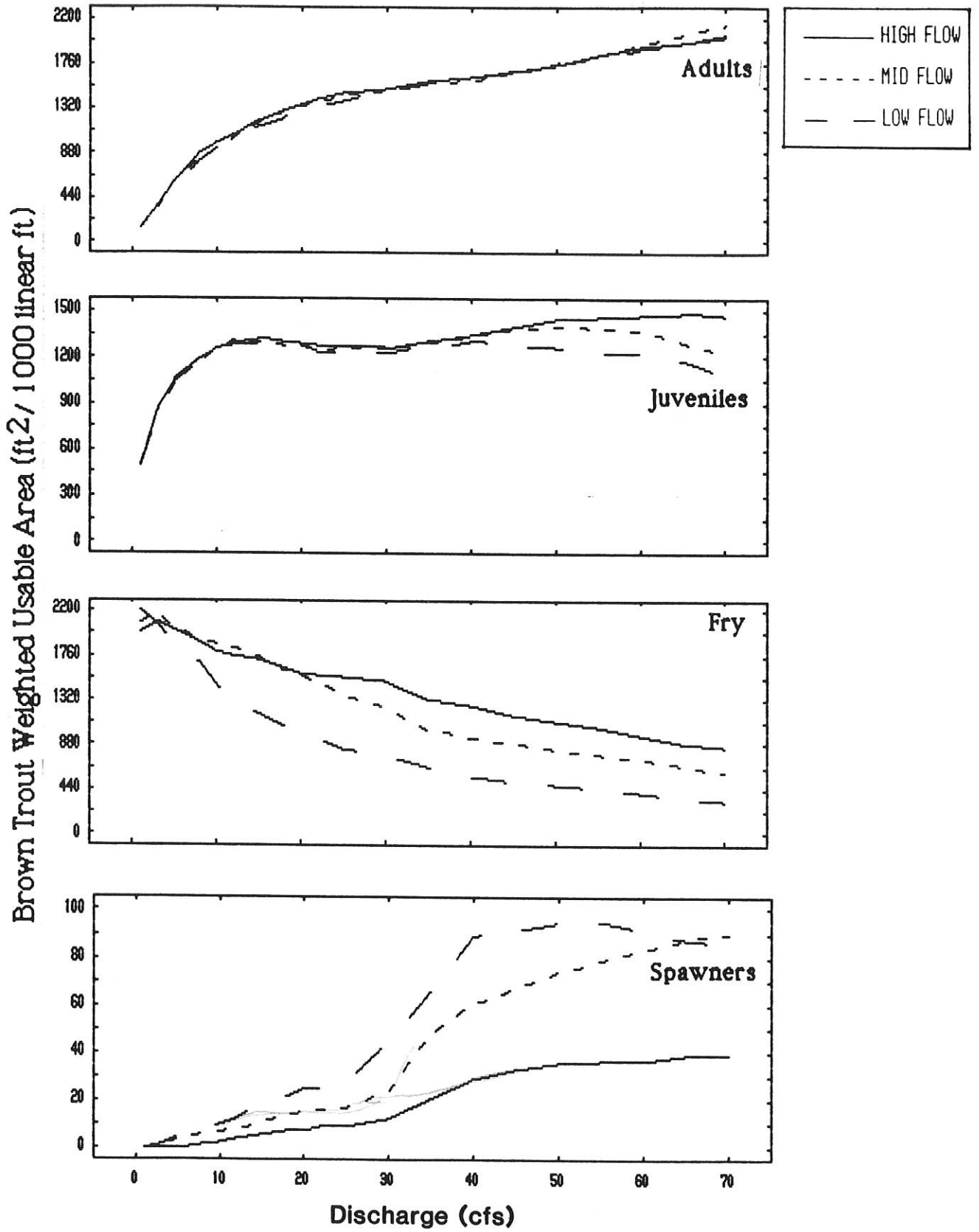
Reach 04: Above Coyote Ck. Confluence



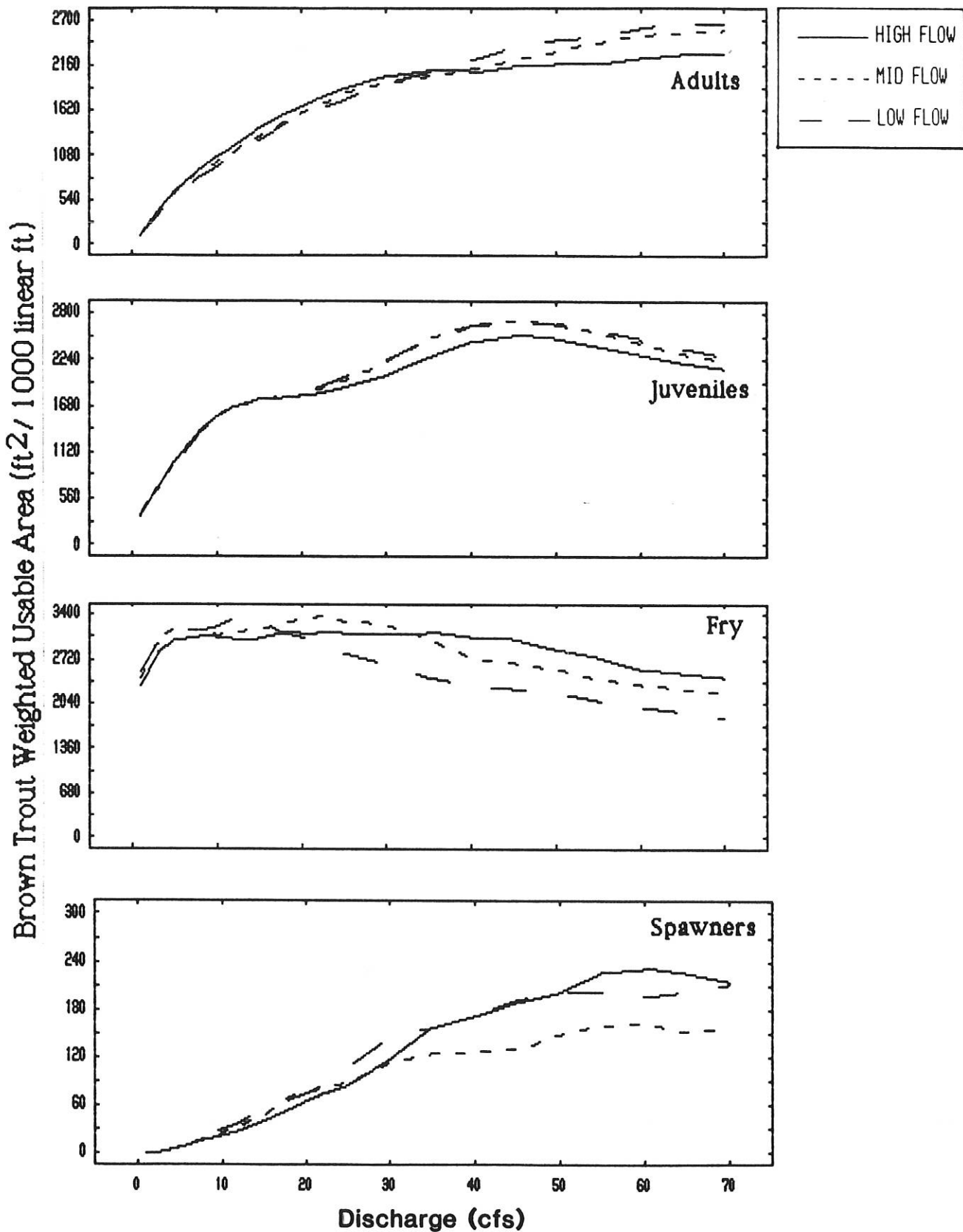
Reach 05: Below Plant No. 2



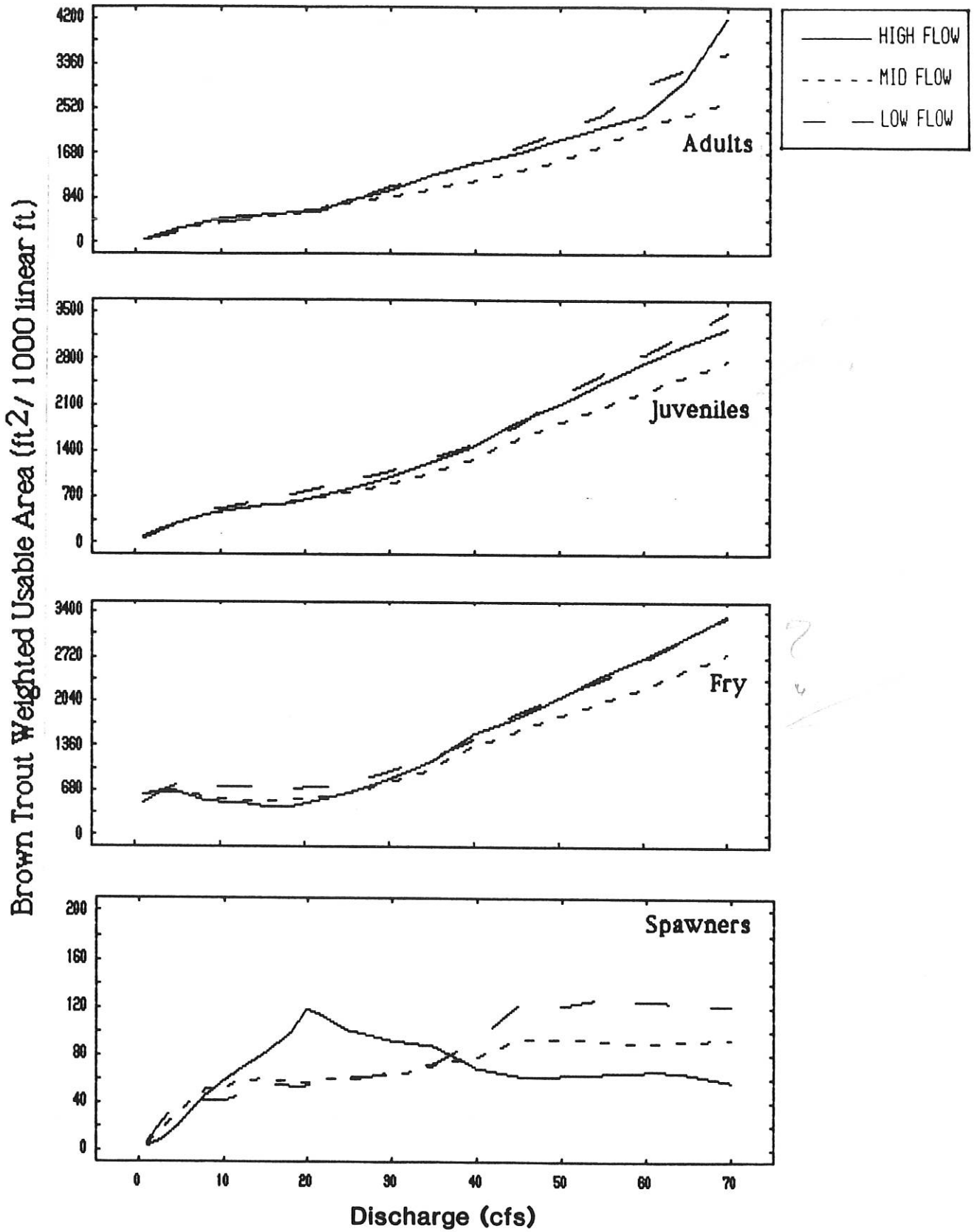
Reach 06: Below Intake No. 2



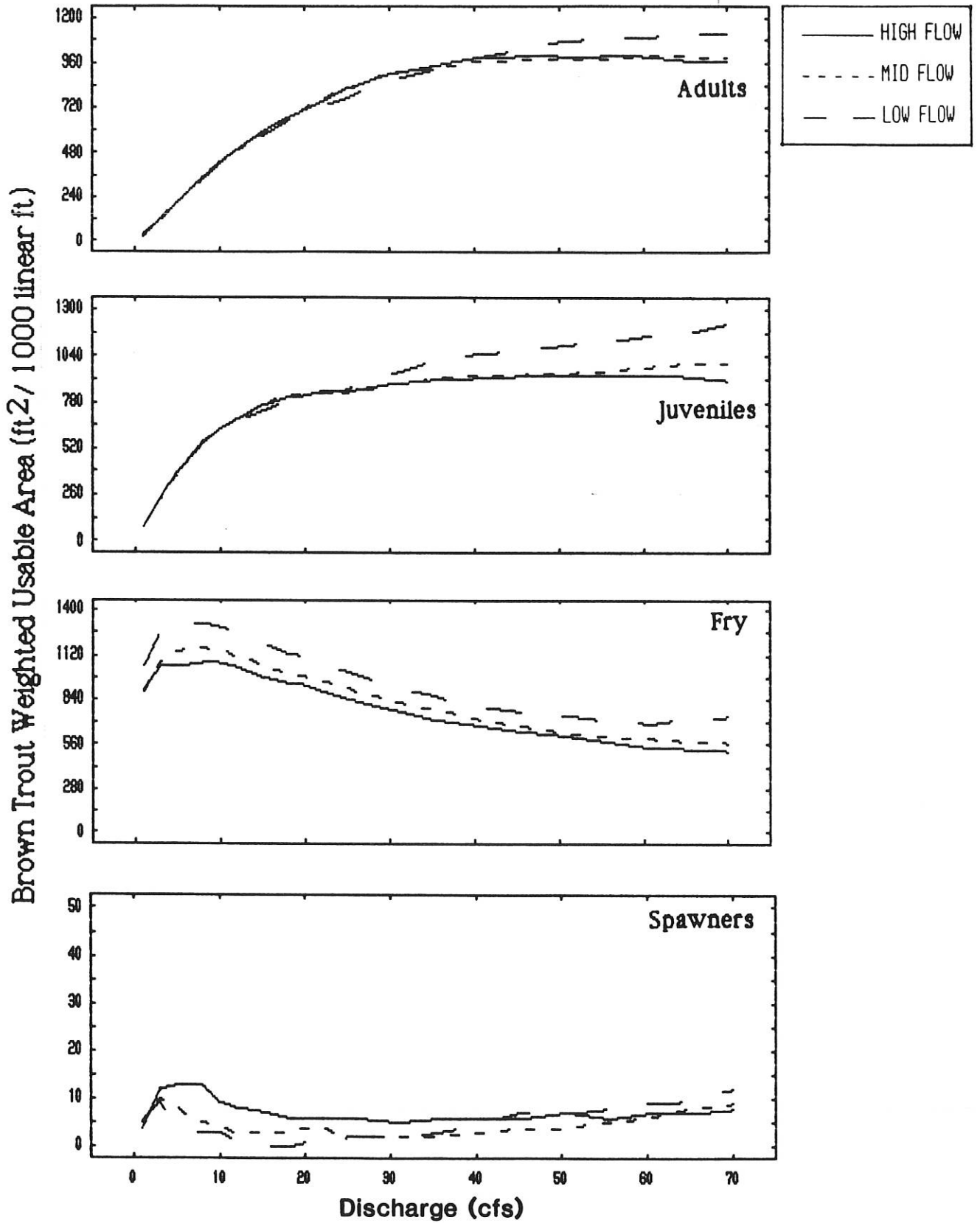
Reach 07: Above Intake No. 2



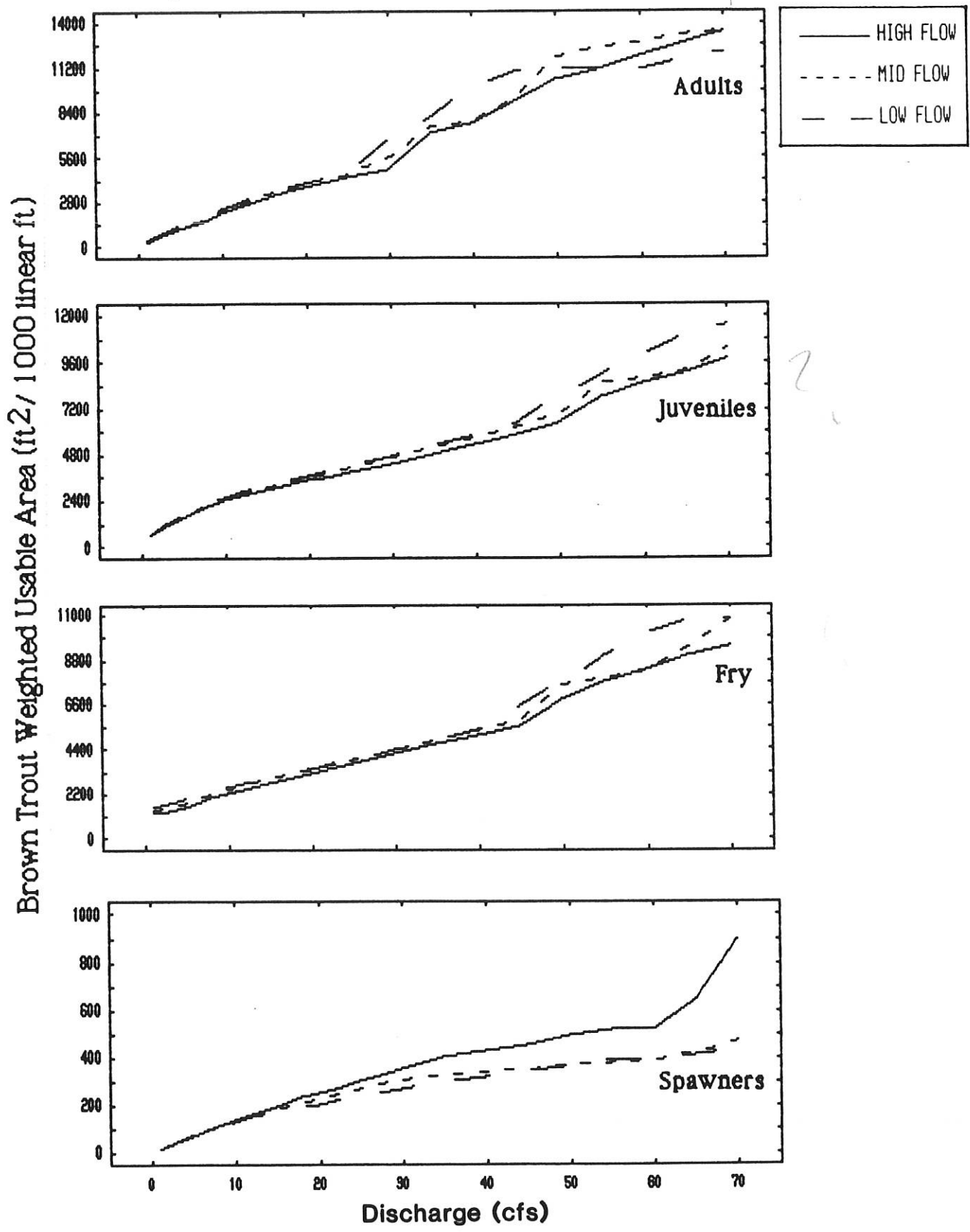
Reach 08: 0.5 mi below South Fork diversion



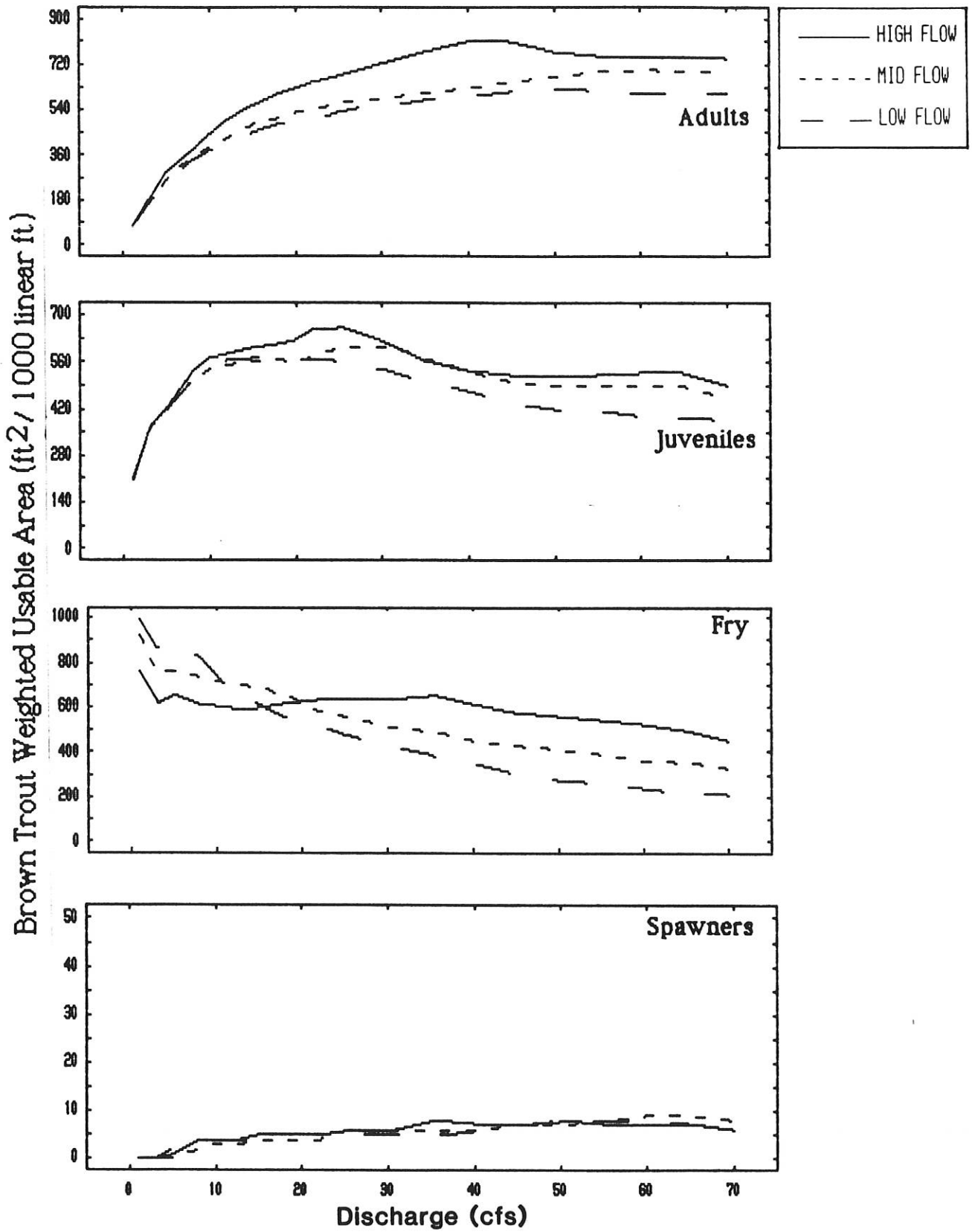
Reach 09: SF, .25 Mi. Below Tyee Ck. Confluence



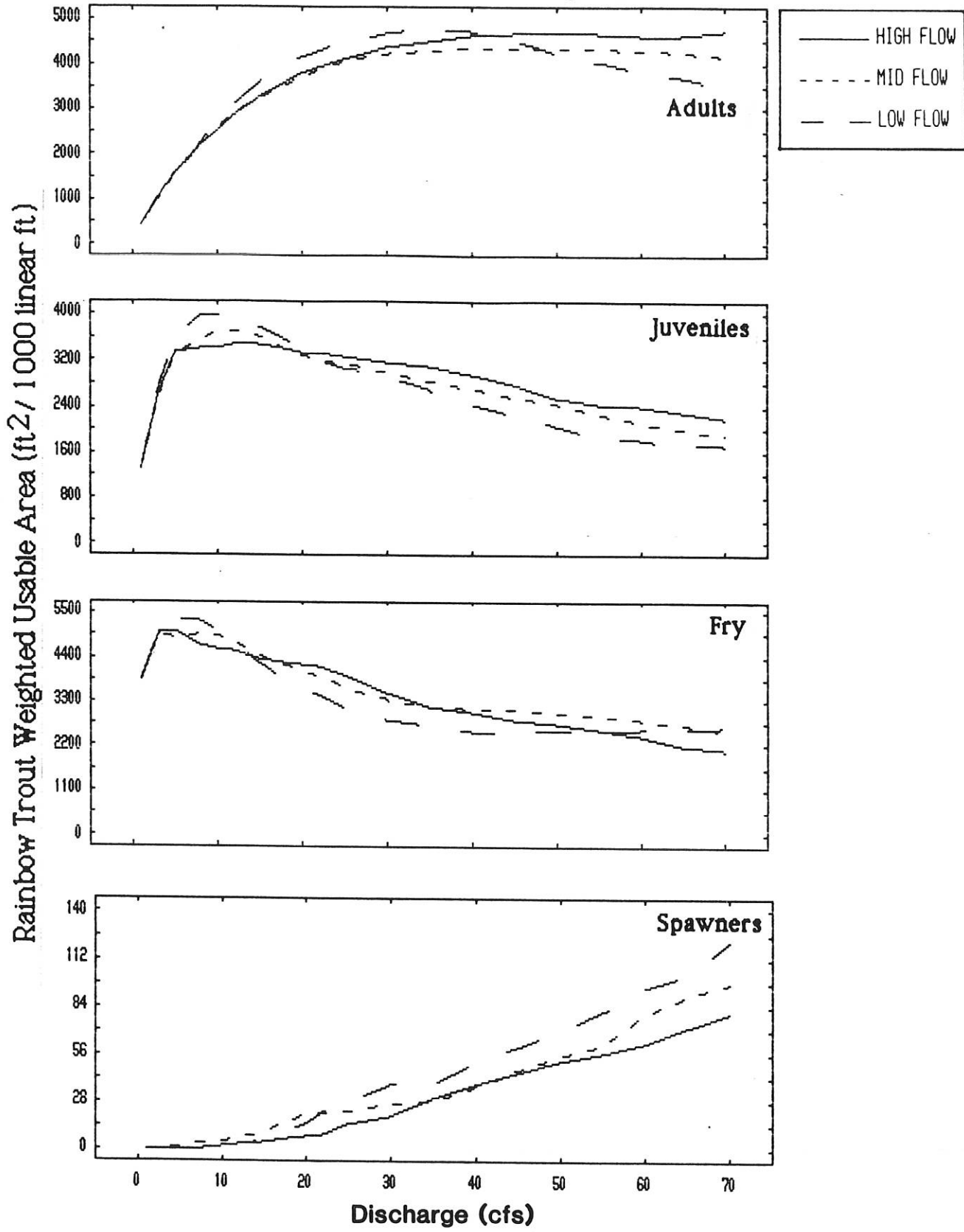
Reach 10: SF, 1.25 Mi. Below Tyee Ck. Confluence



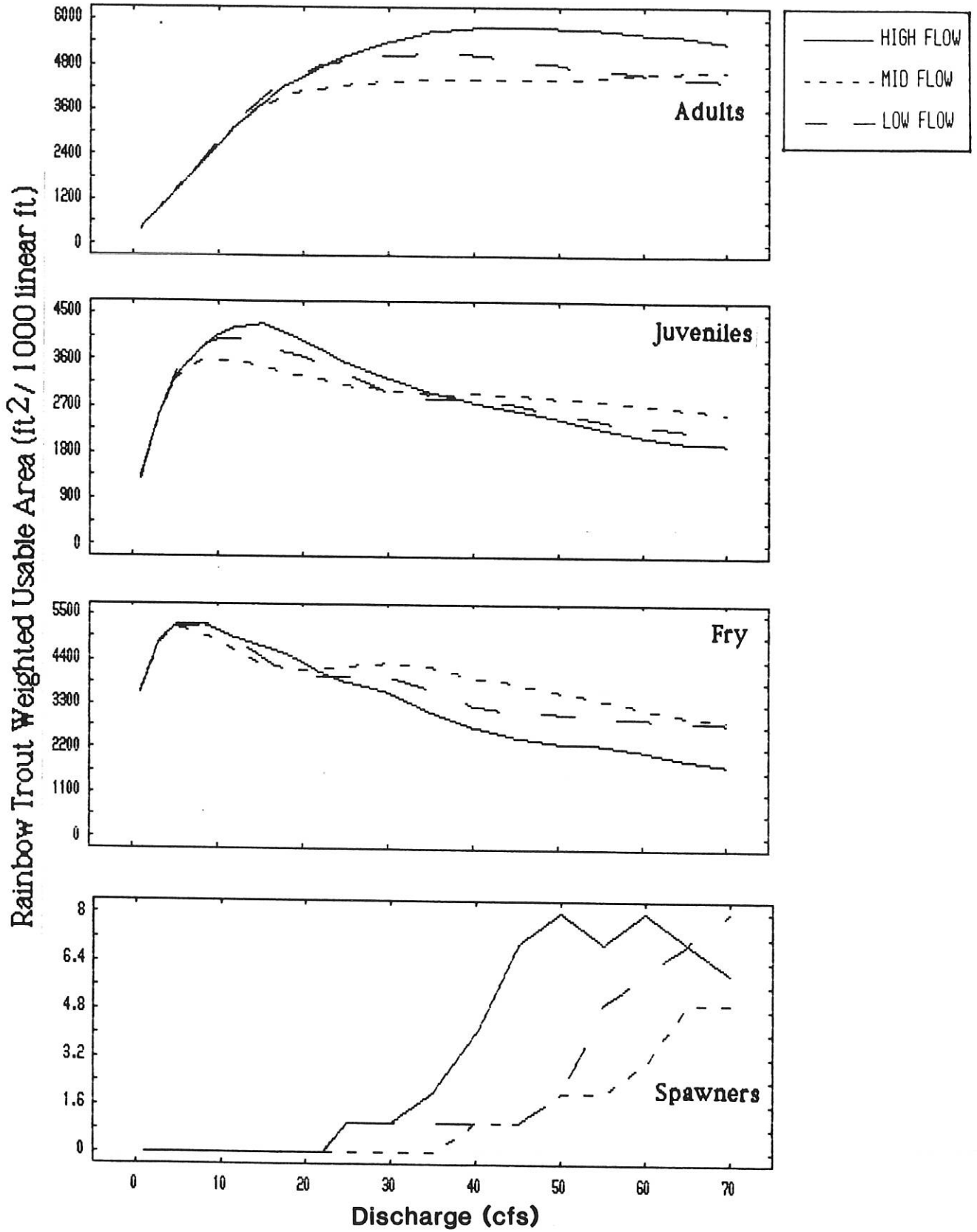
Reach 11: 1.5 mi below South Fork diversion



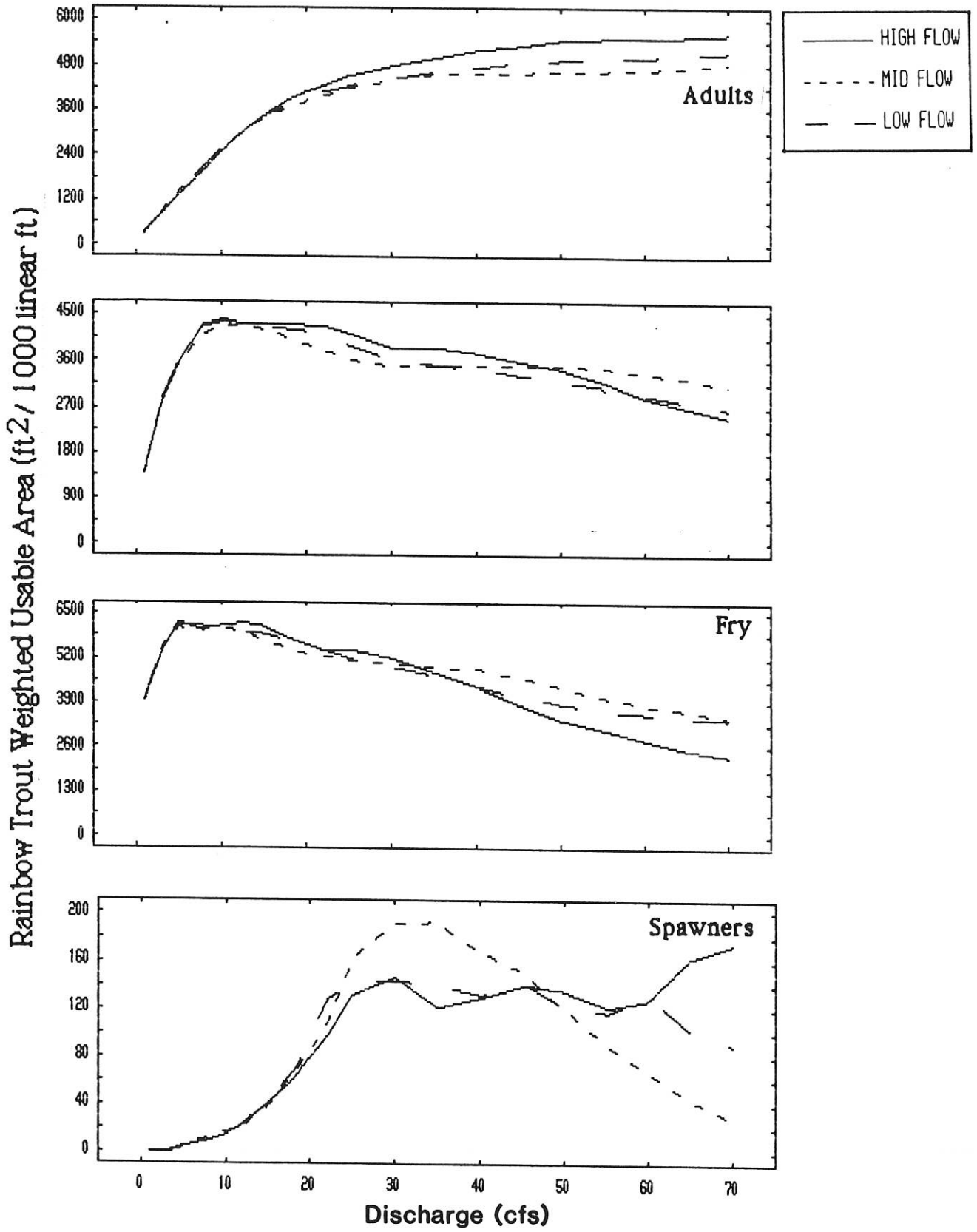
Reach 01: Below Plant No. 5



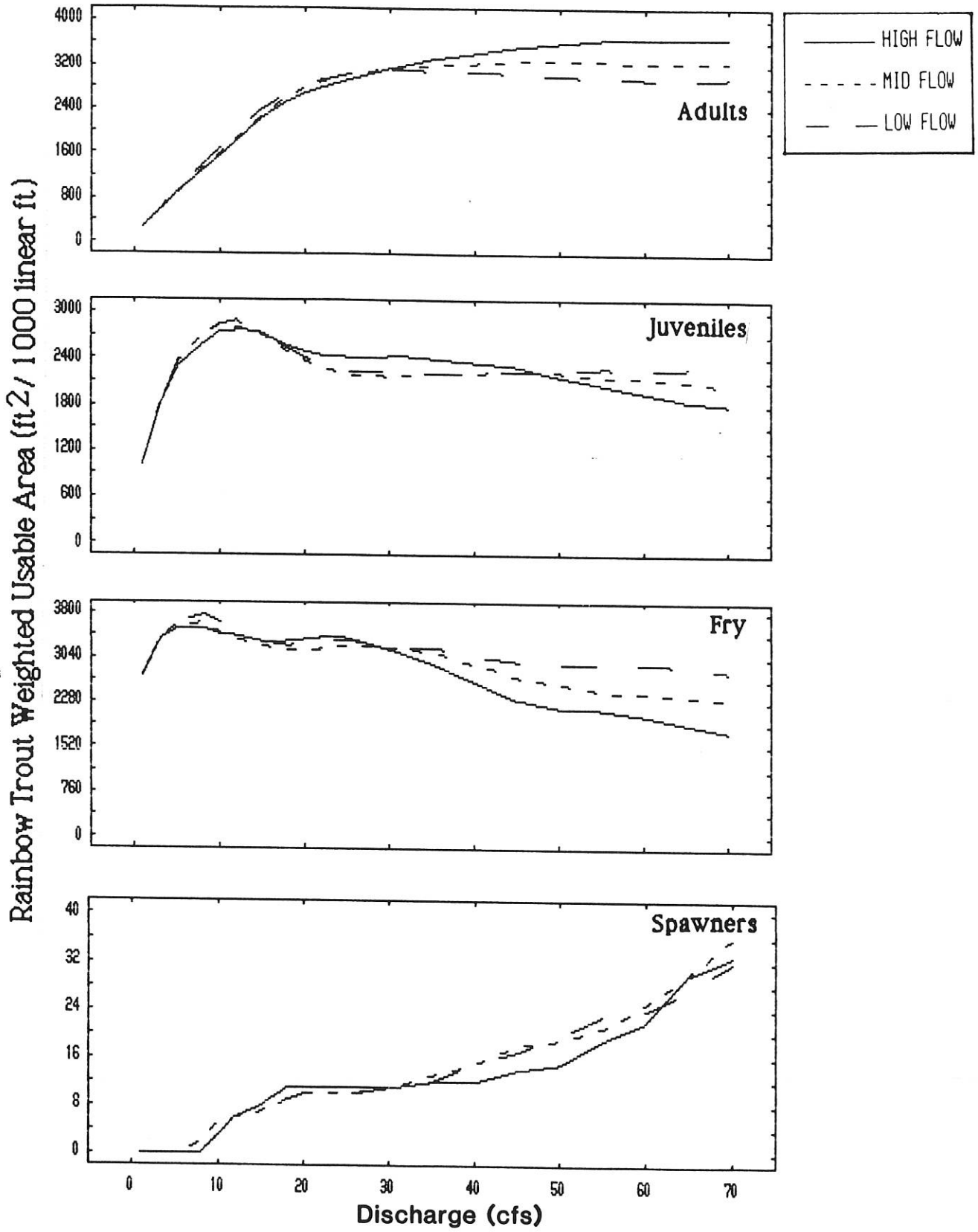
Reach 02: Below Plant No. 4



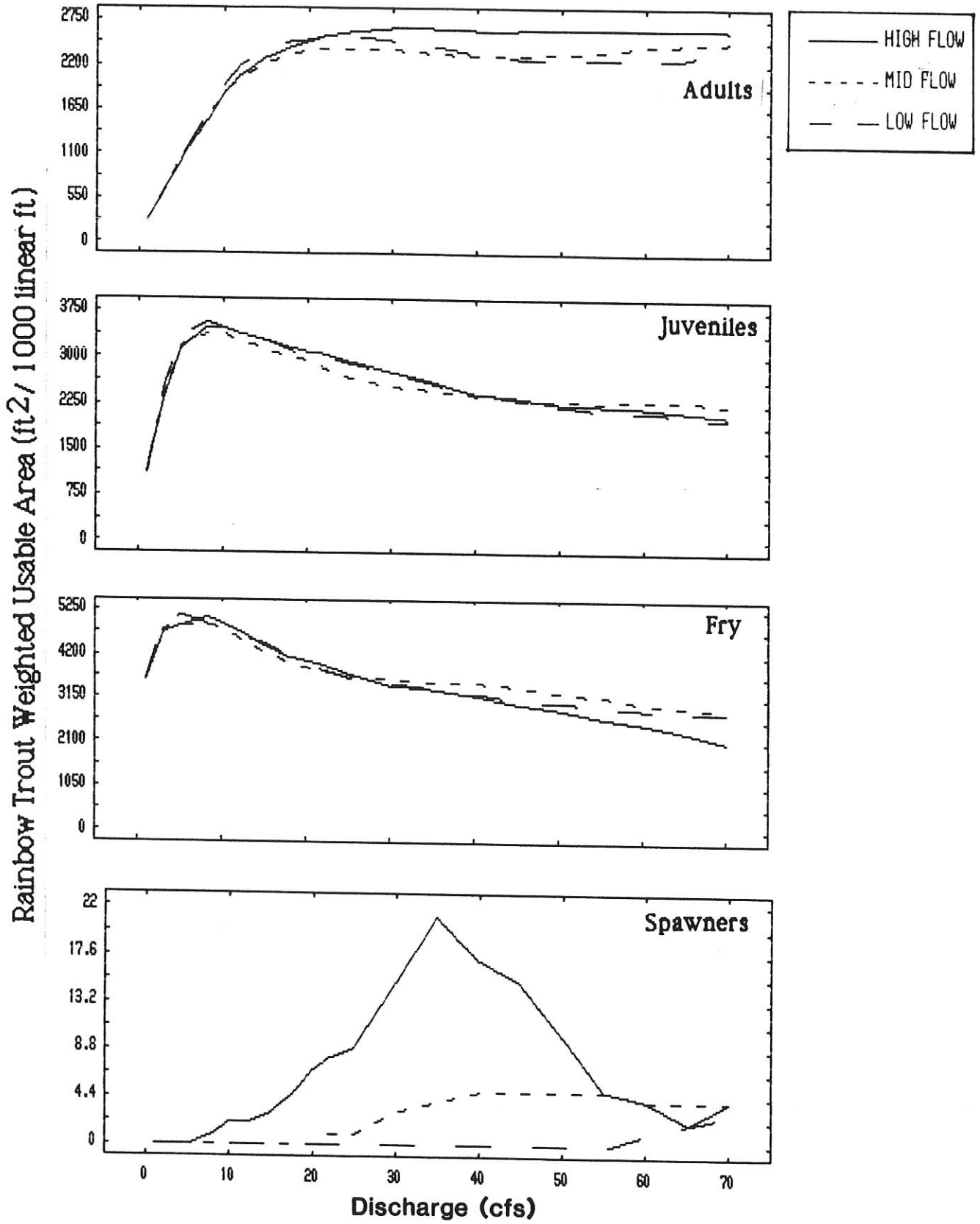
Reach 03: Below Coyote Ck. Confluence



Reach 04: Above Coyote Ck. Confluence

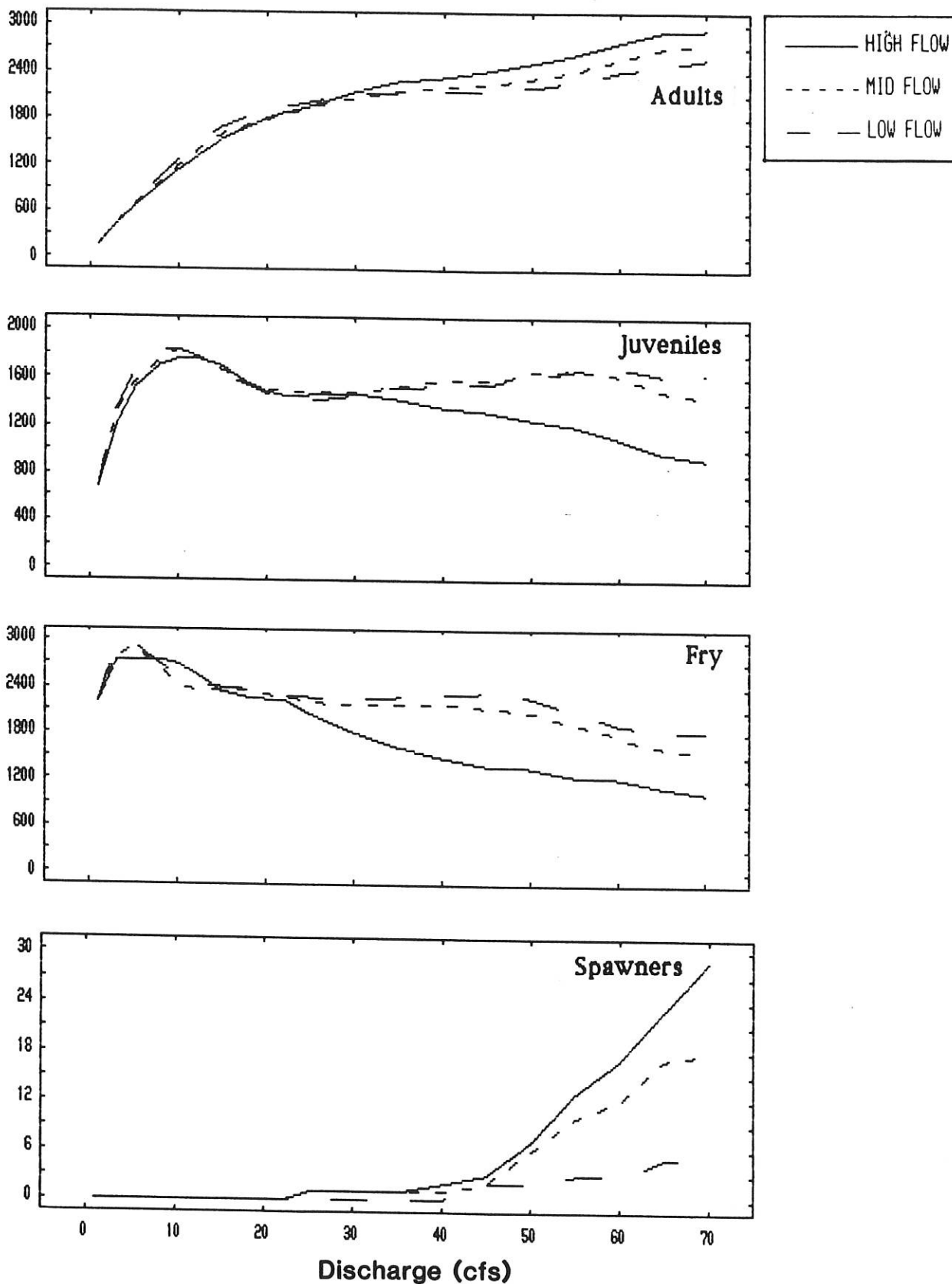


Reach 05: Below Plant No. 2

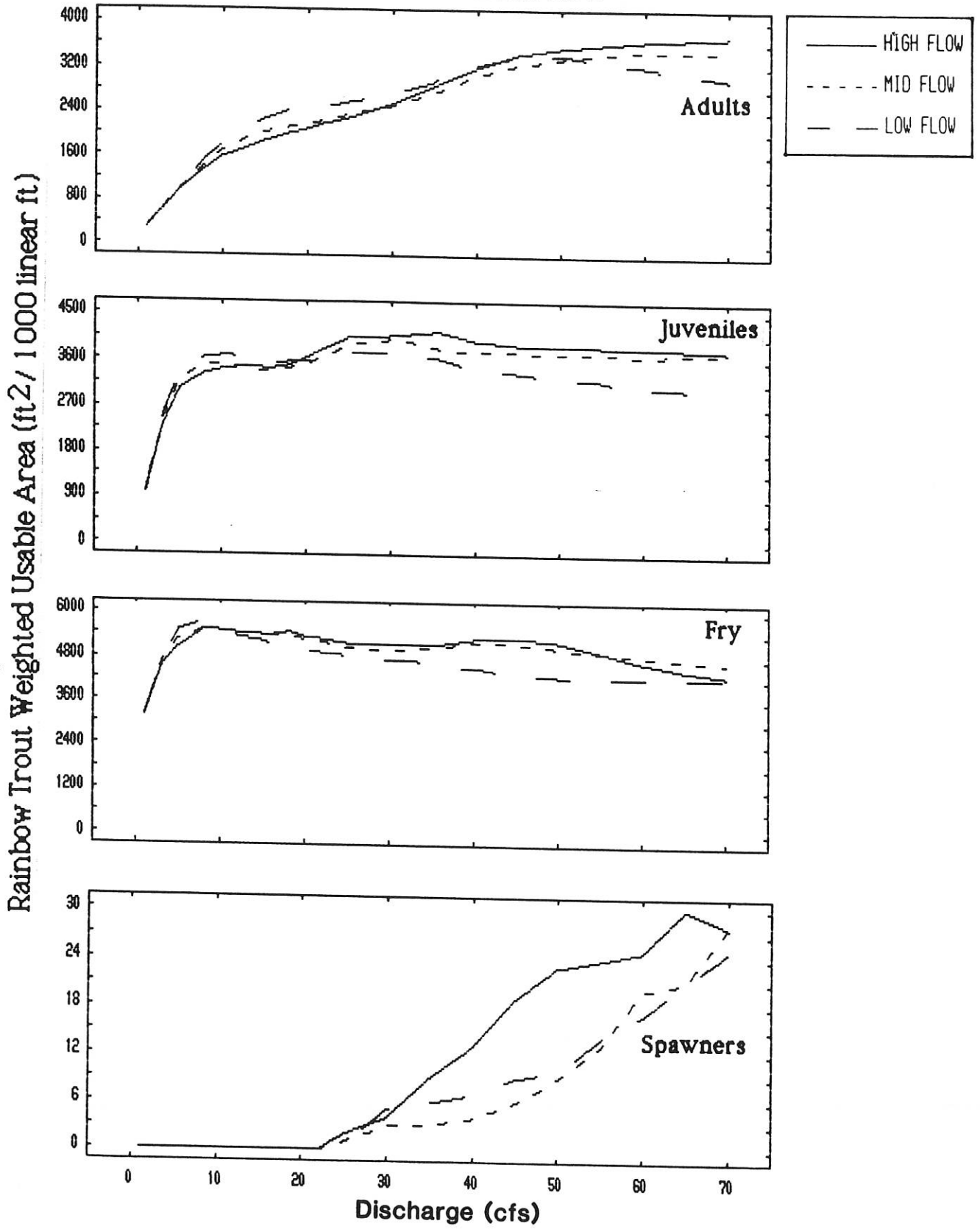


Reach 06: Below Intake No. 2

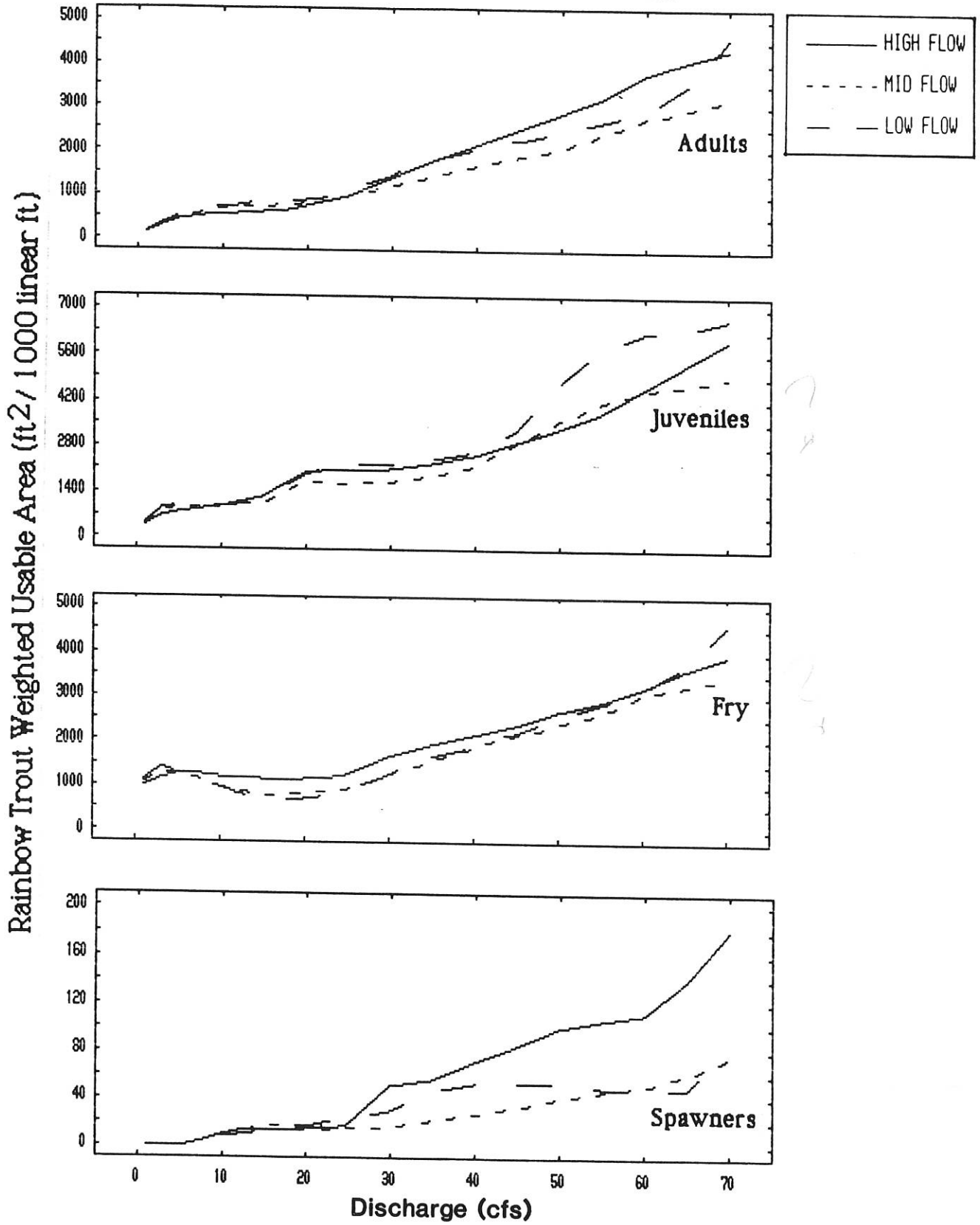
Rainbow Trout Weighted Usable Area (ft²/ 1000 linear ft)



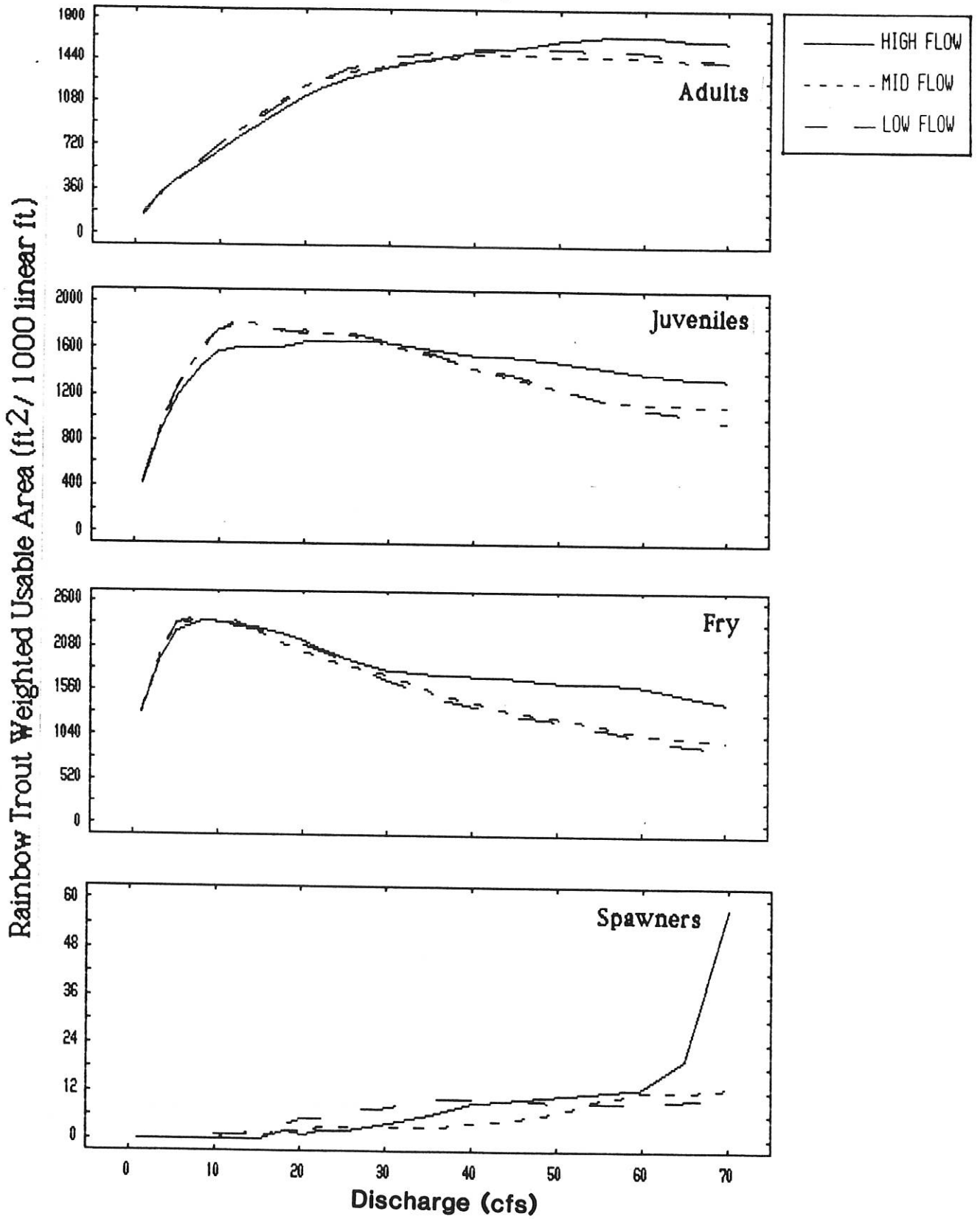
Reach 07: Above Intake No. 2



Reach 08: 0.5 mi below South Fork diversion

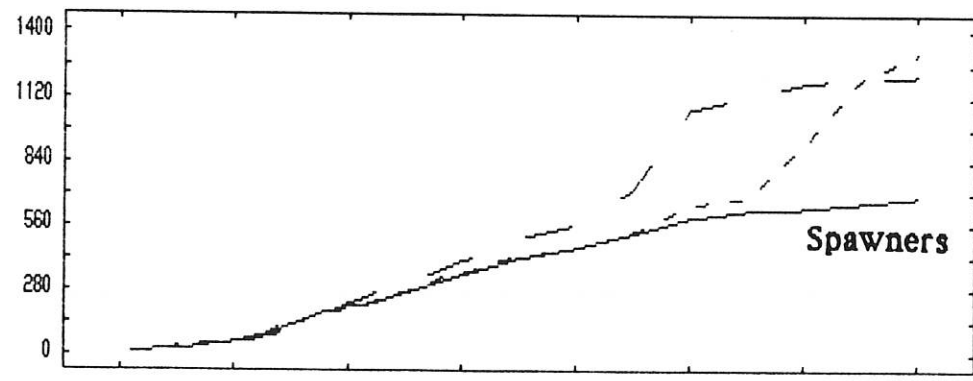
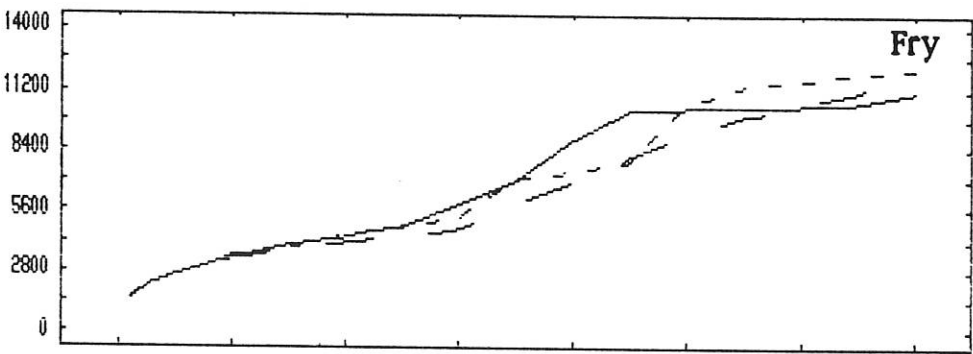
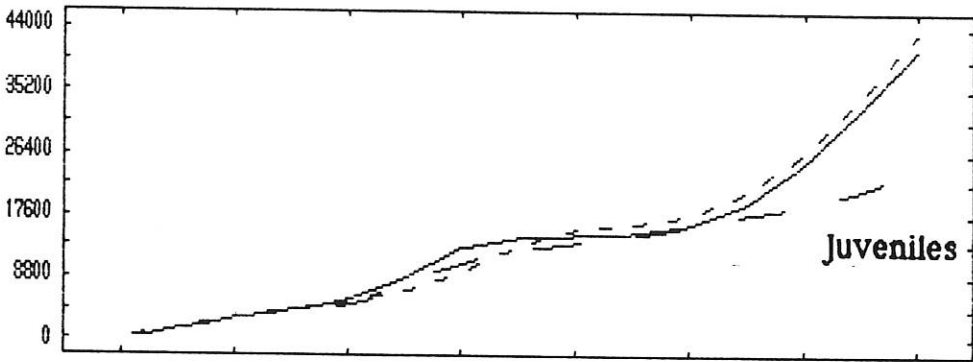
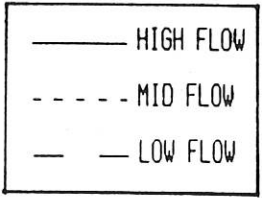
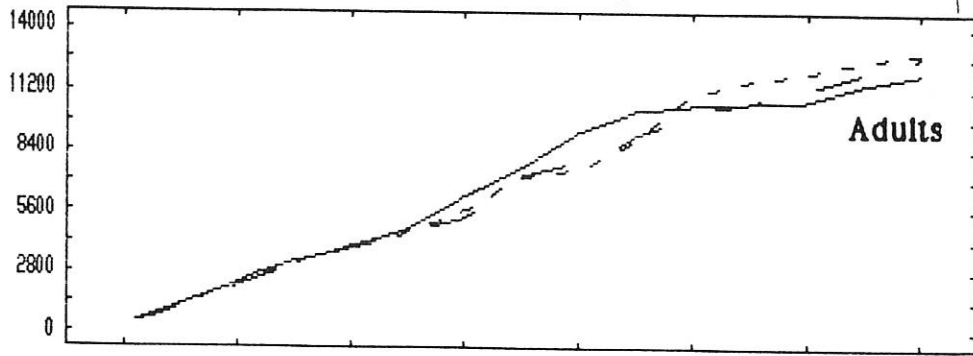


Reach 09: SF, .25 Mi. Below Tyee Ck. Confluence



Reach 10: SF, 1.25 Mi. Below Tyee Ck. Confluence

Rainbow Trout Weighted Usable Area (ft² / 1000 linear ft)



Discharge (cfs)

Reach 11: 1.5 mi below South Fork diversion

Rainbow Trout Weighted Usable Area (ft²/1000 linear ft)

