Appendix A10 Tables

Table 1. Selectivity at age used as a fix input to ASAP catch at age model.

Age	Selectivity
1	0.01
2	0.14
3	0.34
4	0.47
5	0.61
6	0.67
7	0.73
8	0.82
9	0.92
10	1.00
11	1.00
12	1.00
13	1.00

Table 2. Residual sum of squares, number of years, lambda, and log likelihood values of indices used is ASAP catch at age model. Values weighted by lambda, consequently the likelihoods of low weighted values are smaller.

Index	RSS	N	lambda	likelihood
MACOM5	3.646	16	5	9.11
MACOM6	1.960	16	5	4.90
MACOM7	1.443	16	5	3.61
MACOM8	2.379	16	5	5.95
MACOM9	4.538	16	5	11.35
MACOM10	6.675	16	5	16.69
MACOM11	3.406	16	5	8.51
MACOM12	2.880	16	5	7.20
MACOM13+	10.242	16	5	25.60
MDSSN3	16.159	22	25	201.99
MDSSN4	15.620	22	25	195.25
MDSSN5	9.464	22	25	118.30
MDSSN6	10.464	22	25	130.80
MDSSN7	10.897	22	25	136.22
MDSSN8	17.777	20	25	222.21
MDSSN9	20.794	21	25	259.92
MDSSN10	18.279	19	25	228.48
MDSSN11	10.416	17	25	130.20
MDSSN12	7.298	16	25	91.23
MDSSN13+	13.222	21	25	165.27
NYOHS3	8.685	19	25	108.57
NYOHS4	7.720	19	25	96.50
NYOHS5	9.637	19	25	120.46
NYOHS6	8.853	18	25	110.67
NYOHS7	9.833	19	25	122.91
NYOHS8	14.846	19	25	185.57
NYOHS9	9.808	19	25	122.59
YOYNY	17.354	25	25	216.93
YOYNJ	10.080	24	25	126.01
YOYMD	7.169	25	25	89.62
YOYVA	5.249	25	25	65.61
YRLLI	5.701	21	25	71.26
YRLMD	7.054	24	25	88.17
NEFSC2-9	4.808	16	25	60.10
CTTRL4-6	9.176	21	25	114.71
DETRWL2-8	49.128	19	5	122.82
DESSN2	8.526	10	25	106.58
DESSN3	2.086	11	25	26.08
DESSN4	1.461	11	25	18.26
DESSN5	1.166	11	25	14.57
DESSN6	0.452	11	25	5.65
DESSN7	1.273	11	25	15.92
DESSN8	1.836	11	25	22.95
DESSN9	2.371	11	25	29.64
DESSN10	1.201	11	25	15.01
NJTRL2	29.238	18	25	365.47
NJTRL3	15.698	18	25	196.22
NJTRL4	12.392	17	25	154.90
NJTRL5	14.918	18	25	186.48
NJTRL6	13.220	18	25	165.25
NJTRL7	10.568	17	25	132.10
NJTRL8	11.215	17	25	140.19
NJTRL9	11.056	15	25	138.20
MRFSS2-13	1.378	19	25	17.22
CTCPUE2	27.601	24	25	345.01
CTCPUE3	25.242	25	25	315.52
CTCPUE4	4.224	25	25	52.79
CTCPUE5	7.319	25	25	91.48
CTCPUE6	10.155	25	25	126.94
CTCPUE7	9.601	25	25	120.02
CTCPUE8	5.944	24	25	74.30
CTCPUE9	4.606	23	25	57.57
CTCPUE10	13.838	25	25	172.97
Total	621.242	1176	1375	6902.57

Table 3. Fishing mortality estimates from ASAP catch at age model. F_{mult} equals F at age 10.

	1	2	3	4	5	6	7	8	9	10	11	12	13+
1982	0.00	0.04	0.11	0.15	0.19	0.21	0.23	0.26	0.29	0.32	0.32	0.32	0.32
1983	0.00	0.04	0.10	0.14	0.18	0.20	0.22	0.24	0.27	0.30	0.30	0.30	0.30
1984	0.00	0.04	0.09	0.13	0.17	0.18	0.20	0.23	0.25	0.27	0.27	0.27	0.27
1985	0.00	0.02	0.05	0.07	0.09	0.10	0.11	0.12	0.14	0.15	0.15	0.15	0.15
1986	0.00	0.02	0.04	0.05	0.07	0.07	0.08	0.09	0.10	0.11	0.11	0.11	0.11
1987	0.00	0.01	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.06	0.06	0.06
1988	0.00	0.01	0.03	0.04	0.05	0.06	0.06	0.07	0.08	0.08	0.08	0.08	0.08
1989	0.00	0.01	0.02	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.07	0.07
1990	0.00	0.01	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.11	0.11	0.11
1991	0.00	0.01	0.03	0.05	0.06	0.07	0.07	0.08	0.09	0.10	0.10	0.10	0.10
1992	0.00	0.01	0.03	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.08	0.08	0.08
1993	0.00	0.01	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.11	0.11	0.11
1994	0.00	0.02	0.04	0.05	0.07	0.08	0.08	0.09	0.11	0.12	0.12	0.12	0.12
1995	0.00	0.02	0.05	0.07	0.09	0.10	0.11	0.13	0.14	0.15	0.15	0.15	0.15
1996	0.00	0.02	0.06	0.08	0.11	0.12	0.13	0.14	0.16	0.17	0.17	0.17	0.17
1997	0.00	0.03	0.07	0.10	0.13	0.14	0.15	0.17	0.19	0.21	0.21	0.21	0.21
1998	0.00	0.03	0.06	0.09	0.11	0.12	0.13	0.15	0.17	0.18	0.18	0.18	0.18
1999	0.00	0.02	0.05	0.08	0.10	0.11	0.12	0.13	0.15	0.16	0.16	0.16	0.16
2000	0.00	0.02	0.06	0.08	0.11	0.12	0.13	0.14	0.16	0.17	0.17	0.17	0.17
2001	0.00	0.02	0.06	0.08	0.10	0.11	0.12	0.14	0.15	0.17	0.17	0.17	0.17
2002	0.00	0.02	0.06	0.08	0.11	0.12	0.13	0.14	0.16	0.18	0.18	0.18	0.18
2003	0.00	0.03	0.06	0.09	0.11	0.13	0.14	0.15	0.17	0.19	0.19	0.19	0.19
2004	0.00	0.03	0.07	0.10	0.13	0.14	0.15	0.17	0.19	0.21	0.21	0.21	0.21
2005	0.00	0.03	0.07	0.10	0.13	0.15	0.16	0.18	0.20	0.22	0.22	0.22	0.22
2006	0.00	0.03	0.08	0.12	0.15	0.17	0.18	0.20	0.23	0.25	0.25	0.25	0.25

Table 4. Population estimates (000s) from ASAP catch at age model.

Jan. 1 Abundance estimates

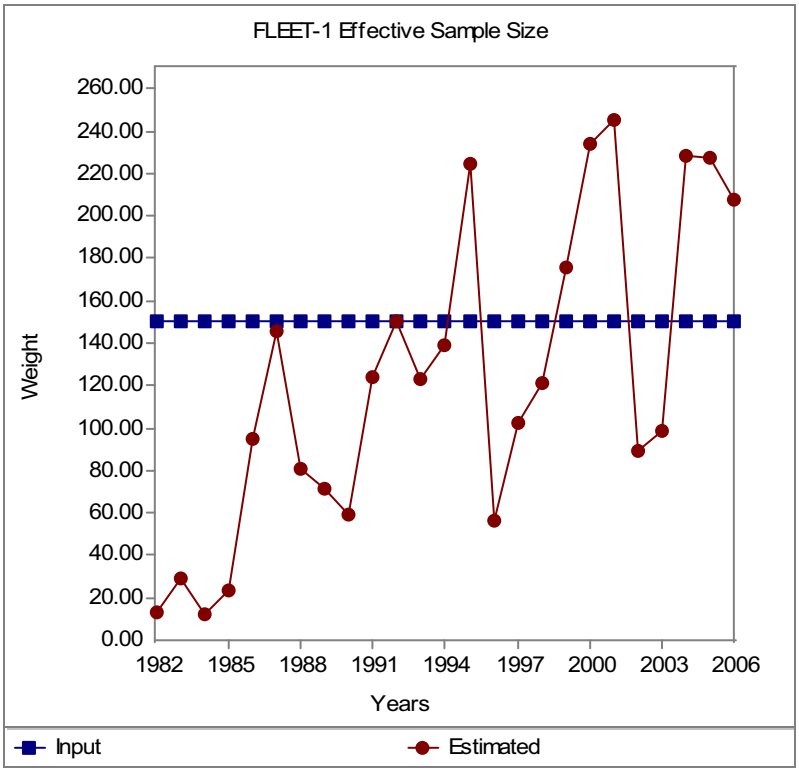
	1	2	3	4	5	6	7	8	9	10	11	12	13+	total	8+
1982	2,059	1,217	821	560	535	187	49	47	36	46	94	111	106	5,869	441
1983	5,745	1,766	1,002	634	415	379	130	33	31	23	29	59	136	10,383	311
1984	3,937	4,930	1,458	779	475	297	267	90	23	21	15	18	124	12,434	291
1985	4,483	3,380	4,083	1,143	589	345	213	188	62	15	13	10	93	14,618	381
1986	3,918	3,853	2,849	3,341	917	463	269	164	143	46	11	10	76	16,062	452
1987	4,492	3,369	3,267	2,363	2,733	739	371	214	129	112	36	9	67	17,899	566
1988	5,801	3,864	2,876	2,757	1,980	2,271	612	306	176	106	91	29	61	20,931	769
1989	6,543	4,989	3,287	2,407	2,283	1,620	1,850	496	246	140	84	72	72	24,088	1,109
1990	8,844	5,628	4,255	2,767	2,009	1,888	1,335	1,518	405	200	113	68	116	29,146	2,419
1991	7,978	7,604	4,774	3,534	2,267	1,622	1,515	1,064	1,199	316	155	88	142	32,256	2,964
1992	7,605	6,859	6,453	3,970	2,900	1,835	1,305	1,211	843	940	246	120	179	34,466	3,539
1993	10,758	6,540	5,837	5,403	3,289	2,376	1,496	1,058	975	674	746	195	237	39,583	3,885
1994	20,660	9,250	5,546	4,846	4,423	2,653	1,904	1,191	835	761	521	577	335	53,501	4,220
1995	13,814	17,762	7,833	4,589	3,950	3,548	2,113	1,506	932	646	584	400	699	58,376	4,767
1996	16,315	11,871	14,962	6,399	3,675	3,095	2,755	1,626	1,143	697	477	431	811	64,255	5,183
1997	17,437	14,018	9,973	12,142	5,077	2,846	2,373	2,090	1,214	839	504	345	899	69,756	5,891
1998	10,002	14,976	11,713	7,989	9,462	3,841	2,126	1,750	1,512	860	584	351	867	66,035	5,925
1999	11,614	8,593	12,562	9,469	6,305	7,278	2,922	1,599	1,295	1,099	616	418	872	64,642	5,899
2000	8,955	9,980	7,231	10,238	7,558	4,921	5,626	2,237	1,207	962	805	451	946	61,116	6,608
2001	15,695	7,694	8,384	5,867	8,121	5,852	3,770	4,266	1,670	885	696	583	1,011	64,494	9,110
2002	22,175	13,486	6,469	6,818	4,669	6,313	4,503	2,873	3,202	1,233	645	507	1,161	74,053	9,619
2003	9,717	19,053	11,325	5,245	5,402	3,609	4,829	3,408	2,140	2,343	890	465	1,203	69,629	10,450
2004	29,220	8,348	15,974	9,146	4,133	4,147	2,740	3,625	2,516	1,550	1,672	635	1,191	84,896	11,189
2005	14,204	25,097	6,976	12,798	7,129	3,128	3,099	2,022	2,625	1,784	1,081	1,166	1,273	82,382	9,950
2006	12,743	12,199	20,952	5,575	9,943	5,373	2,327	2,275	1,456	1,849	1,235	748	1,688	78,361	9,250

Table 5. Average biomass (MT) from ASAP catch at age model.

Average Biomass (mt)	1	2	3	4	5	6	7	8	9	10	11	12	13+
1982	268	779	895	862	1,295	702	237	274	222	397	1,019	1,245	1,491
1983	1,149	971	942	869	983	1,247	491	179	189	186	274	613	1,510
1984	945	2,958	2,464	1,262	1,267	1,008	1,354	509	152	159	123	231	1,541
1985	269	2,062	4,369	1,897	1,291	1,240	1,046	1,027	419	112	121	103	1,298
1986	549	2,196	3,618	8,018	2,238	1,445	1,063	830	780	283	87	91	976
1987	898	2,594	4,606	4,987	6,832	2,151	1,338	1,014	715	725	279	84	877
1988	1,798	3,516	3,164	5,460	6,178	9,131	2,681	1,438	921	594	779	303	812
1989	1,047	4,141	4,010	5,367	6,985	7,340	9,932	3,090	1,487	1,216	749	700	956
1990	707	5,009	4,851	5,673	4,722	7,232	6,556	9,048	2,307	1,191	841	613	1,458
1991	1,675	6,996	6,158	7,668	5,940	5,142	7,286	6,003	7,744	1,973	1,463	727	2,019
1992	760	4,733	8,453	7,662	8,150	6,733	6,393	7,012	5,869	7,662	2,404	1,496	2,495
1993	753	4,970	7,647	10,751	9,110	8,505	7,178	6,466	6,856	5,395	7,110	2,101	3,451
1994	4,958	9,712	9,372	10,709	12,606	9,285	9,406	7,384	5,676	5,731	5,071	6,171	4,259
1995	3,868	12,433	10,575	10,005	10,941	12,949	11,368	9,278	6,778	5,723	4,417	3,888	11,648
1996	2,284	12,465	21,994	14,845	11,869	13,991	17,602	11,558	8,925	6,409	4,438	4,350	11,110
1997	2,267	8,691	11,768	29,870	14,267	10,359	10,700	10,594	8,170	7,692	5,013	3,534	13,284
1998	3,901	11,532	14,056	12,942	21,290	11,332	9,971	9,905	10,314	6,048	4,535	3,468	10,287
1999	7,201	7,733	13,944	13,636	12,043	18,268	9,818	8,045	8,495	8,624	5,351	4,083	10,444
2000	3,313	5,489	7,955	14,845	14,814	13,729	21,883	11,386	8,581	7,087	7,811	4,830	12,815
2001	2,511	2,924	9,390	10,268	17,948	19,017	15,533	21,413	10,621	6,897	6,018	4,830	10,988
2002	2,661	4,181	6,858	10,295	10,178	20,013	18,869	15,742	19,306	9,319	5,862	4,940	13,371
2003	972	11,432	11,325	7,342	11,884	11,549	19,798	17,724	13,054	16,873	7,561	4,375	13,237
2004	6,721	2,755	13,418	12,804	10,044	12,898	11,343	18,740	15,270	11,037	13,679	5,732	12,754
2005	1,830	11,816	7,009	19,111	14,915	9,607	12,047	10,911	16,083	11,862	8,514	10,364	13,674
2006	1,511	4,270	13,869	6,462	18,592	14,510	9,393	11,005	8,977	12,906	9,981	6,692	18,689

Appendix A10 Figures

A.



B.

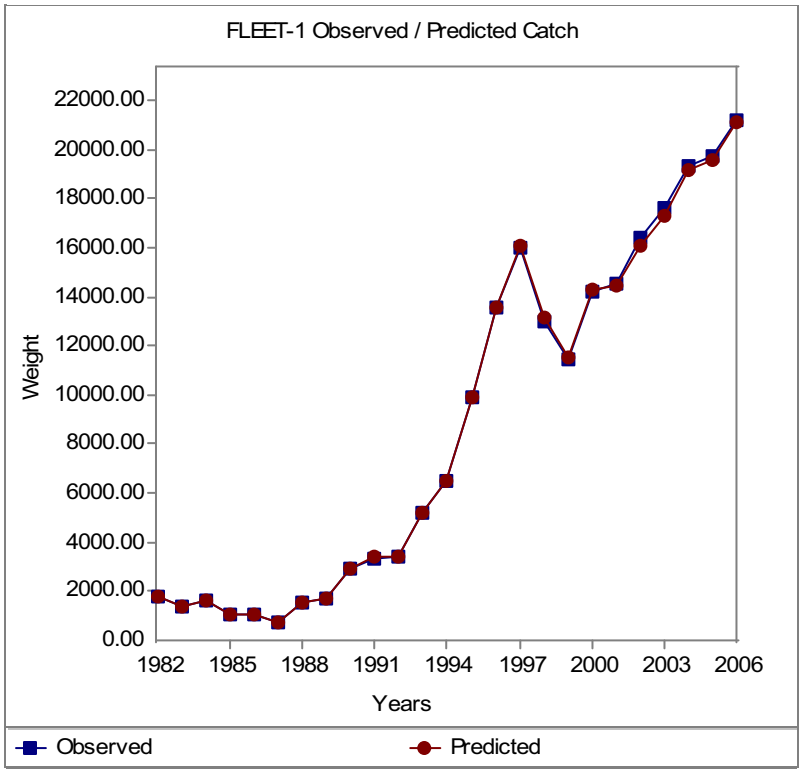


Figure 1. (A) Effective sample size and (B) observed and predicted catch biomass from ASAP catch at age model.

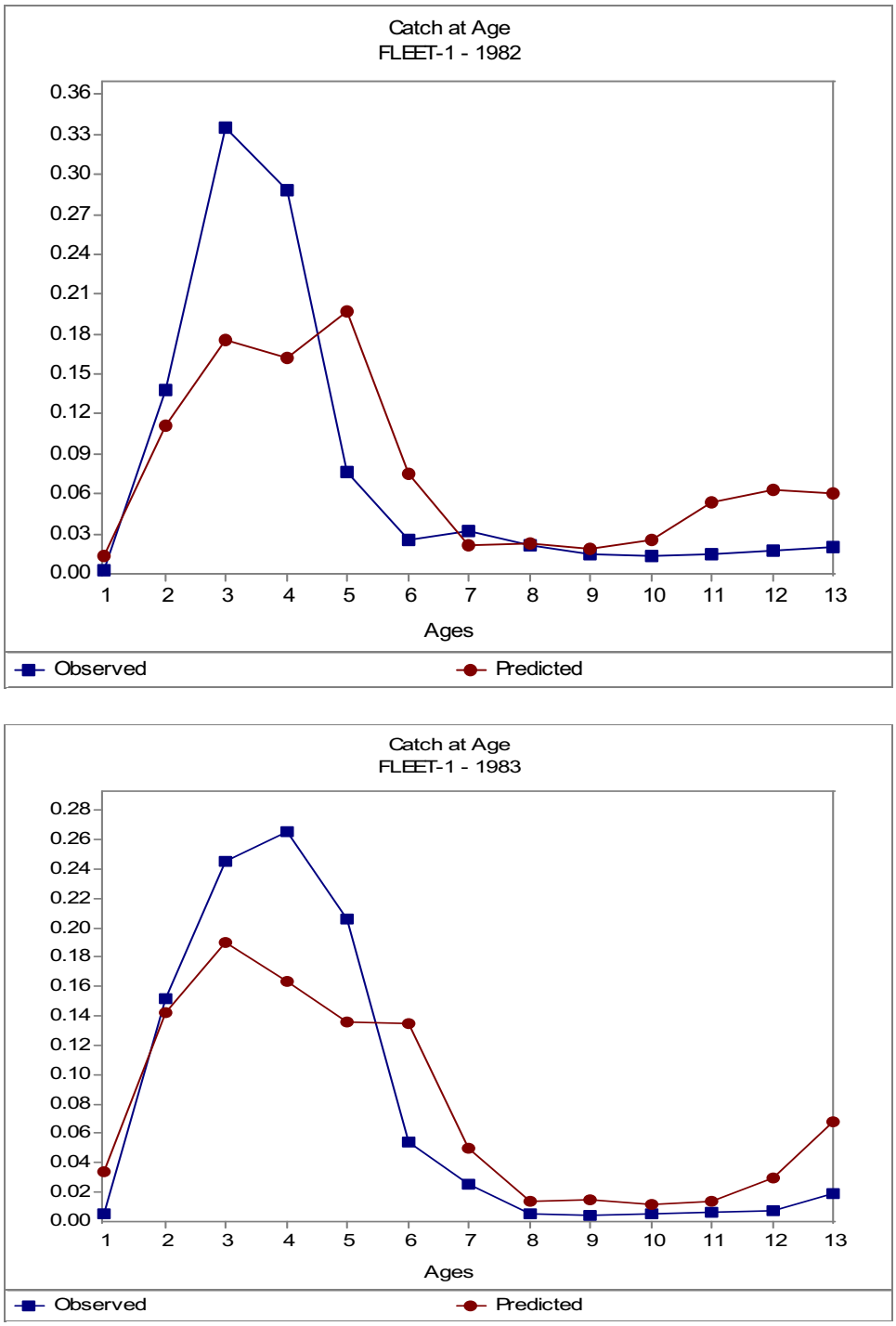
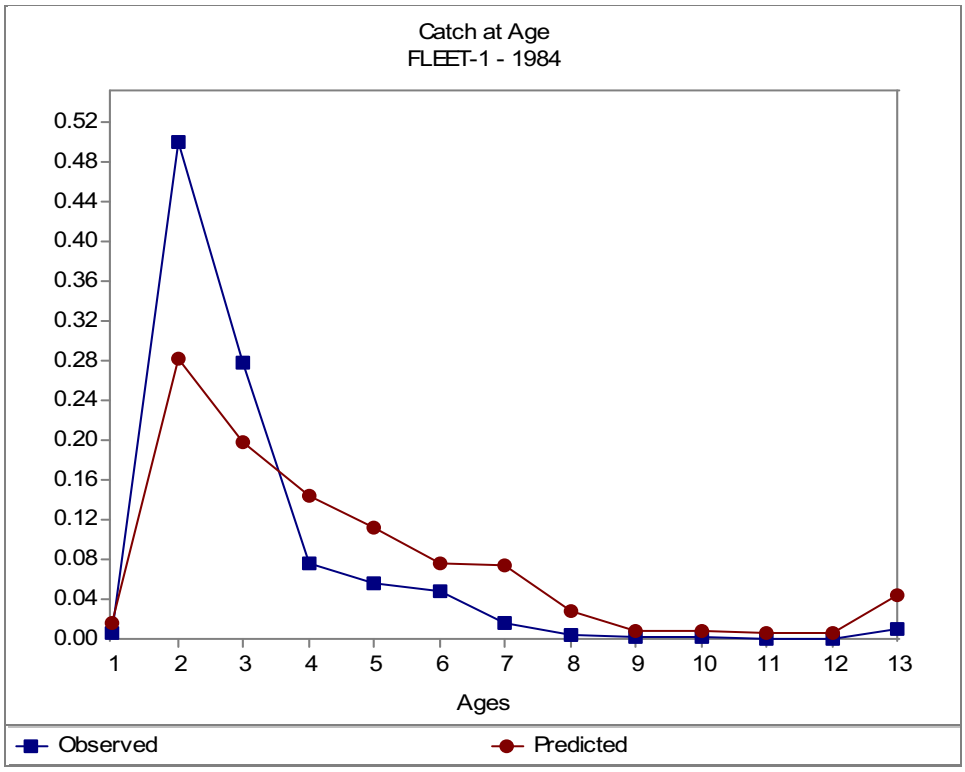


Figure 2. Comparison of observed and predicted proportions-at-age from the ASAP model.



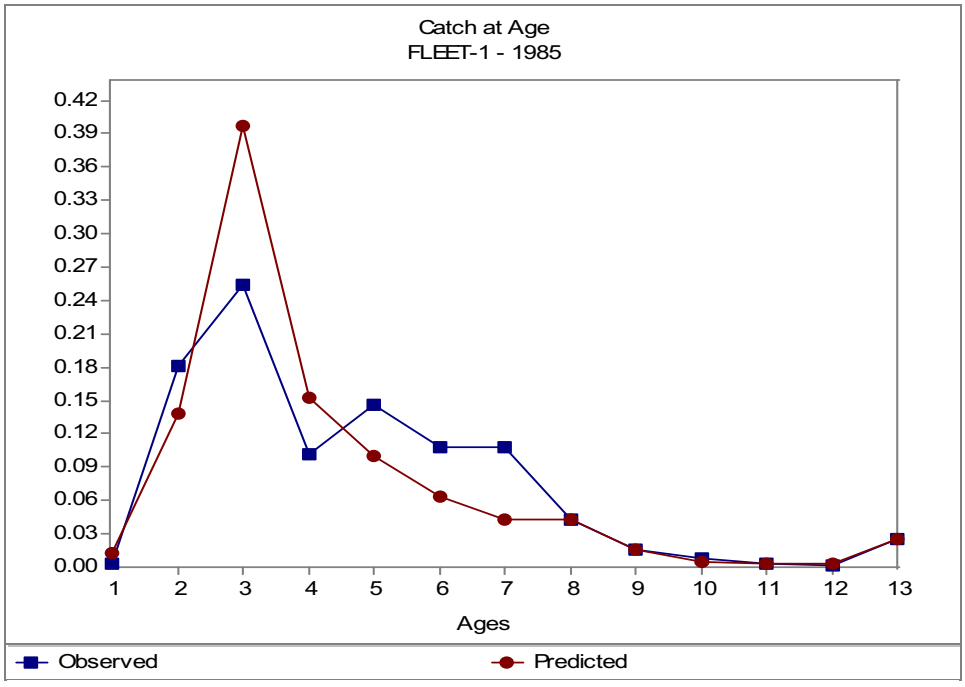
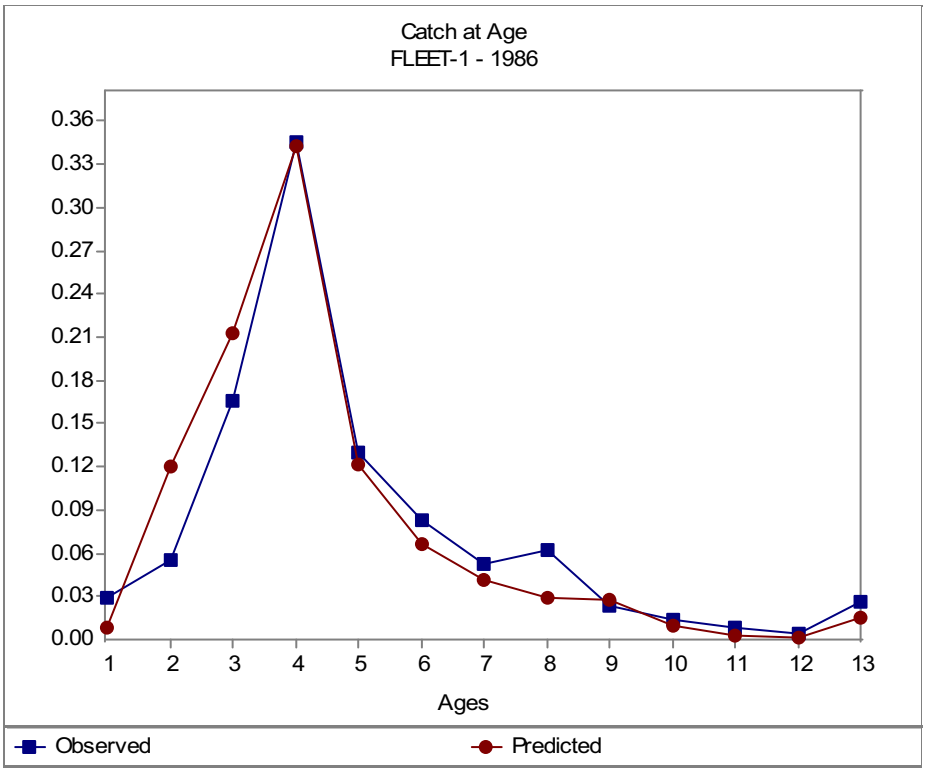
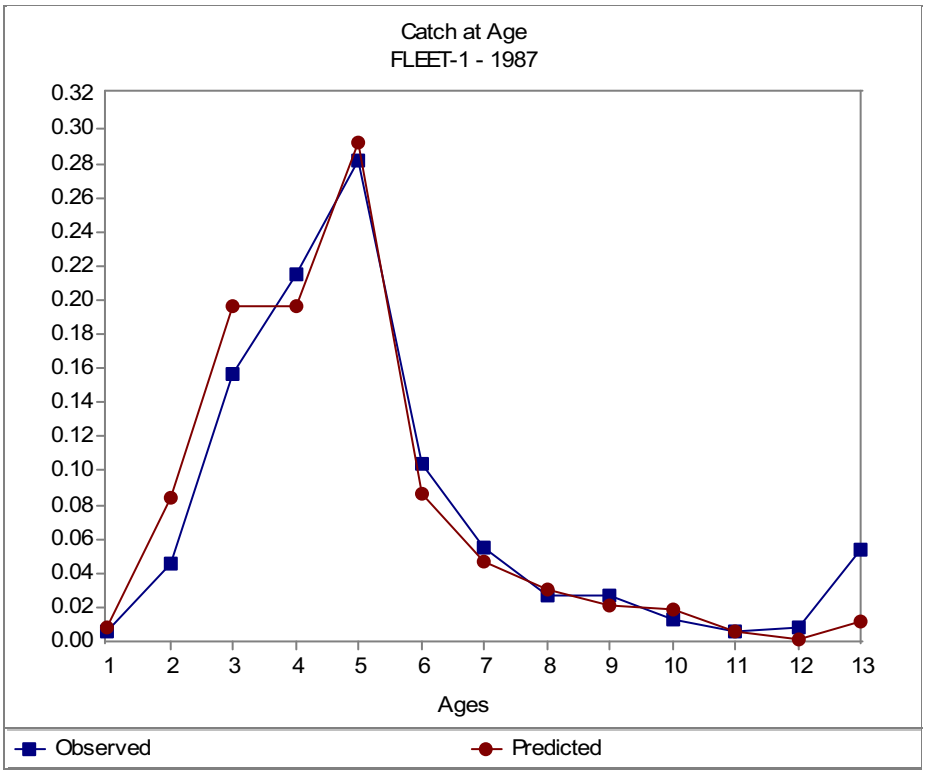


Figure 2 continued.





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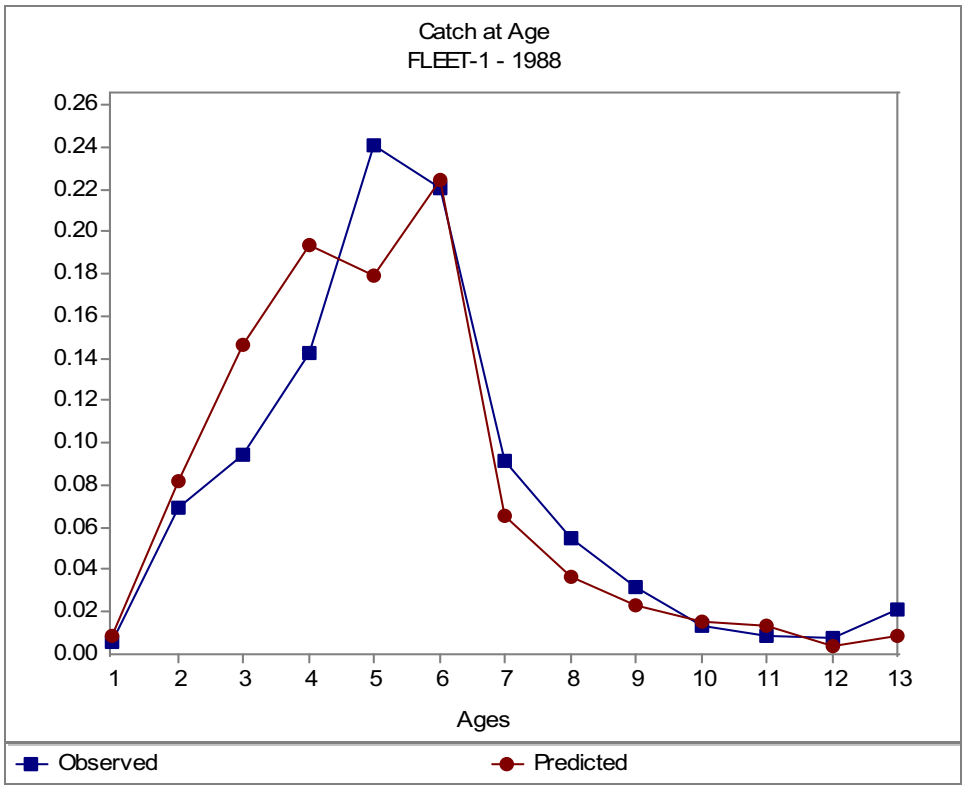

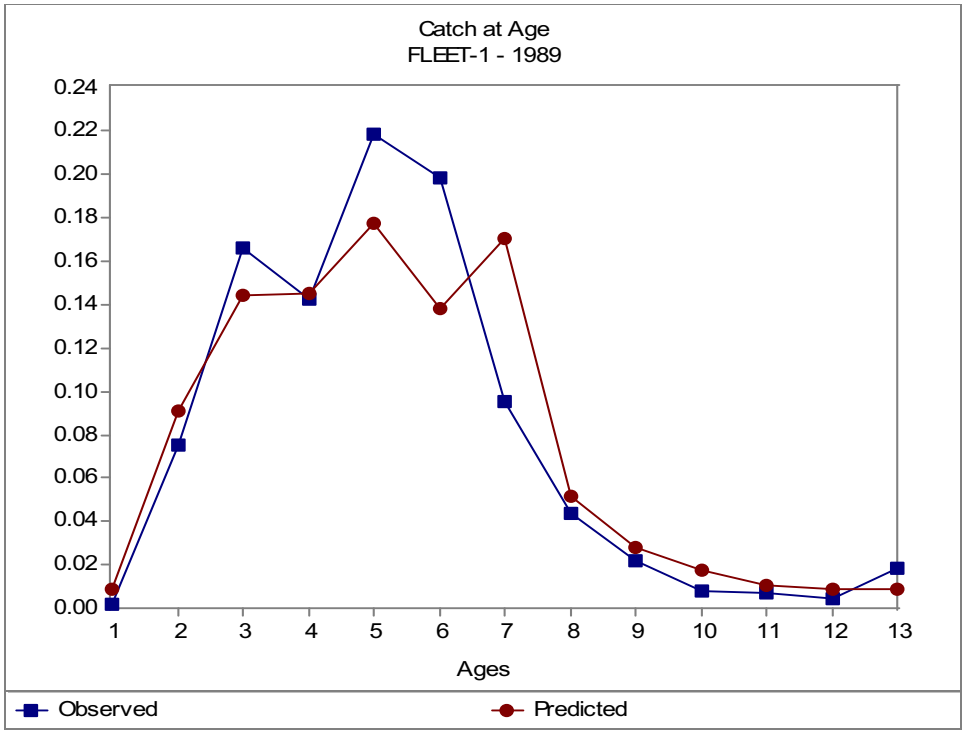

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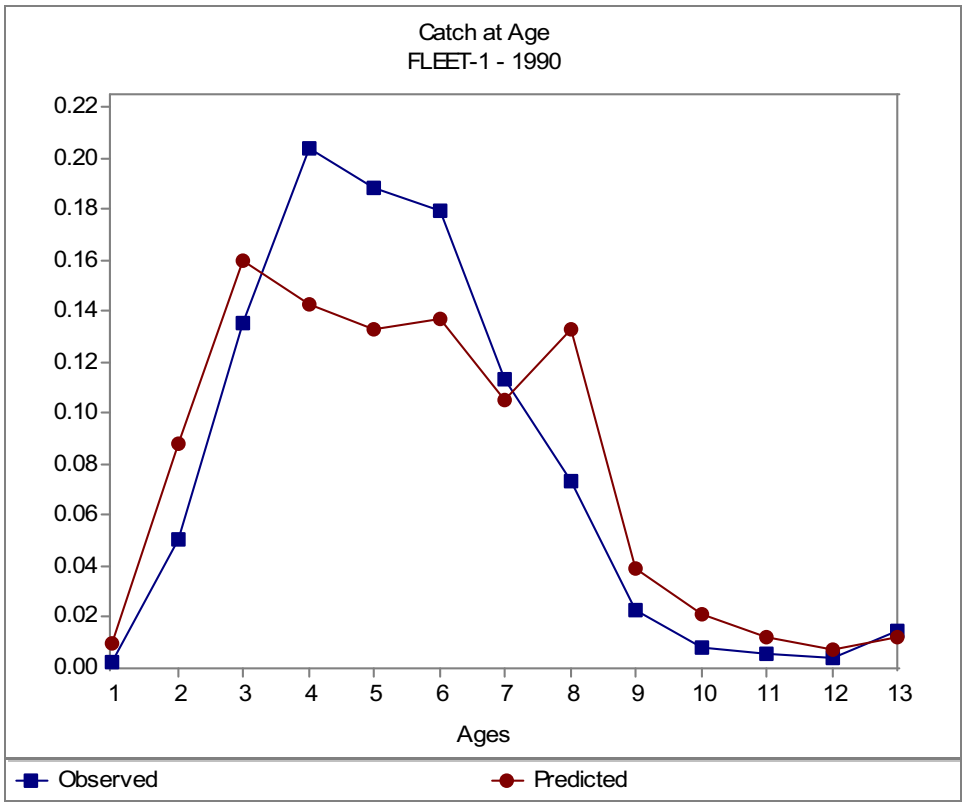

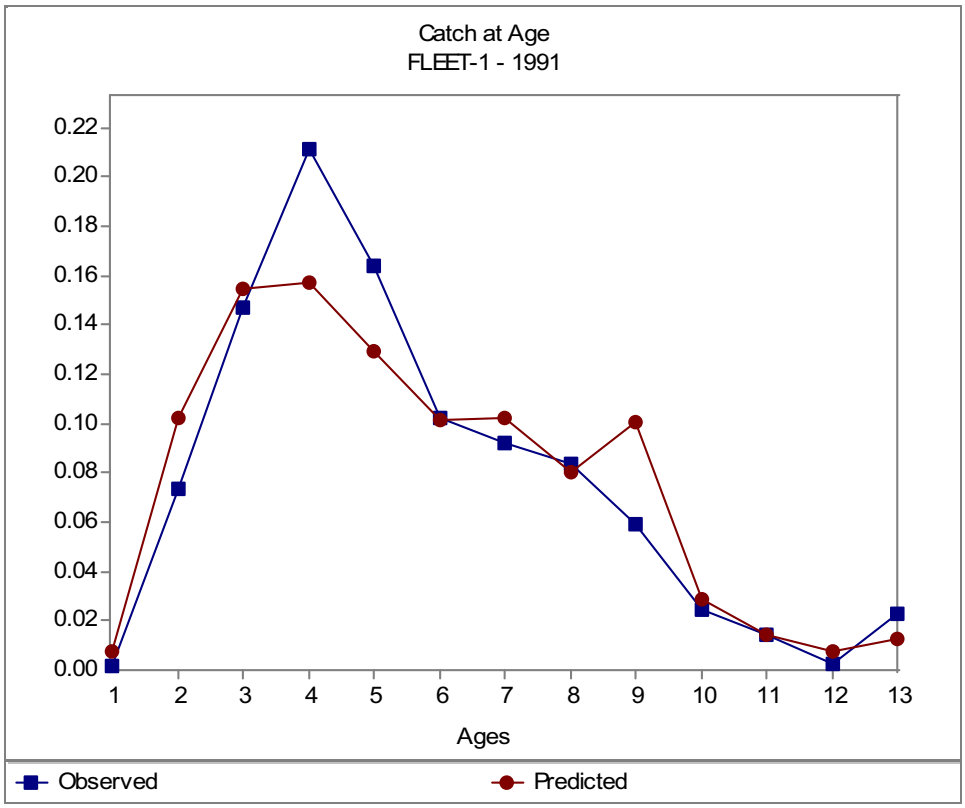

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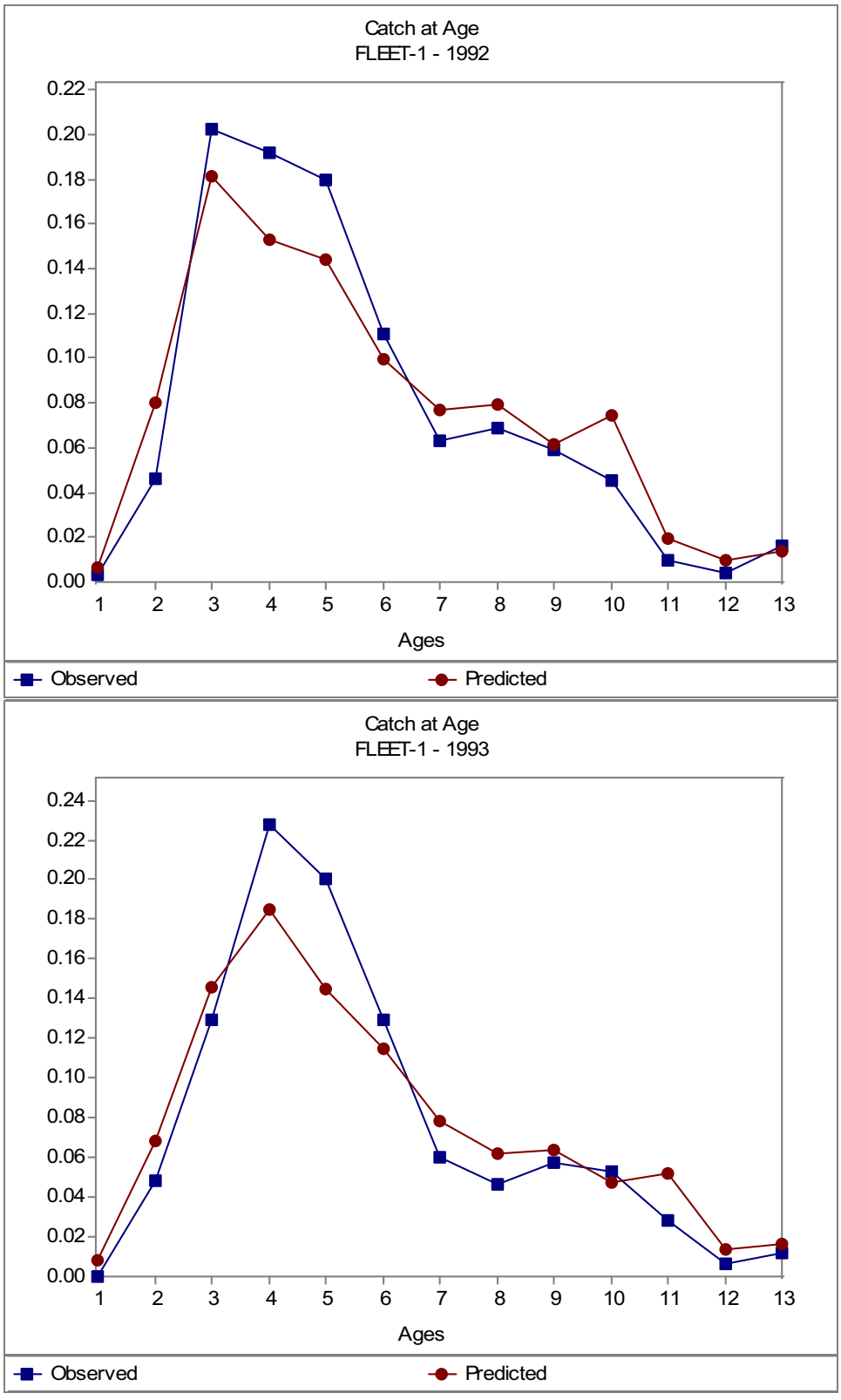

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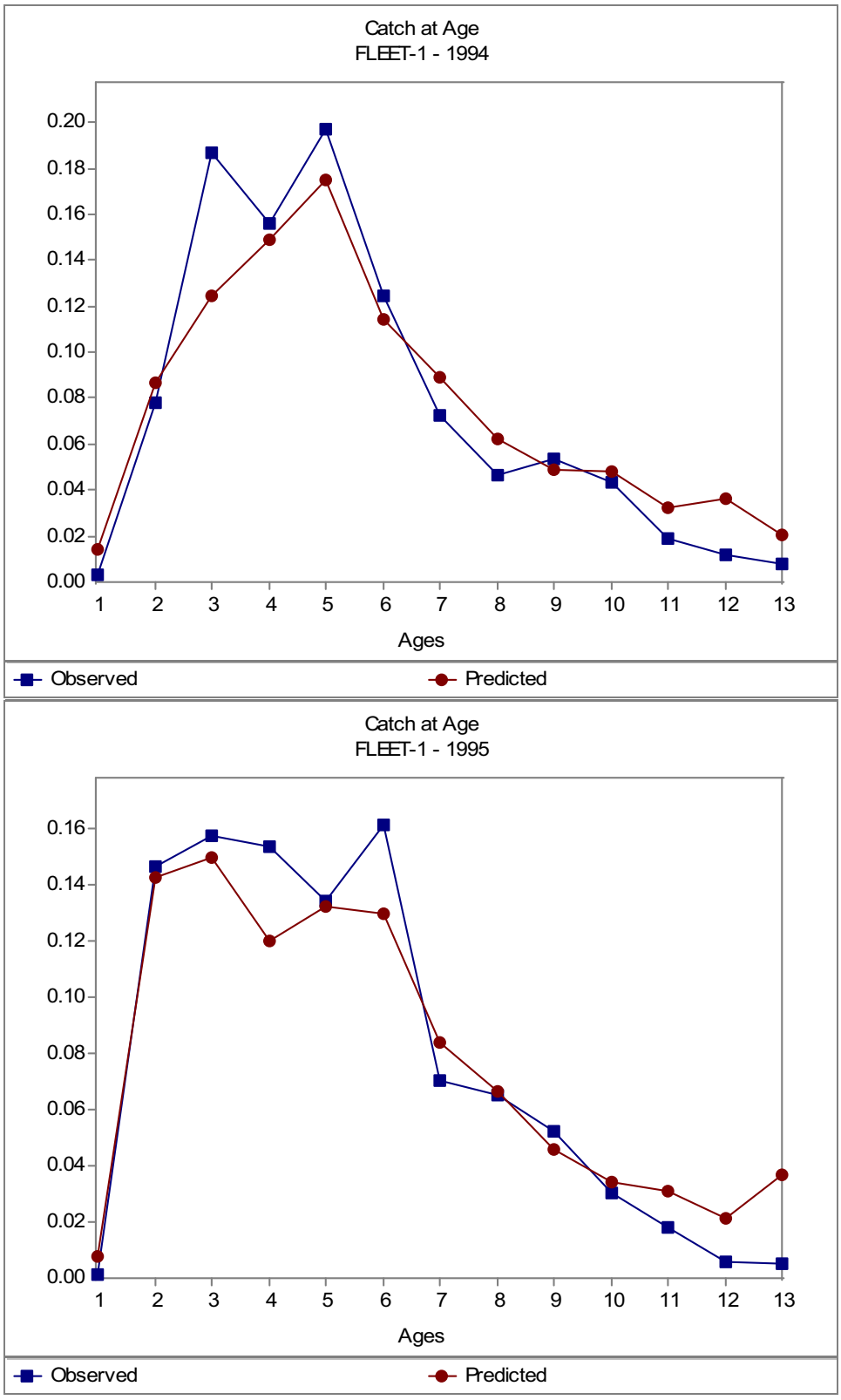

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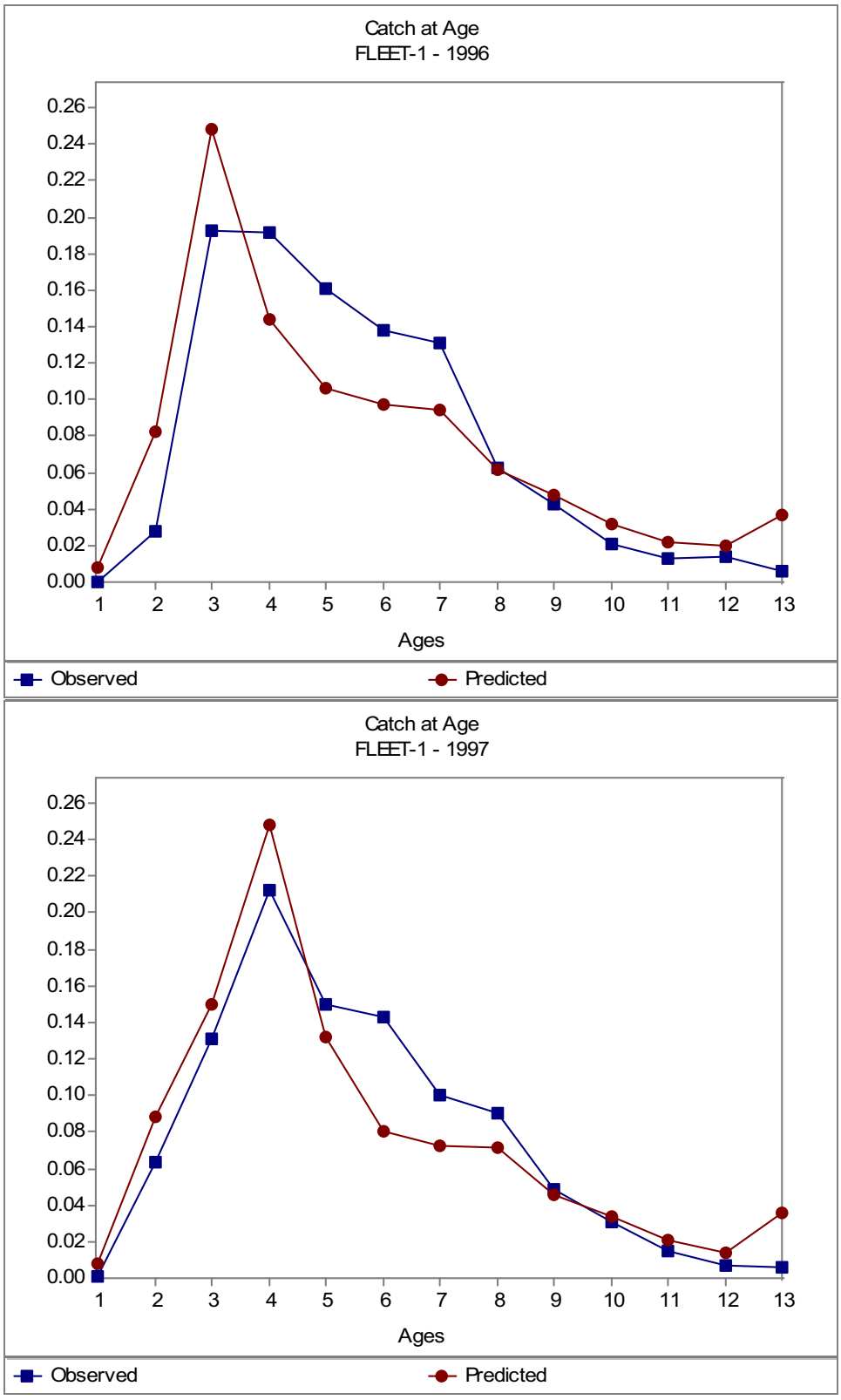

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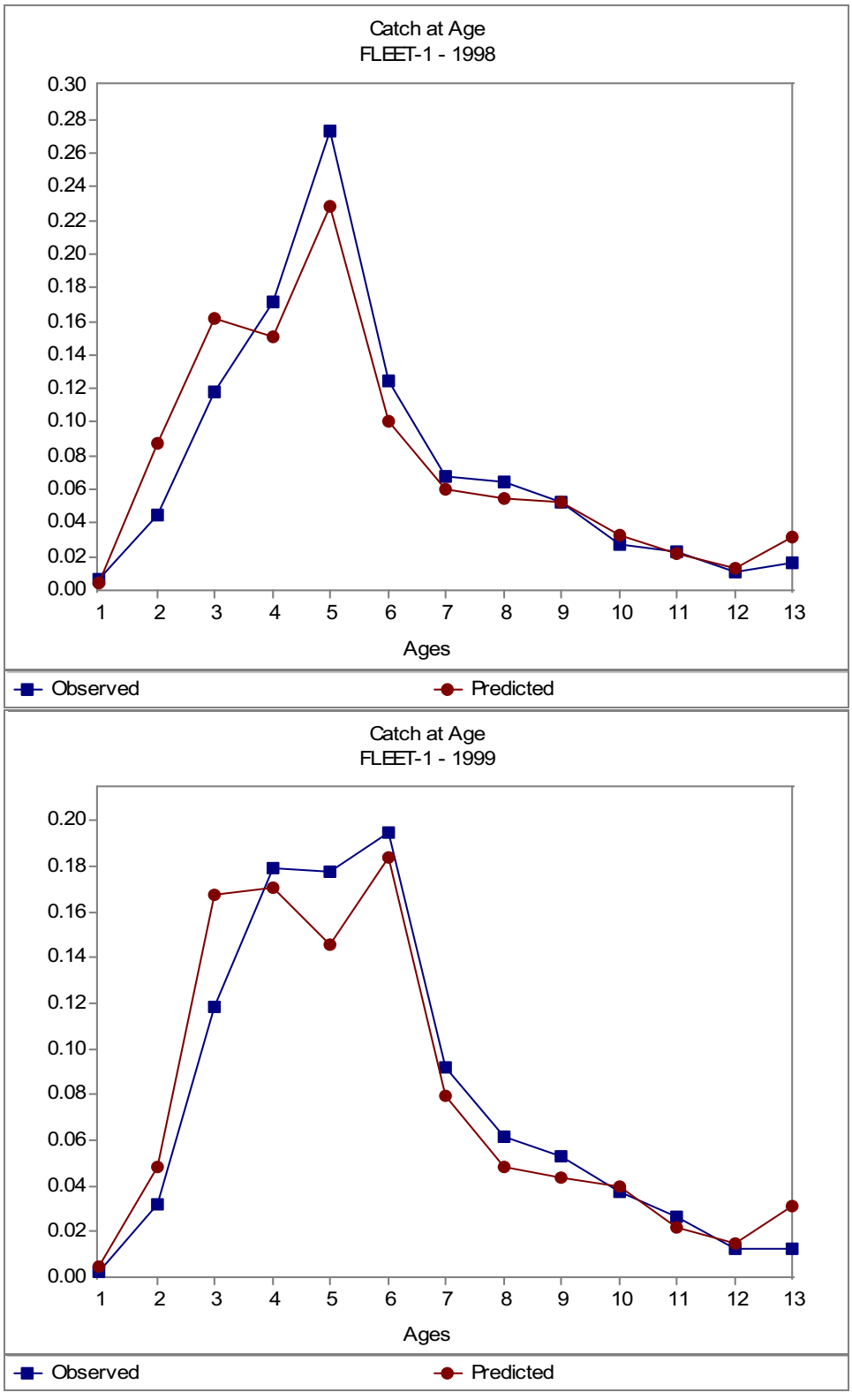

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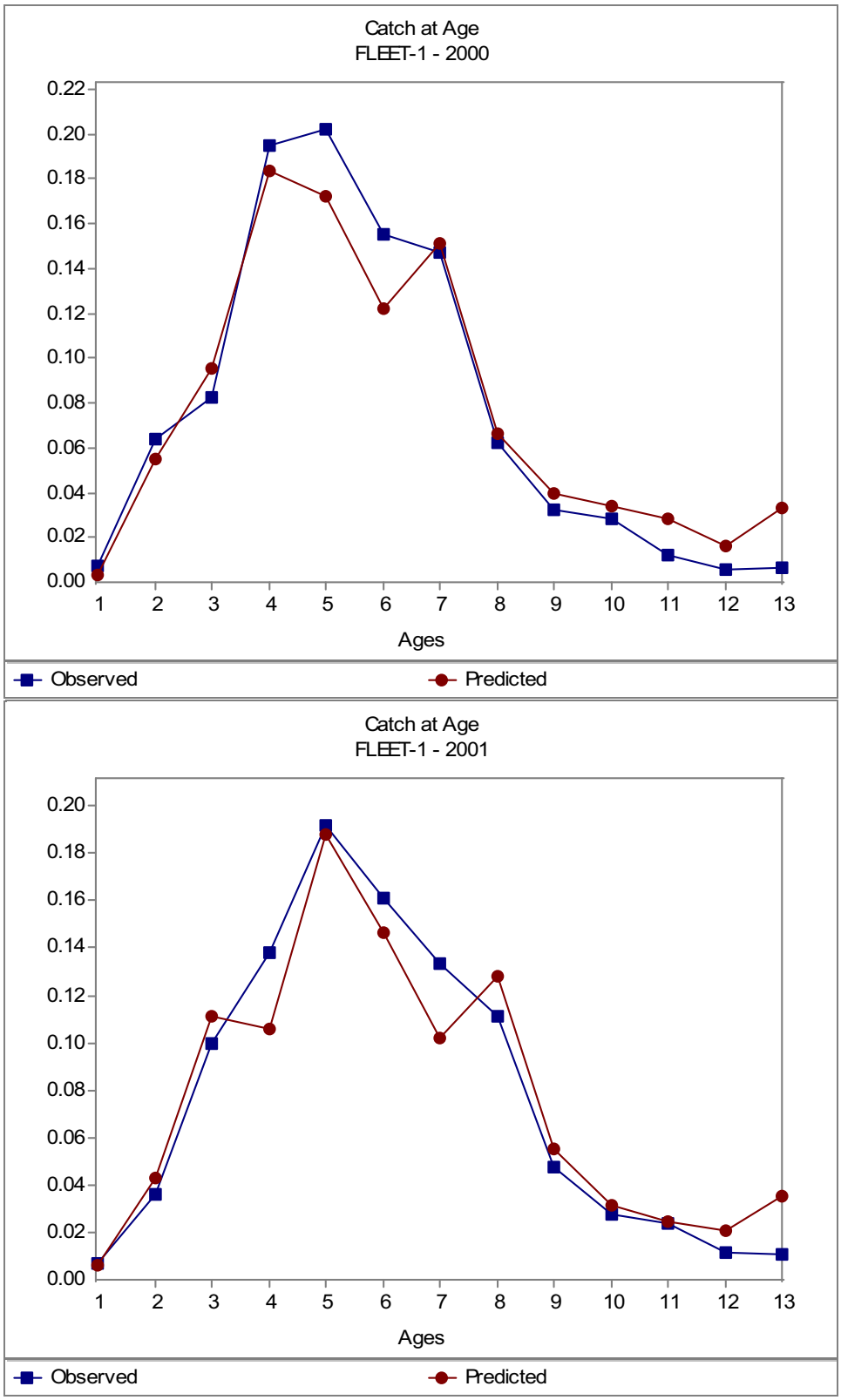

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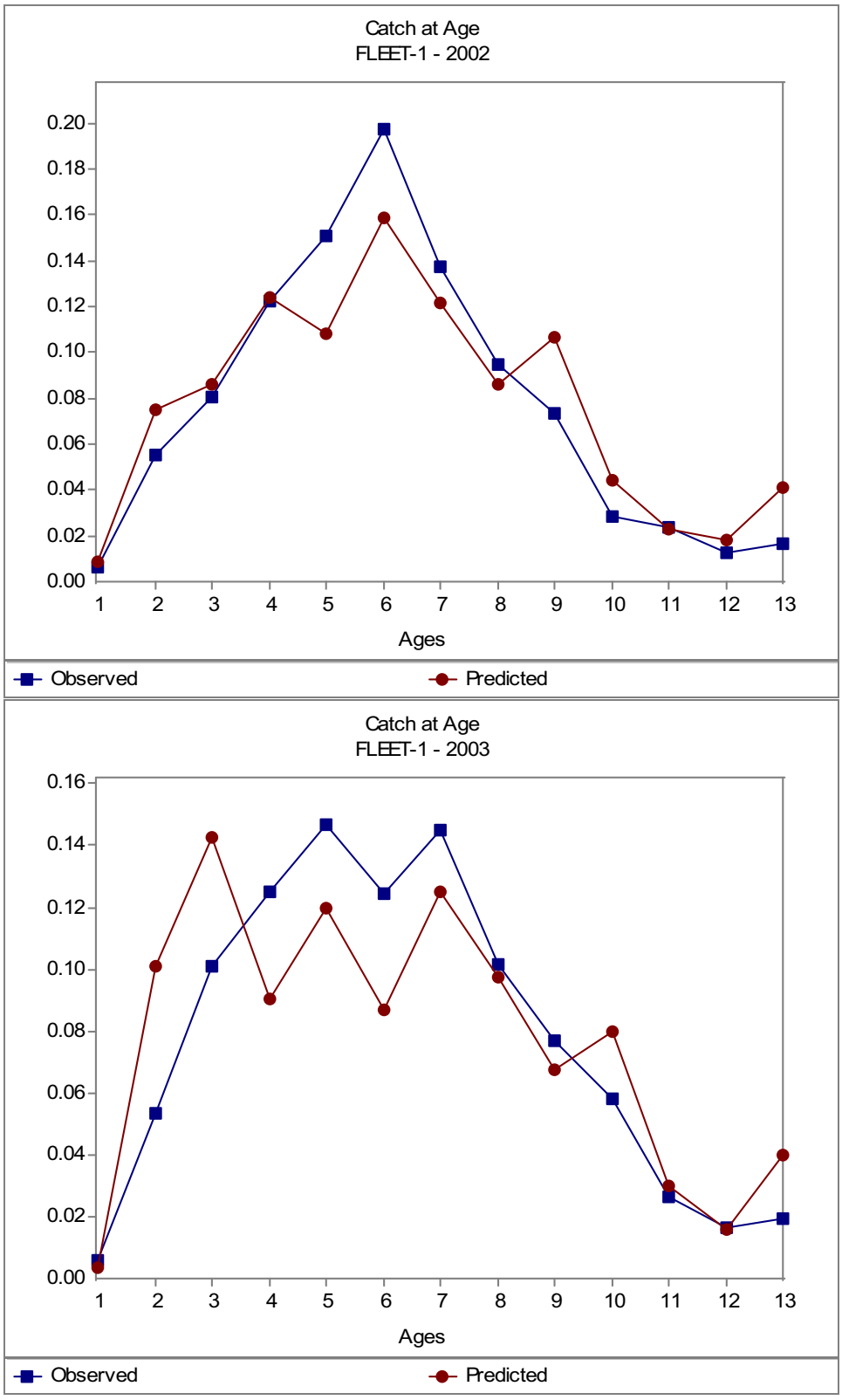

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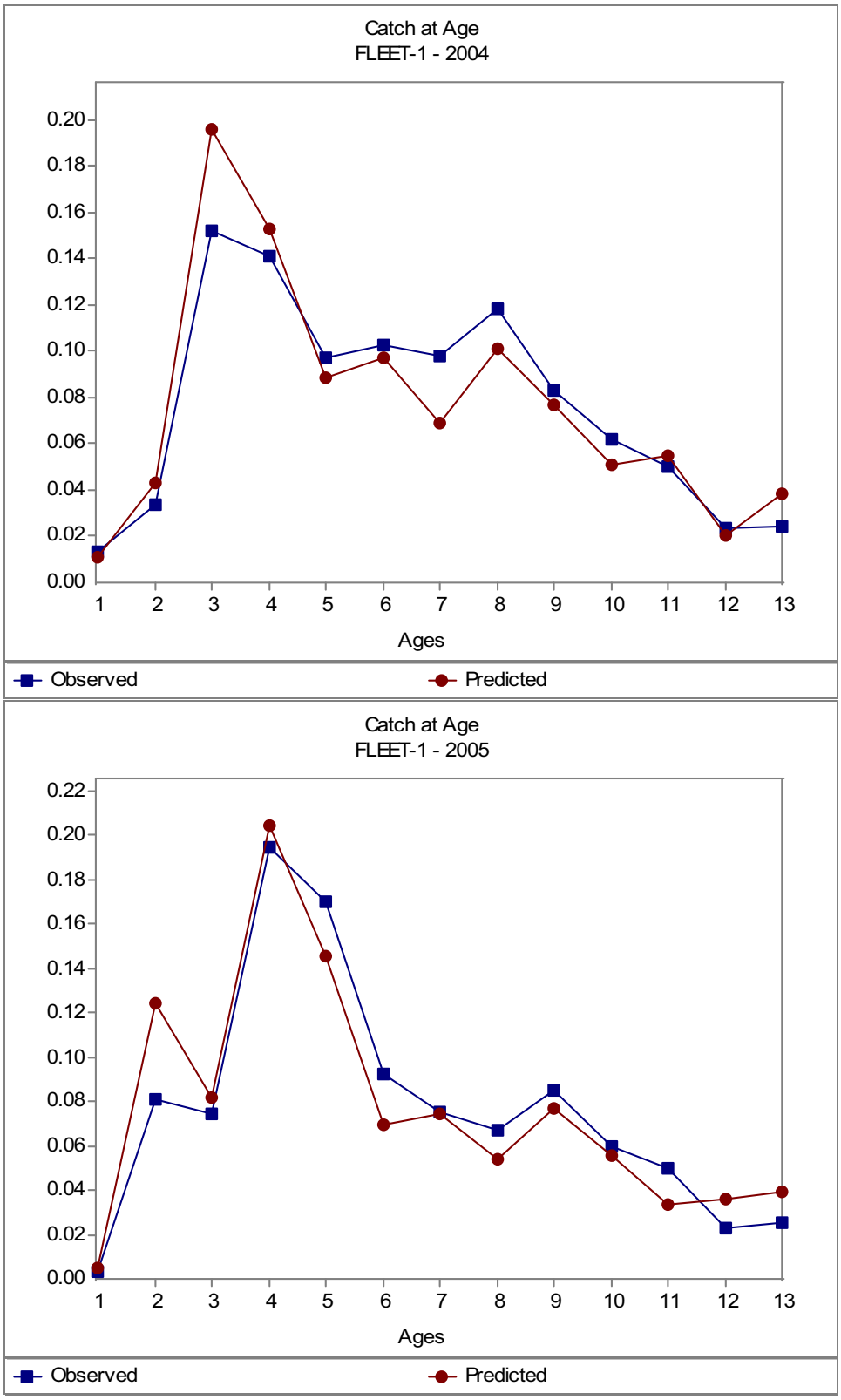

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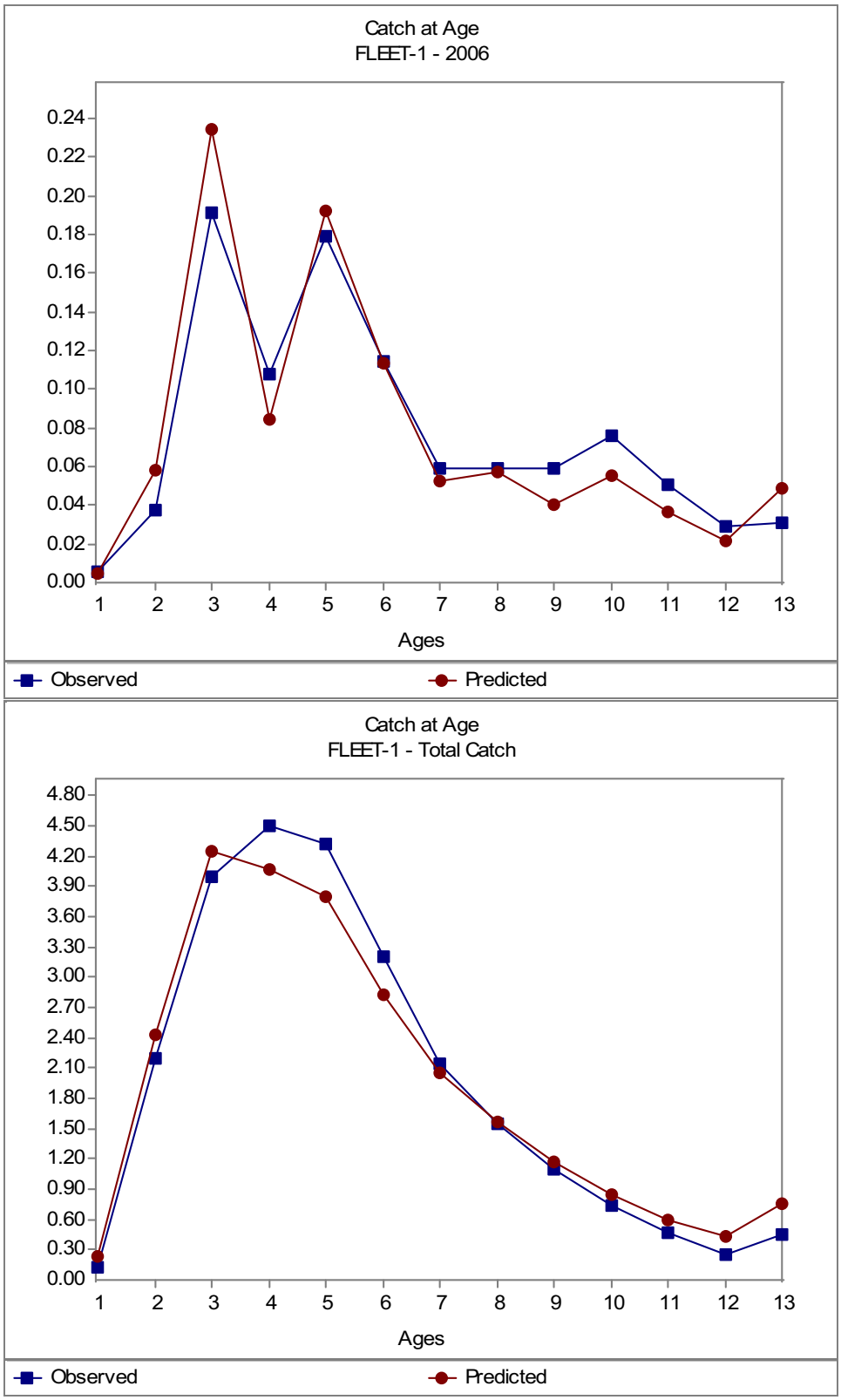


Figure 2 continued.

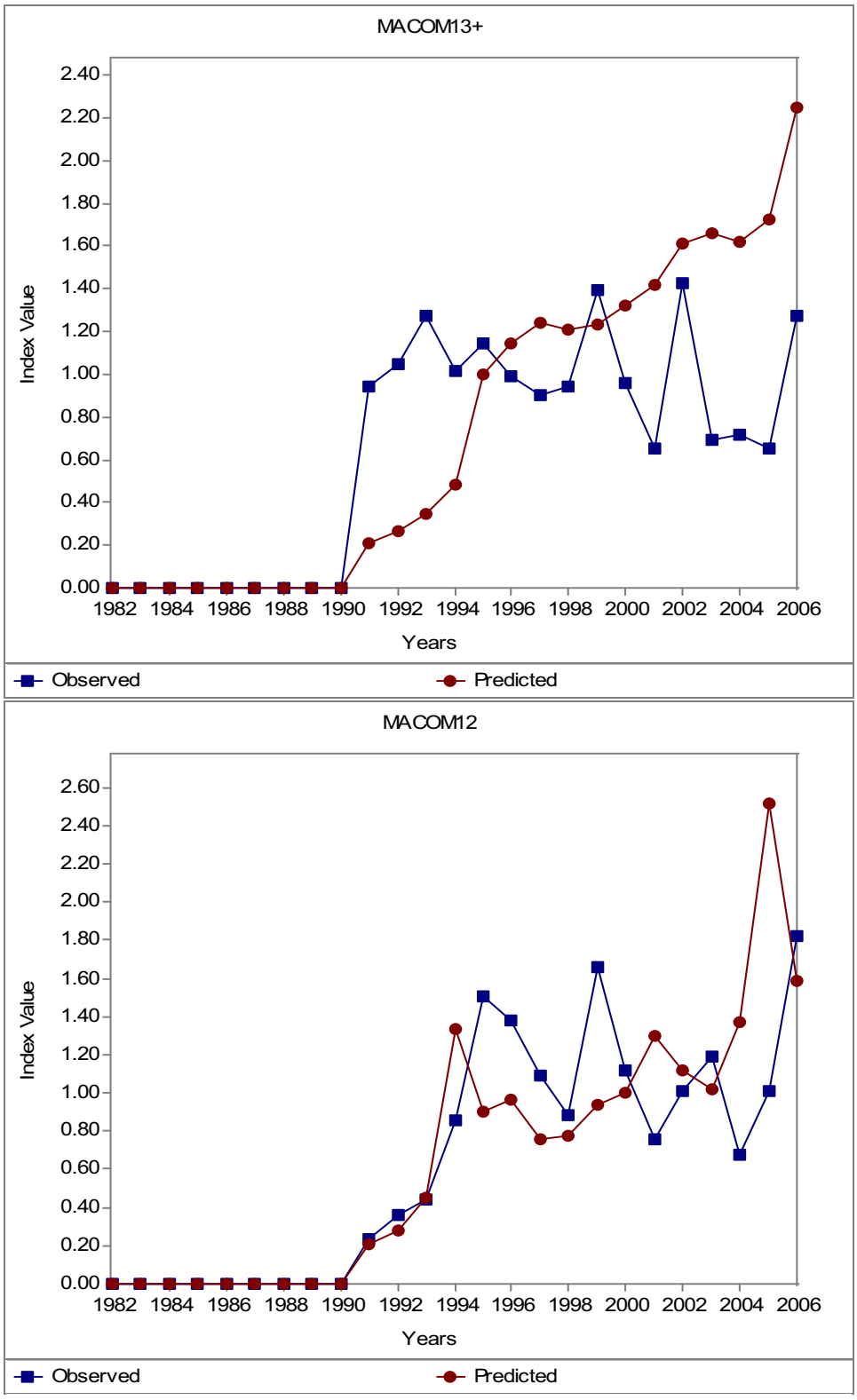
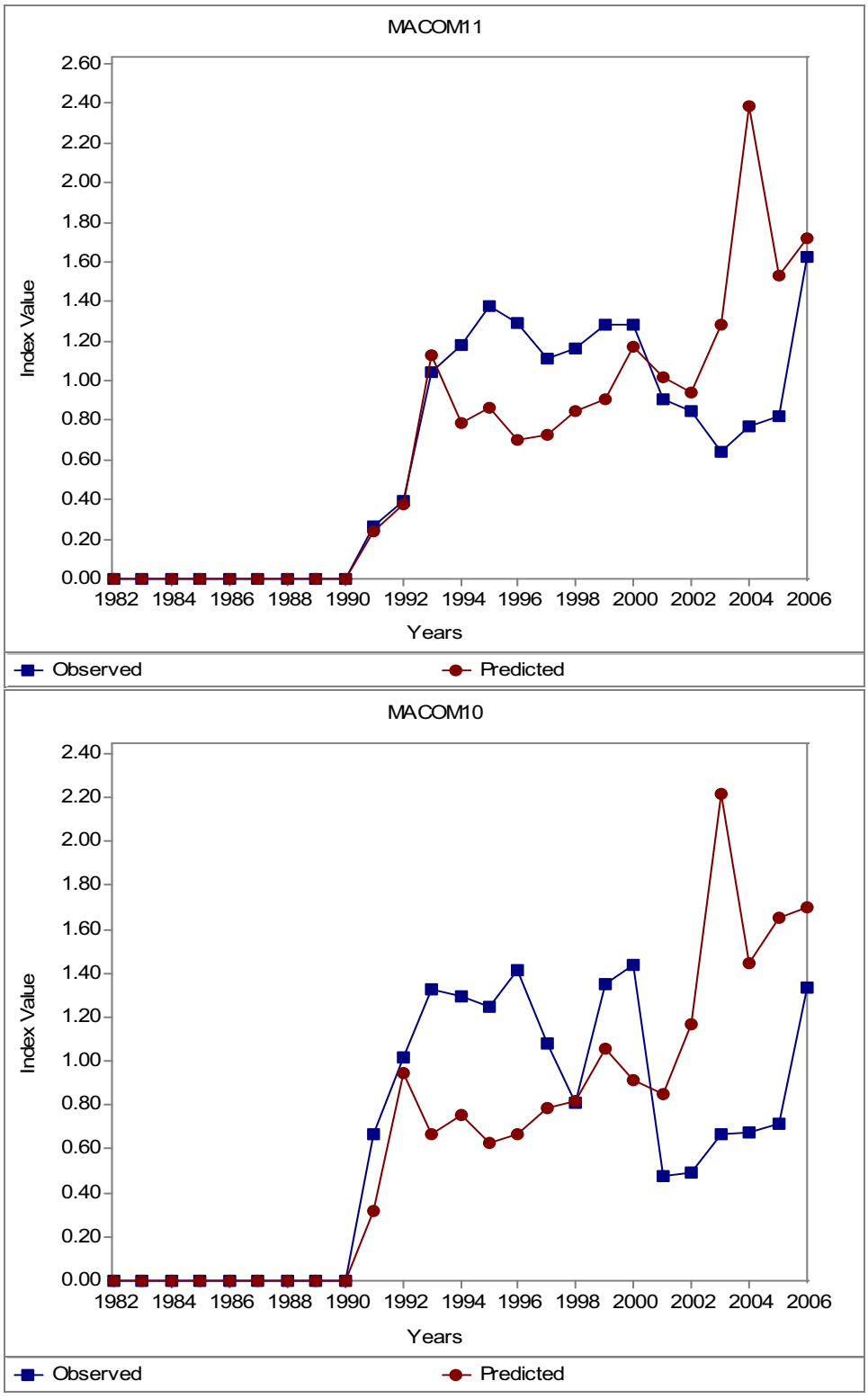


Figure 3. Observed and predicted indices used in ASAP catch at age model.



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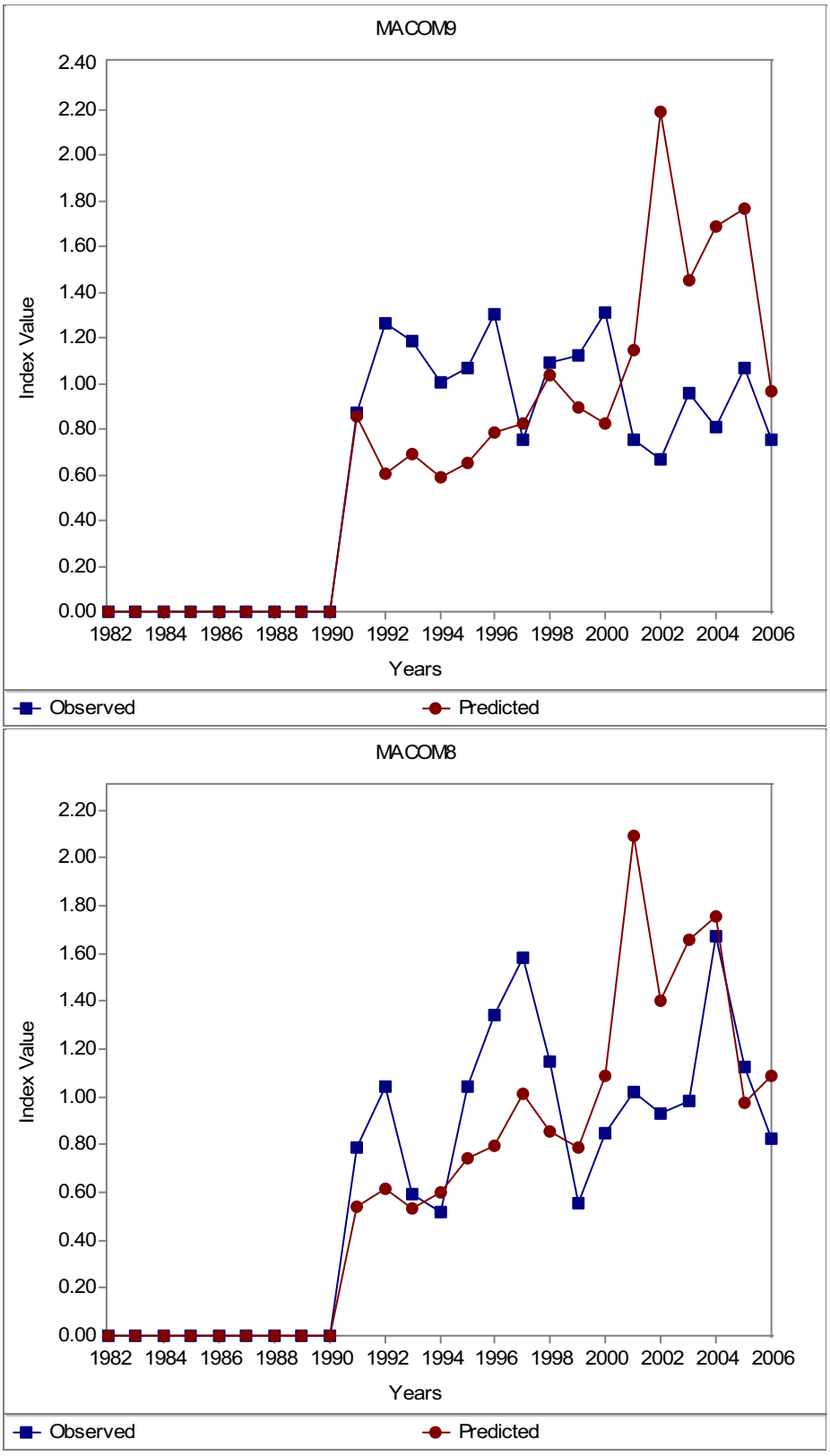

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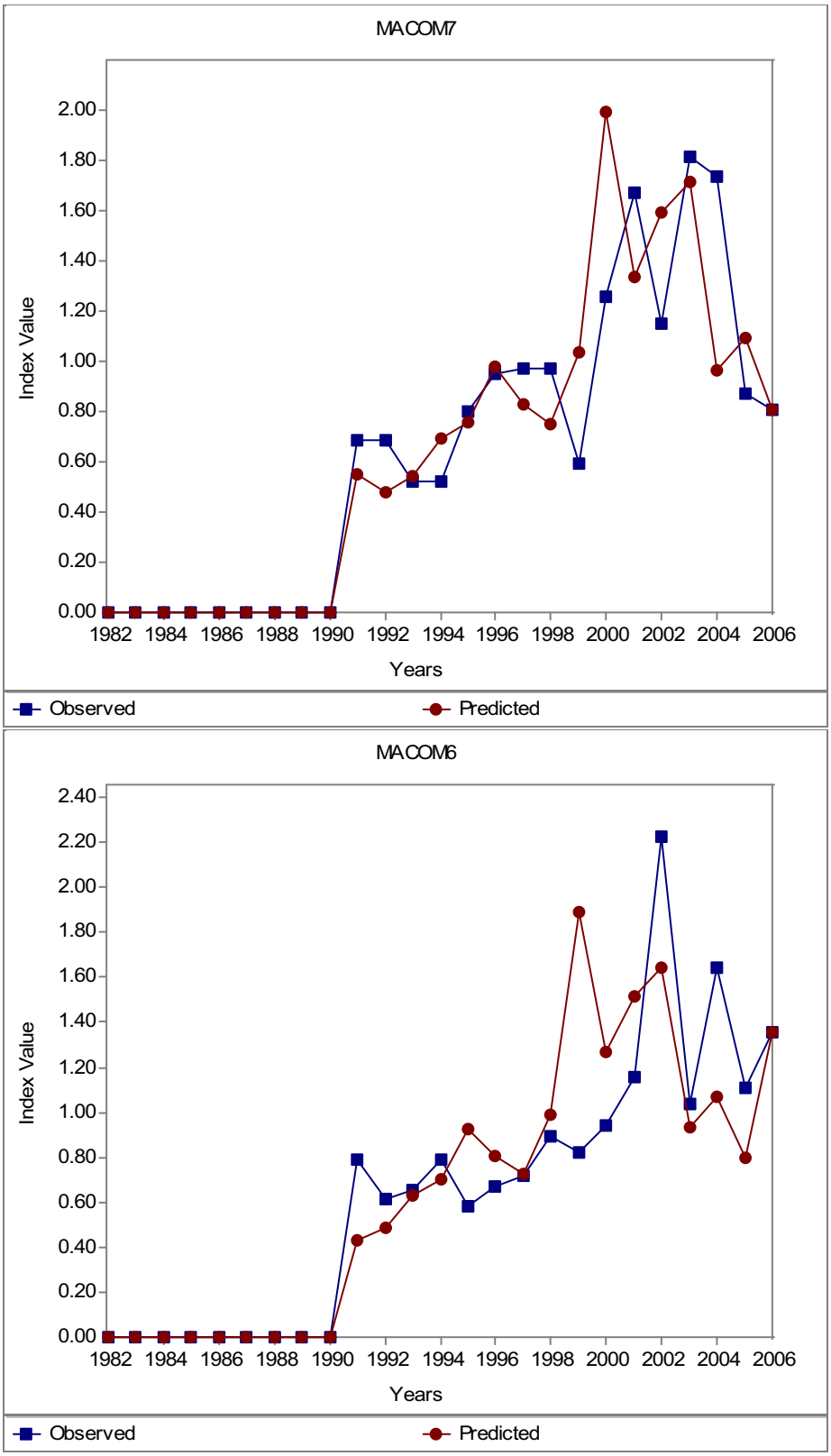

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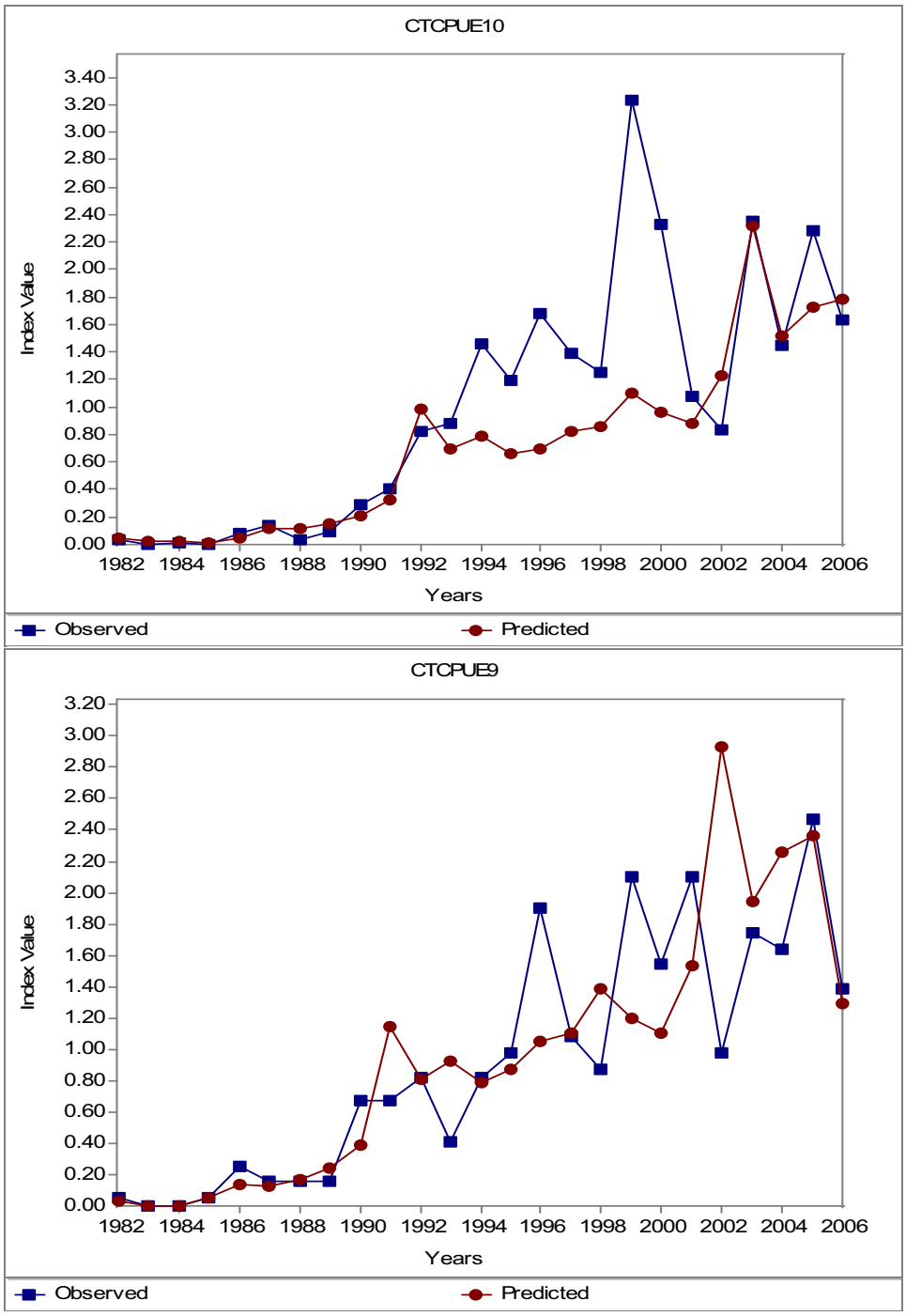

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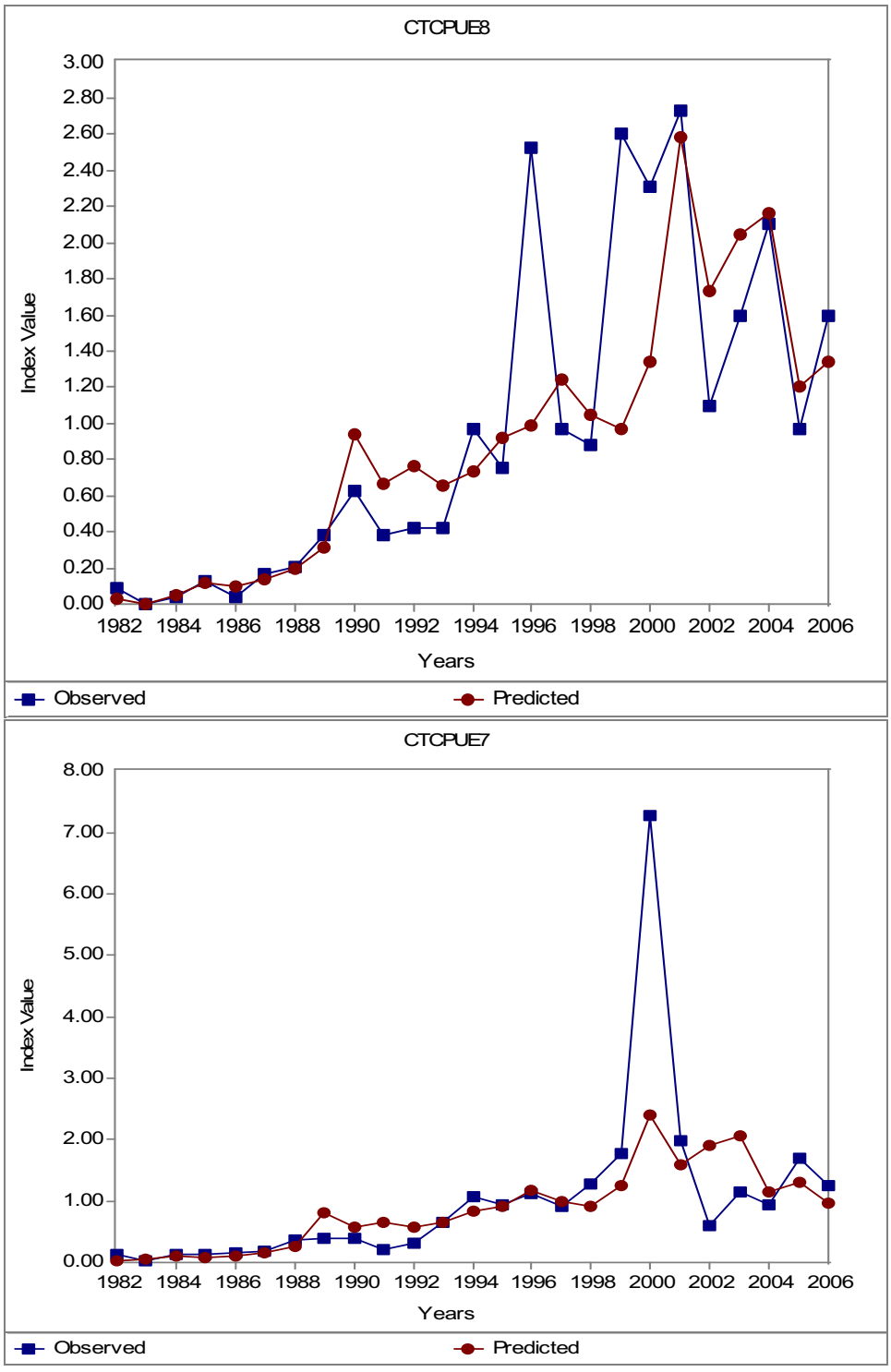

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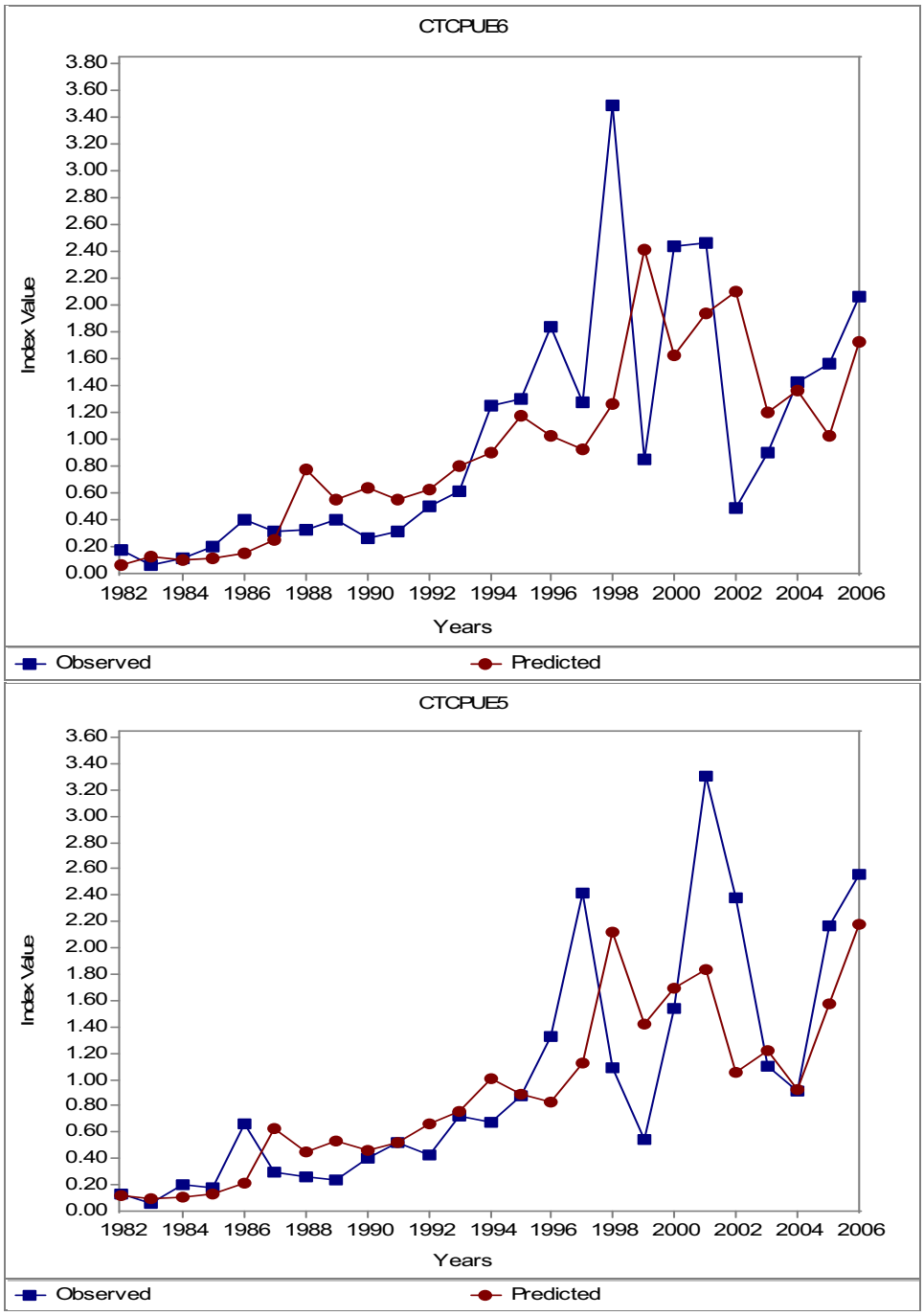

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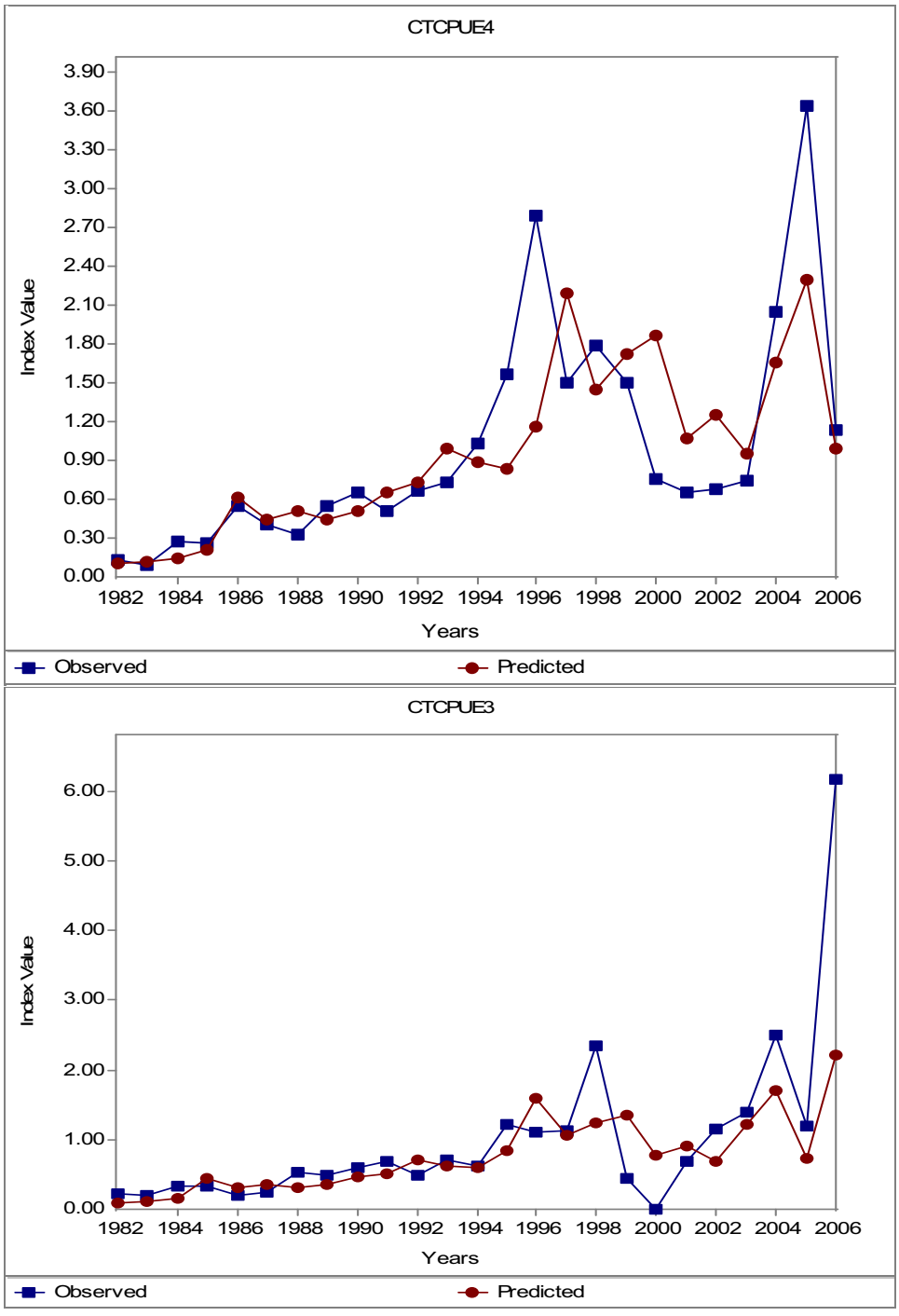

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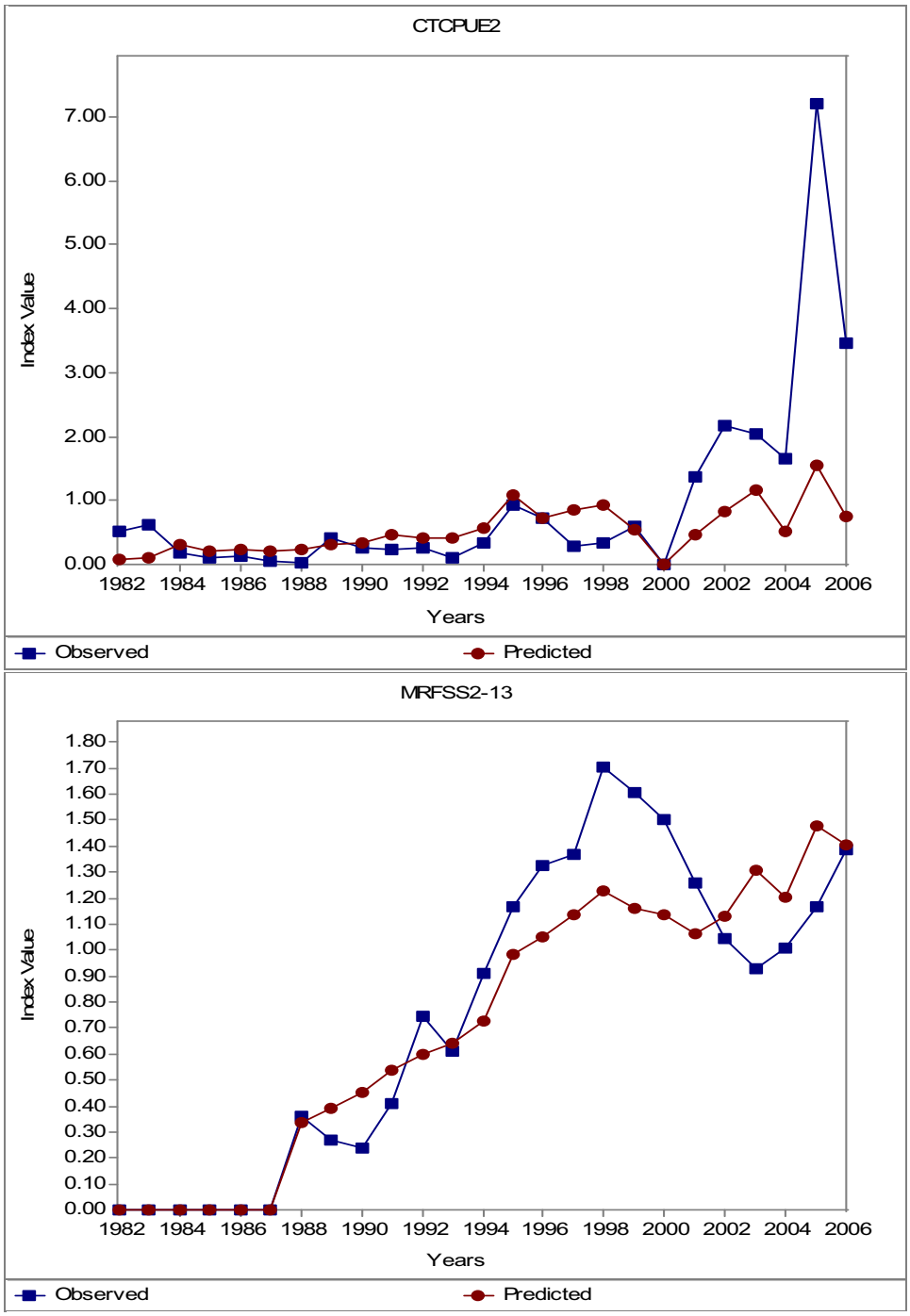

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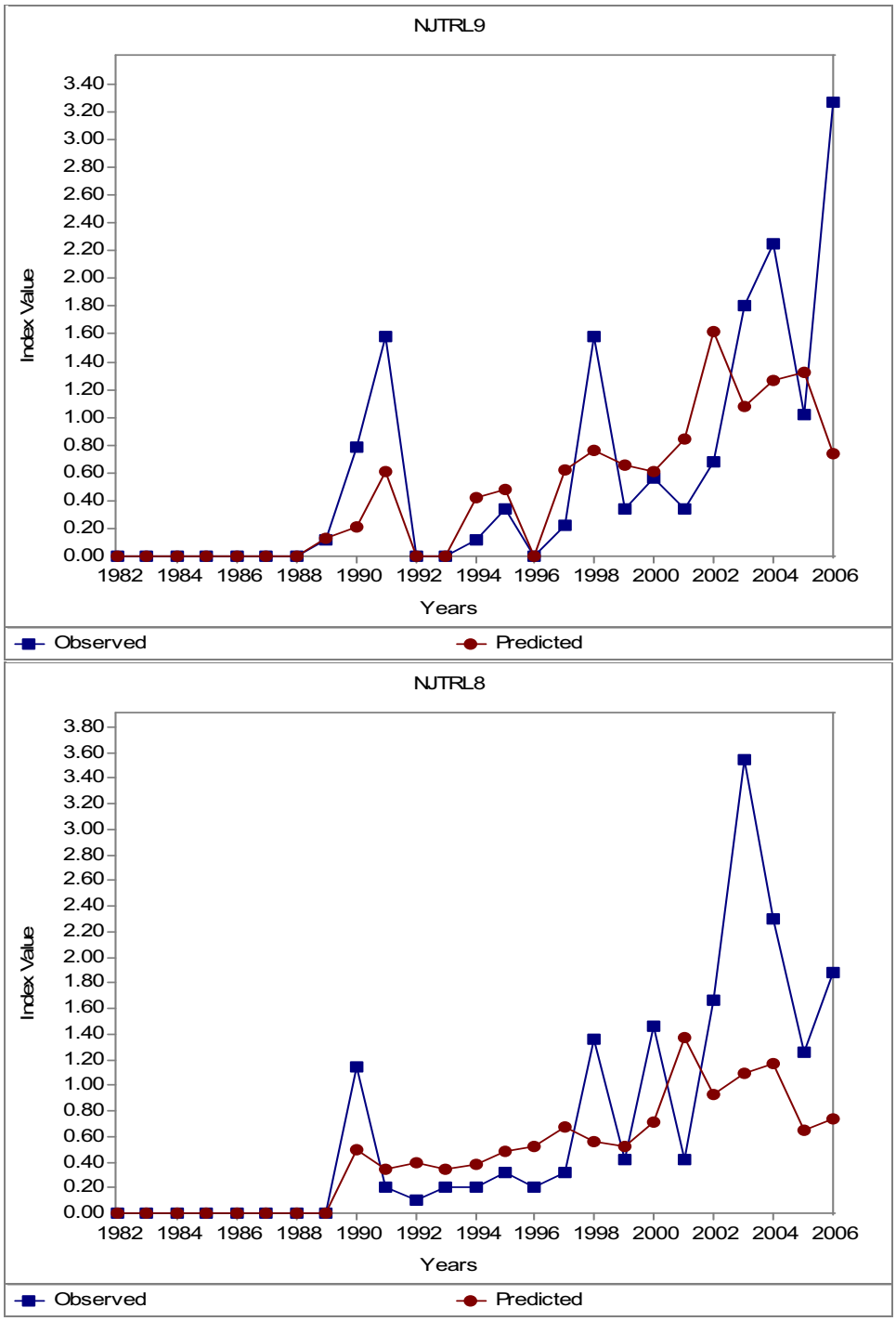

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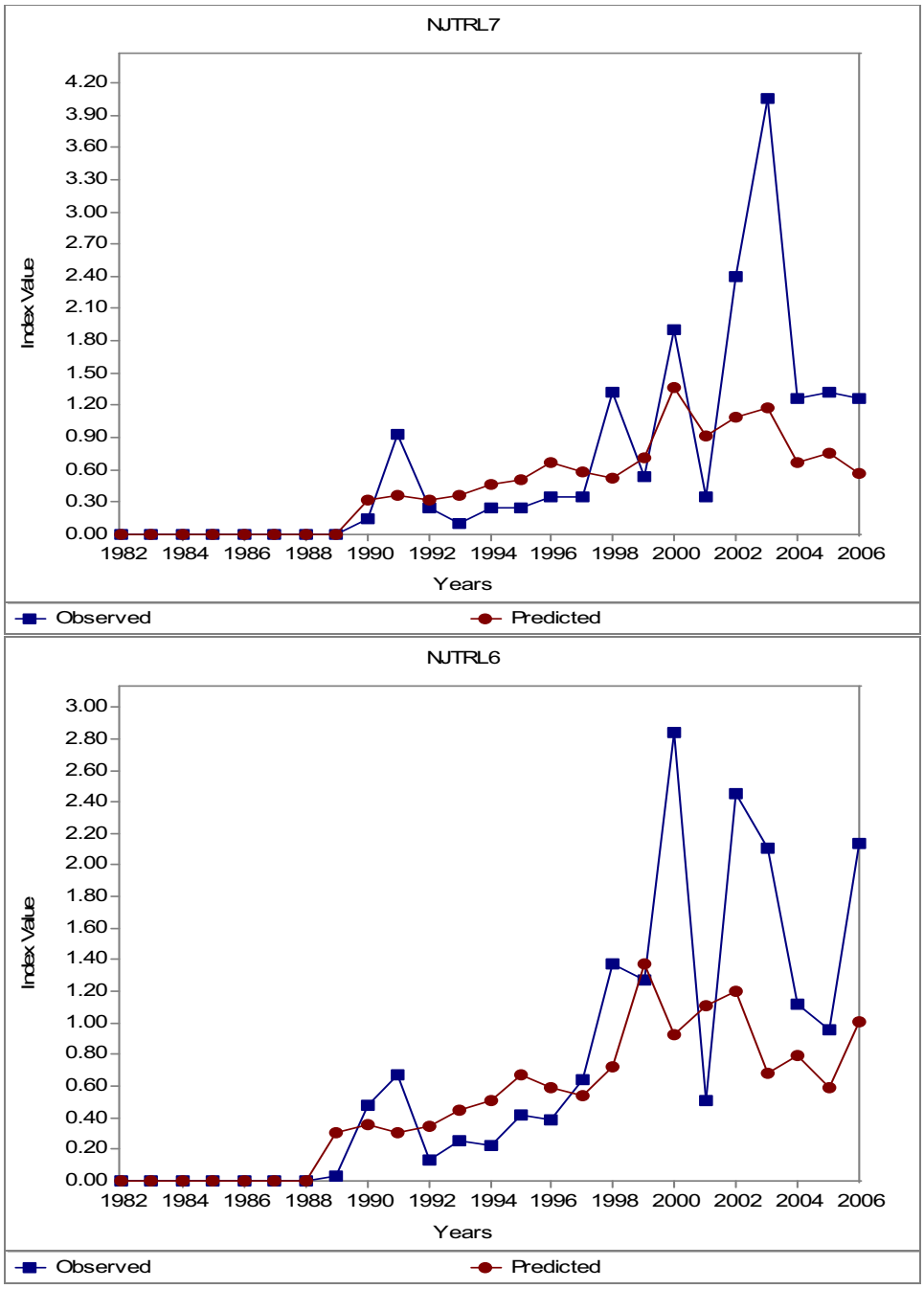

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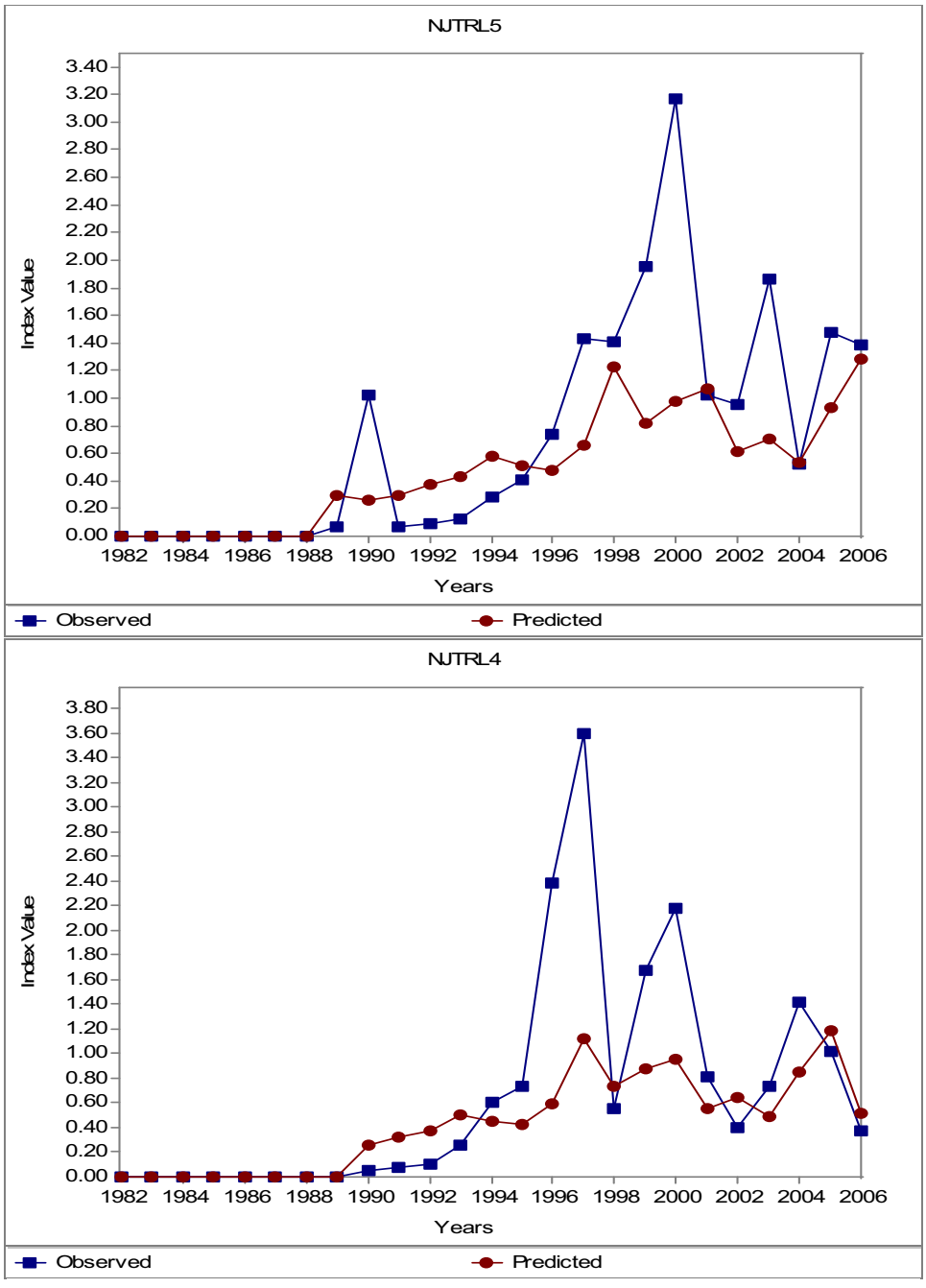

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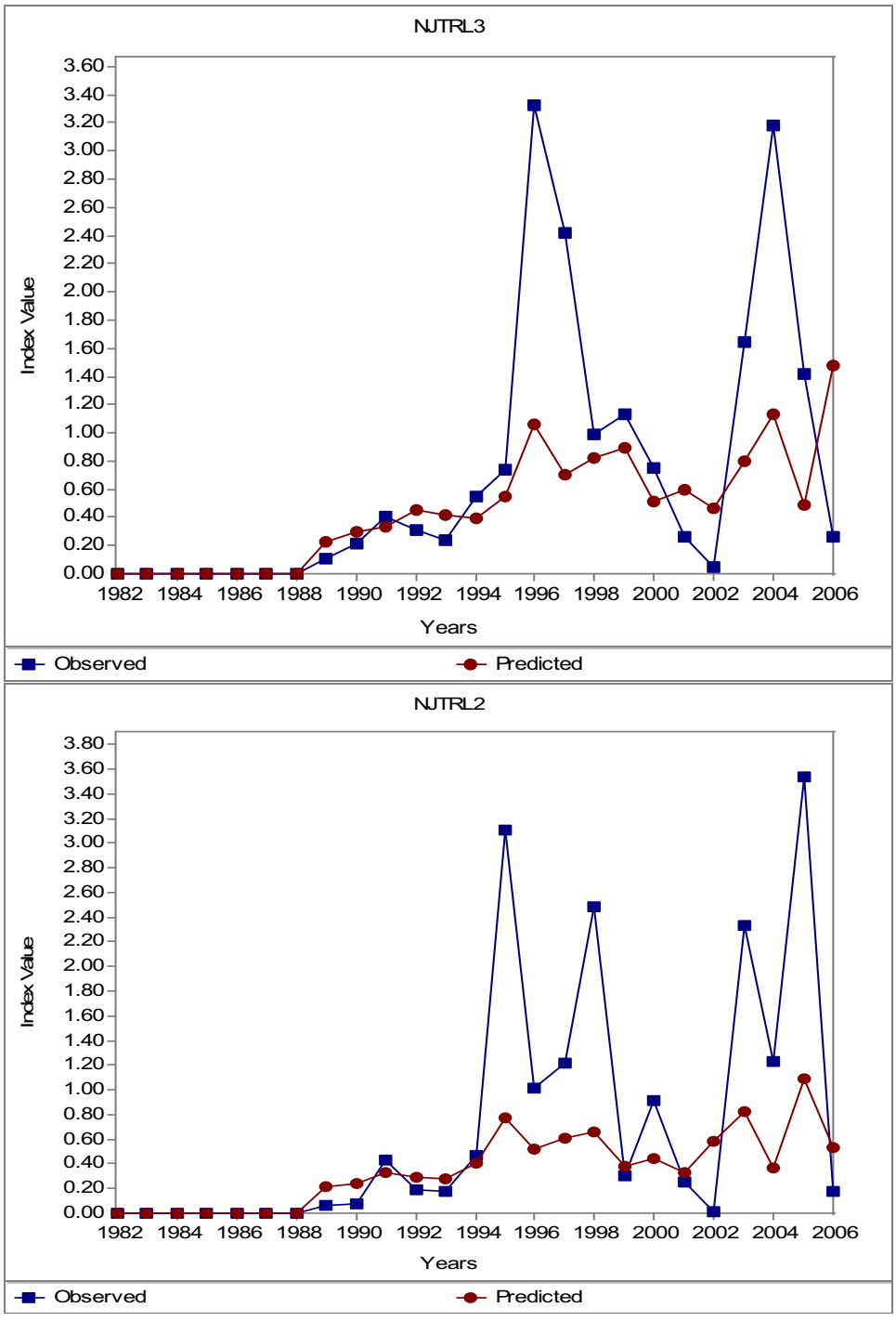

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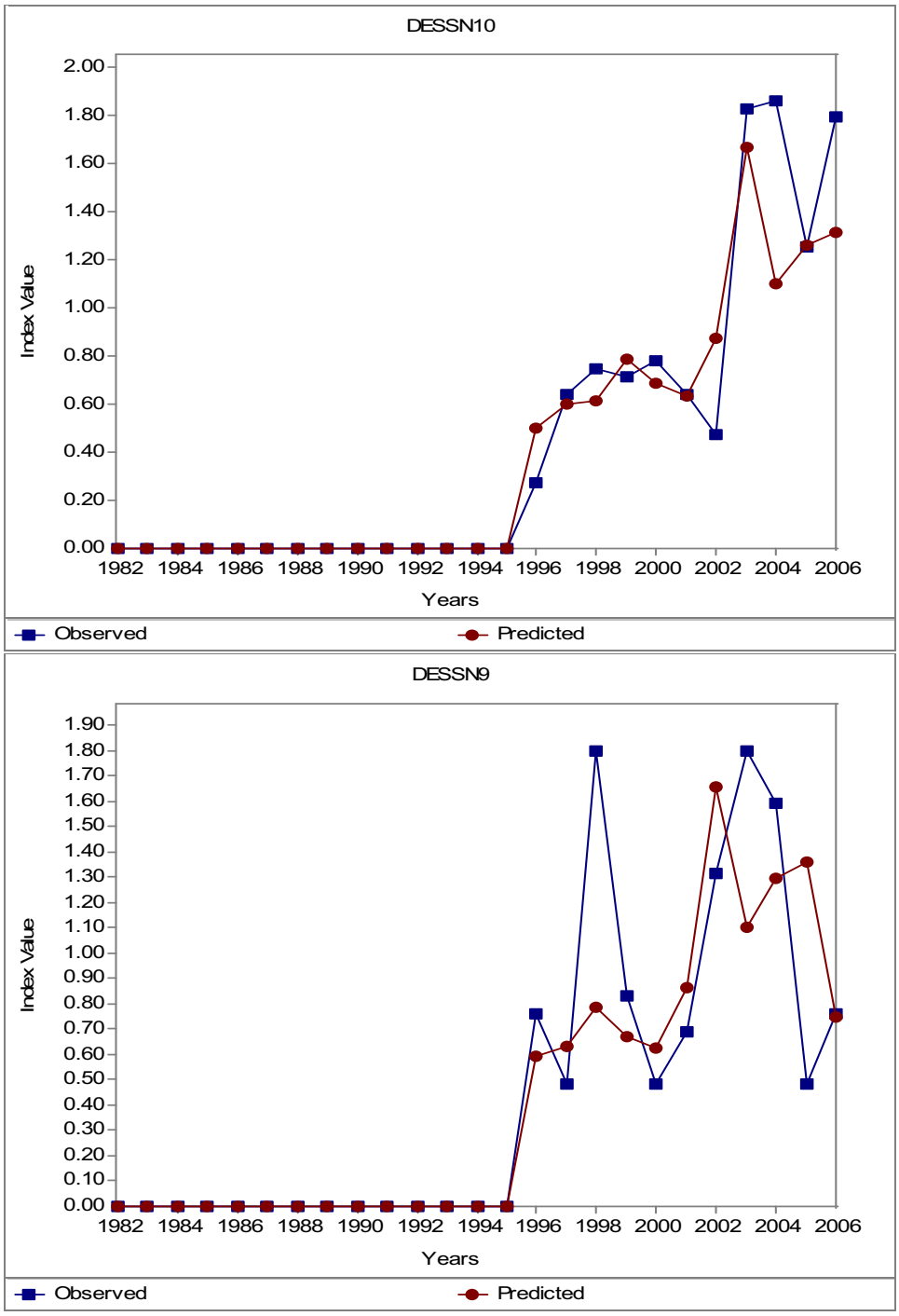

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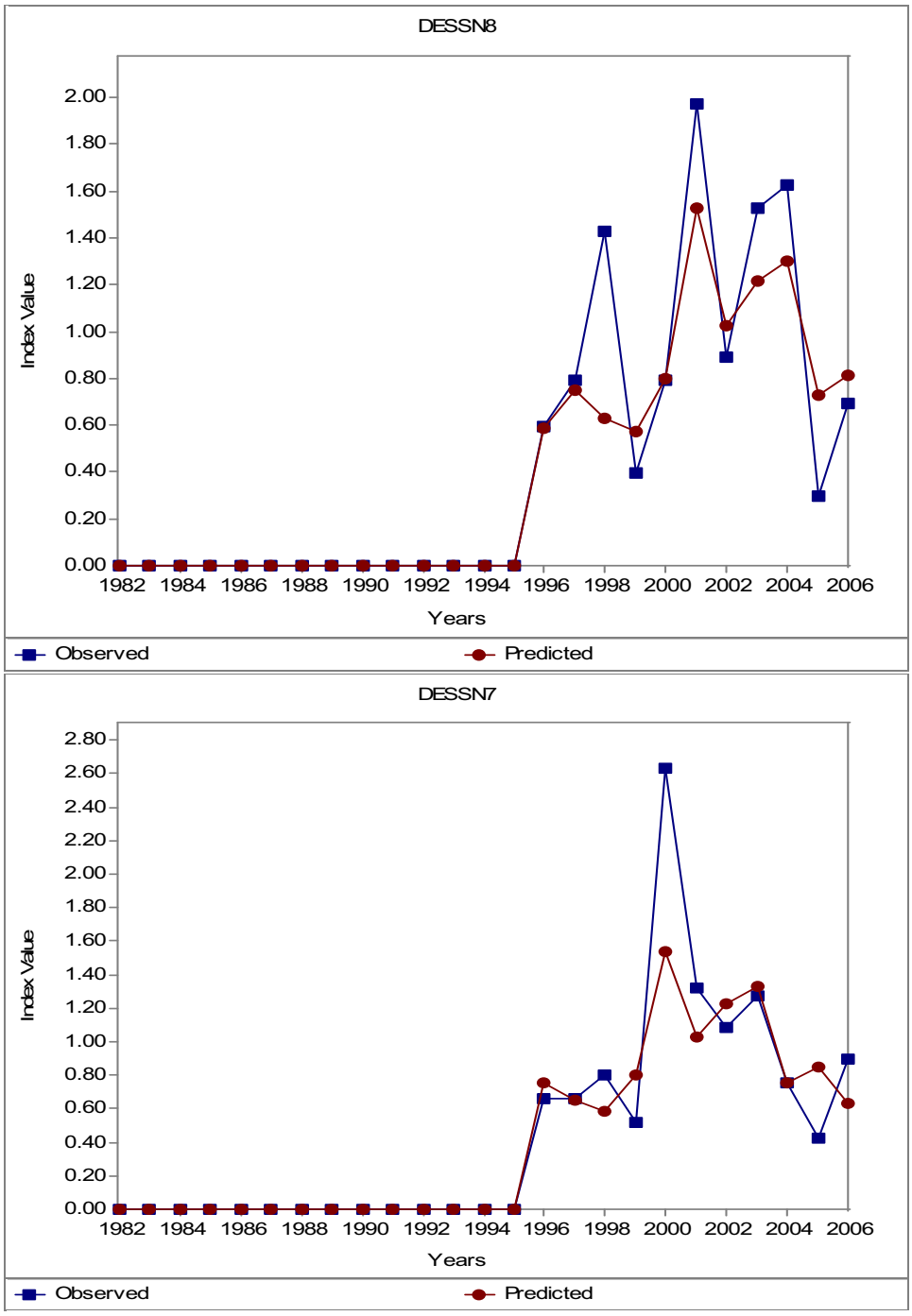

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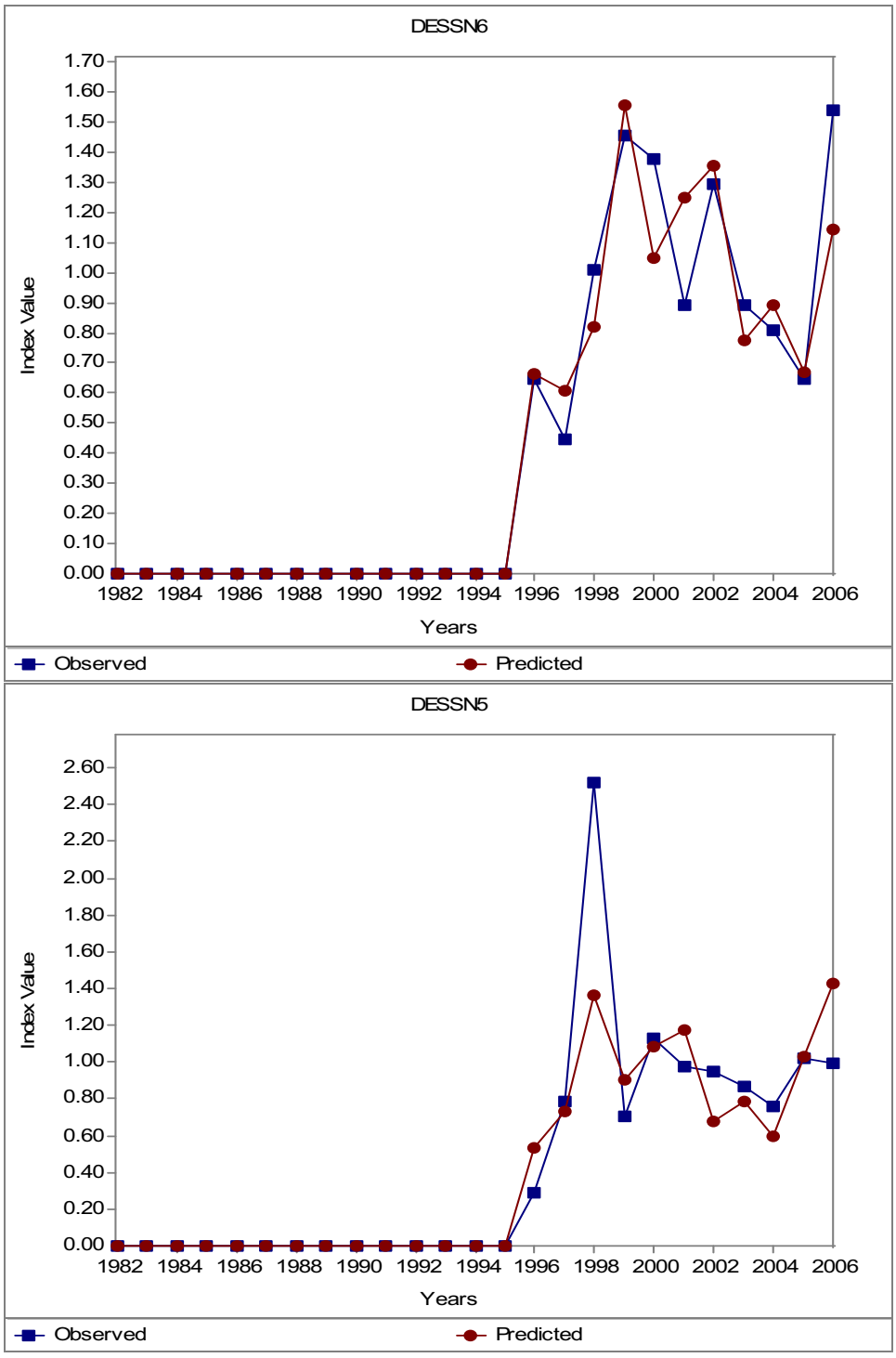

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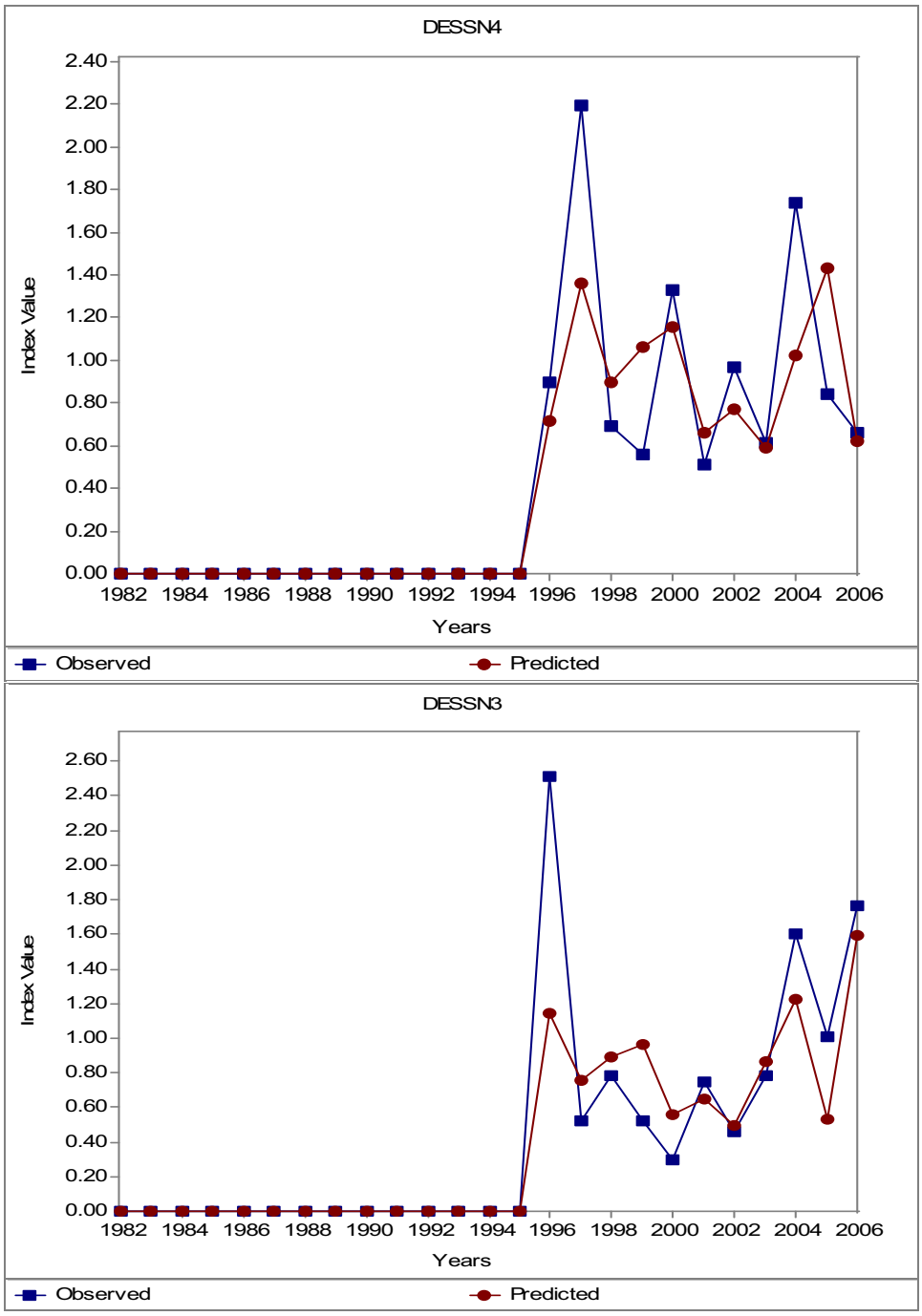

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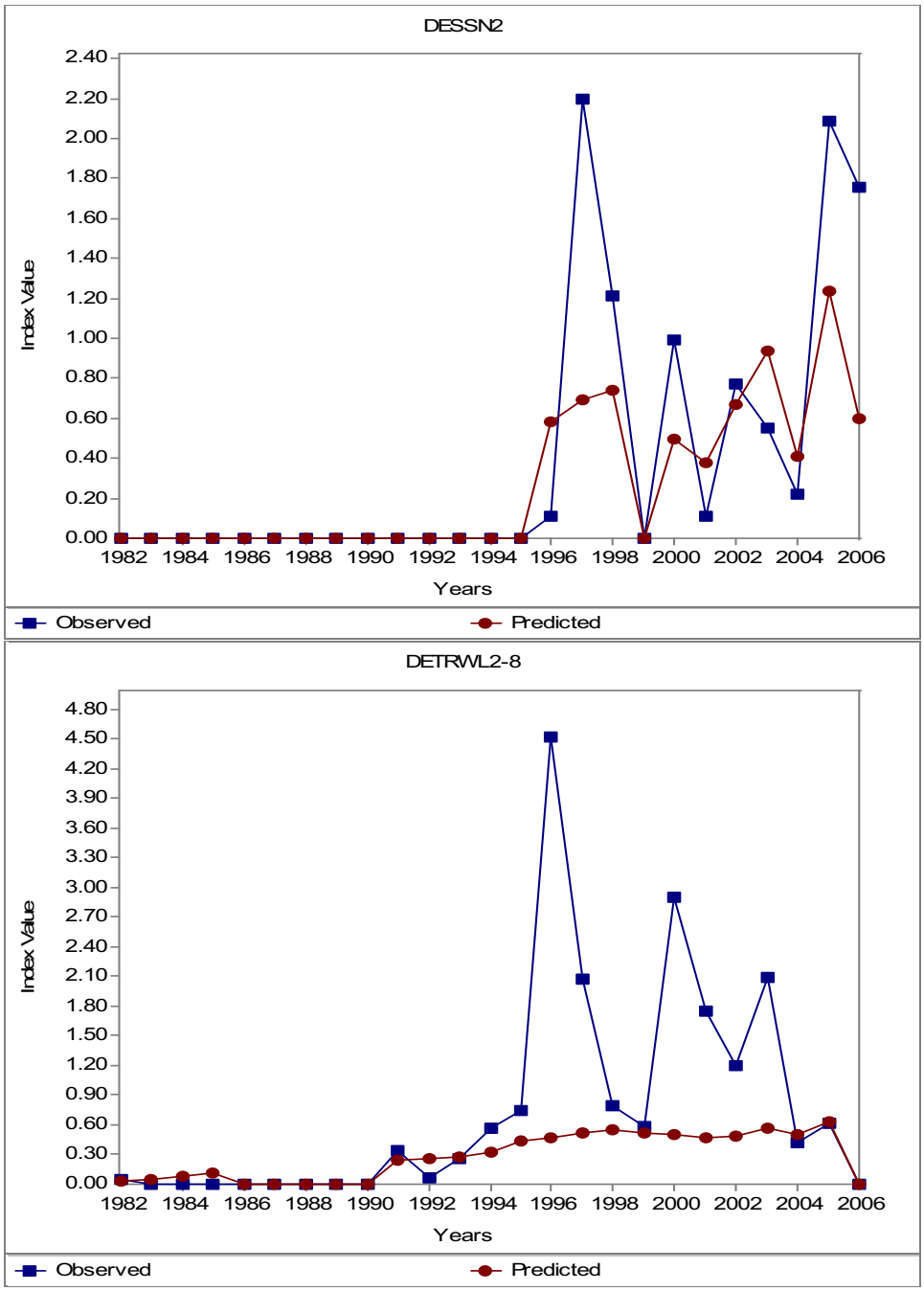

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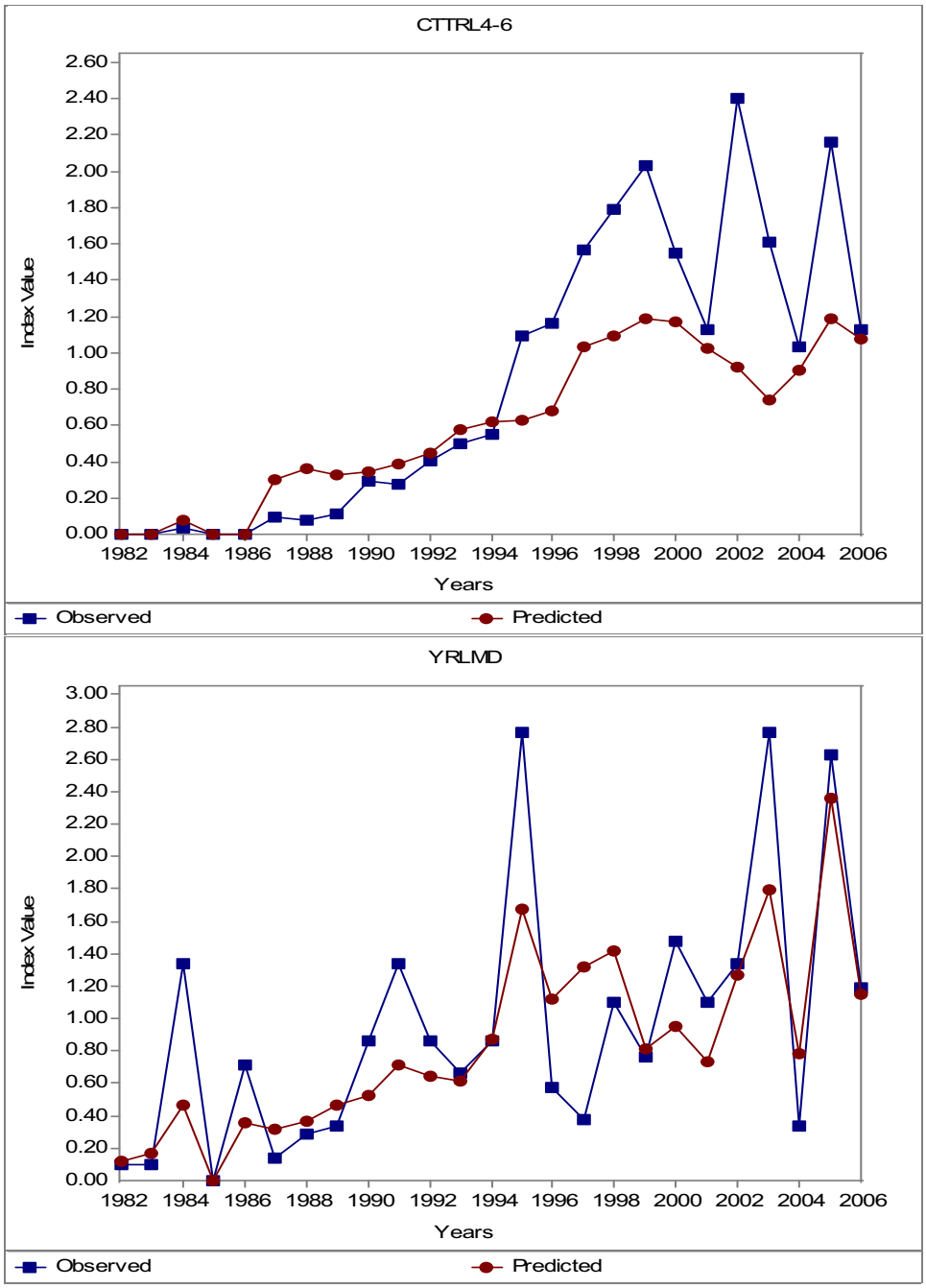

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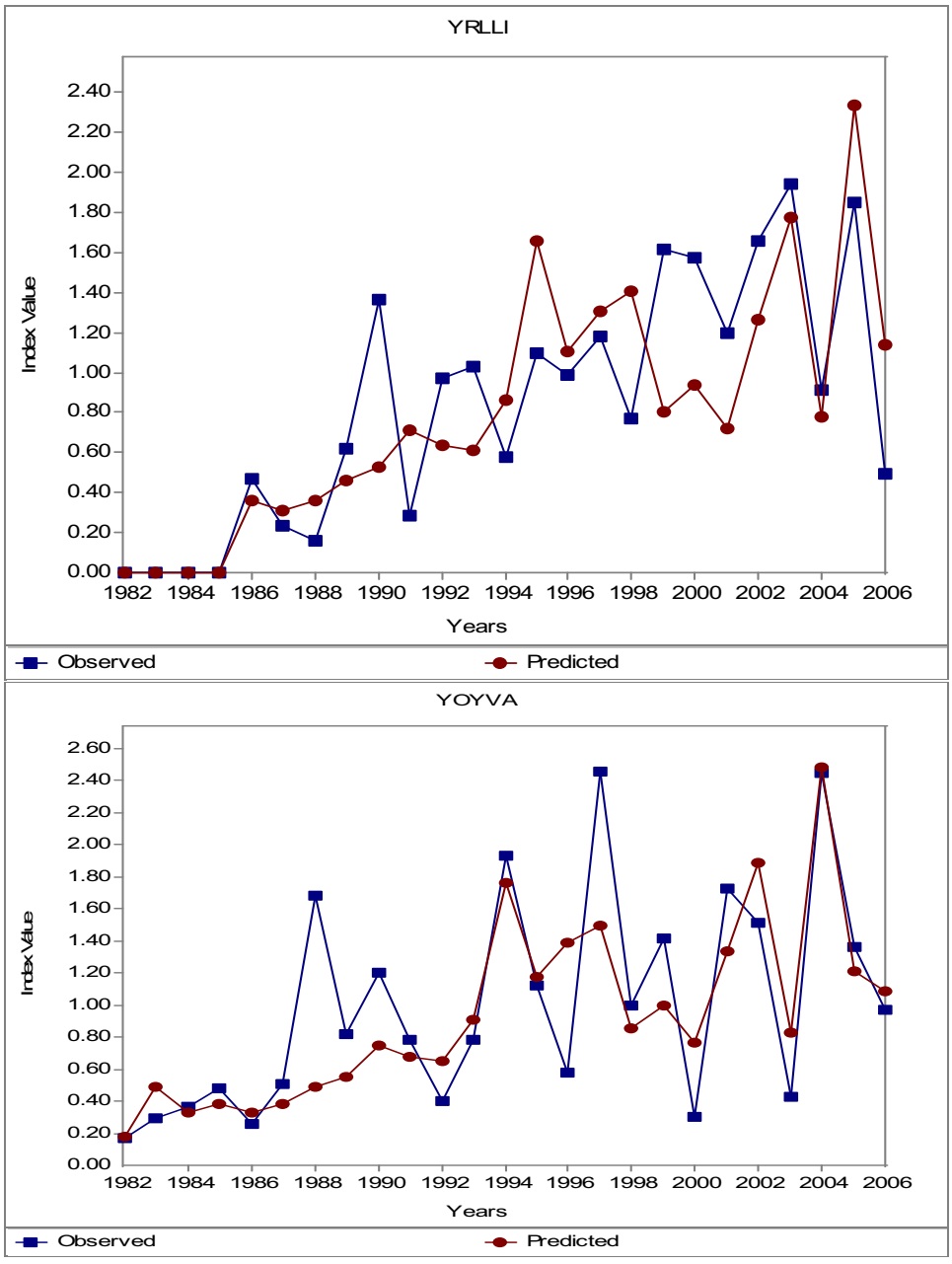

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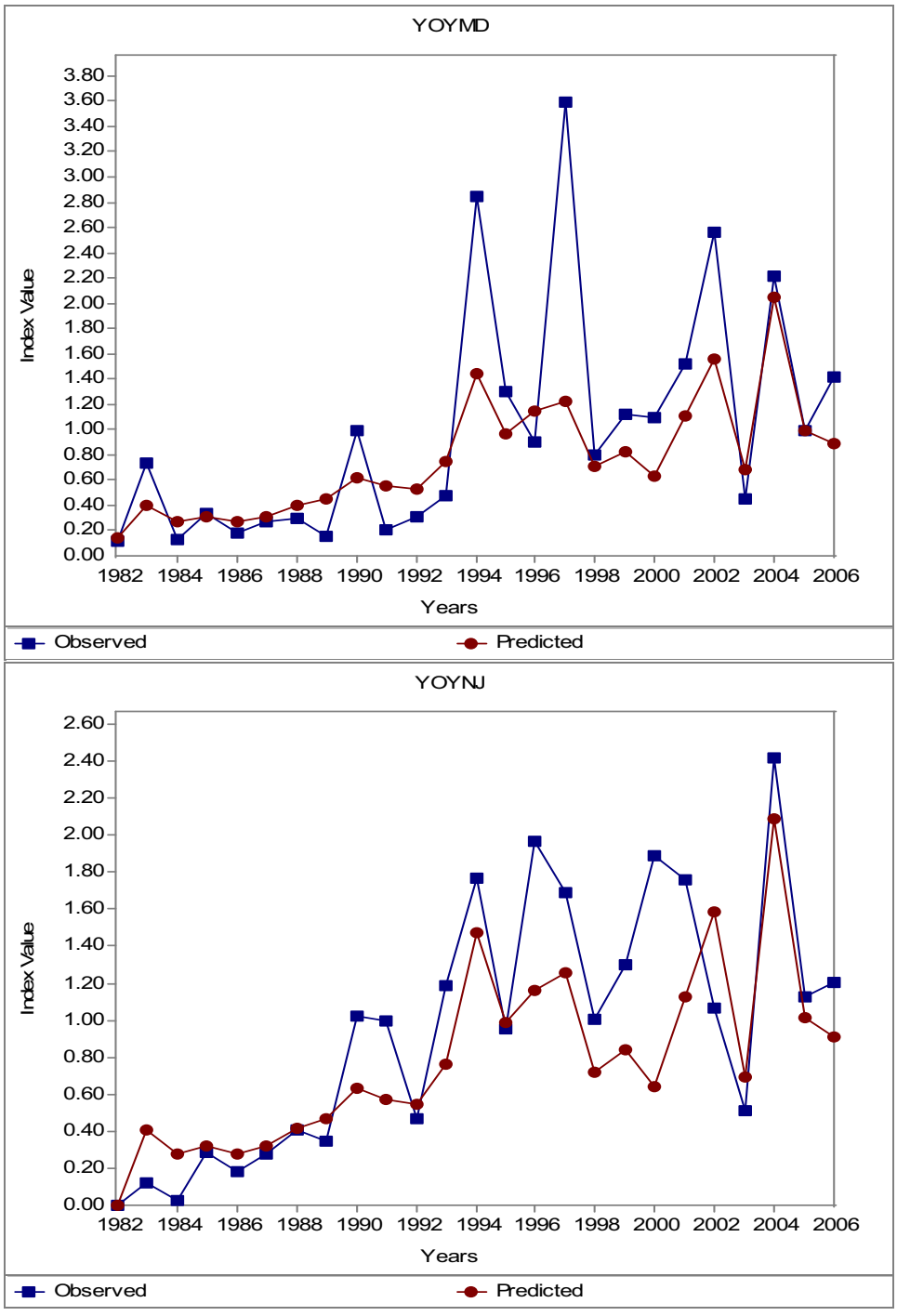

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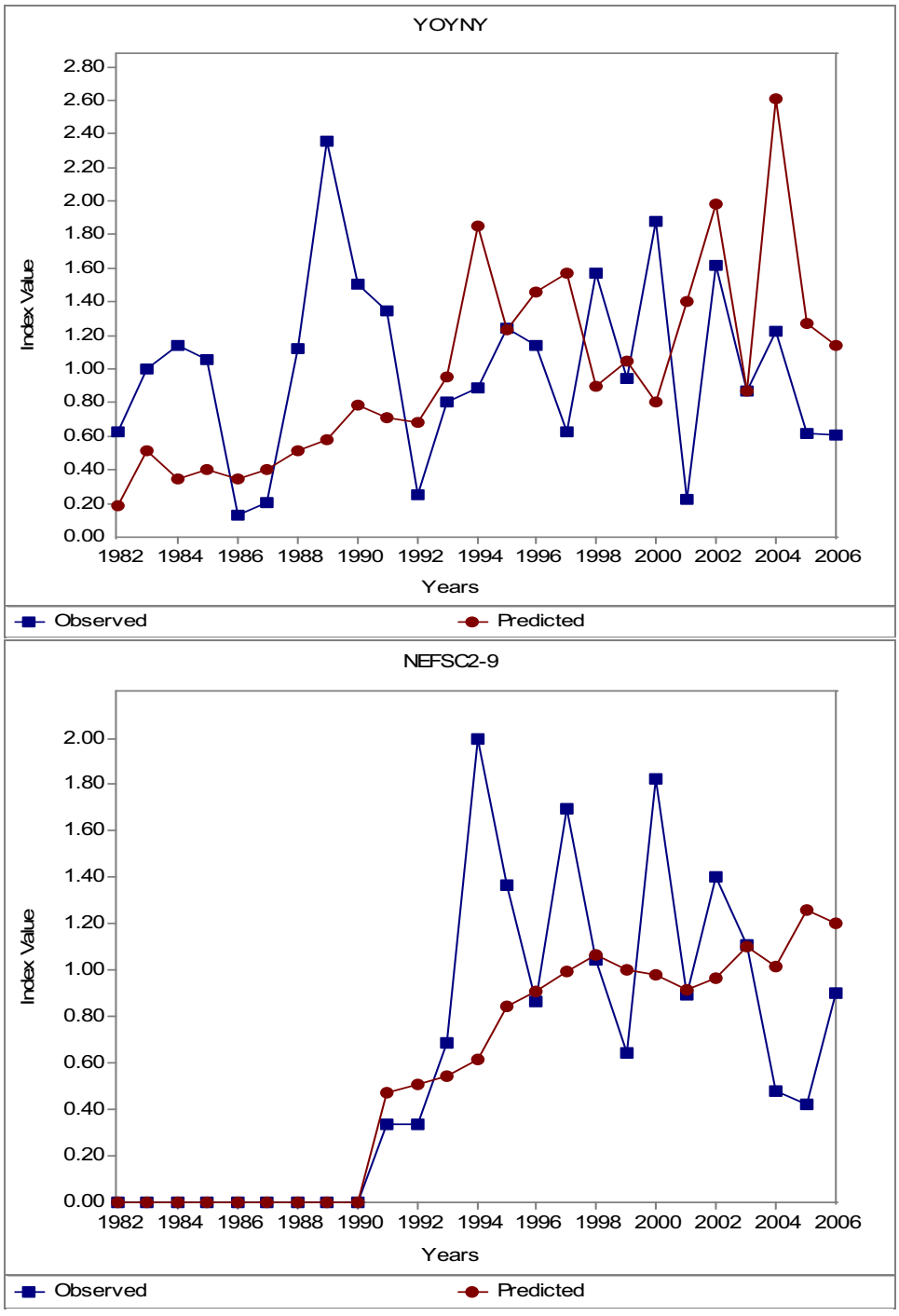

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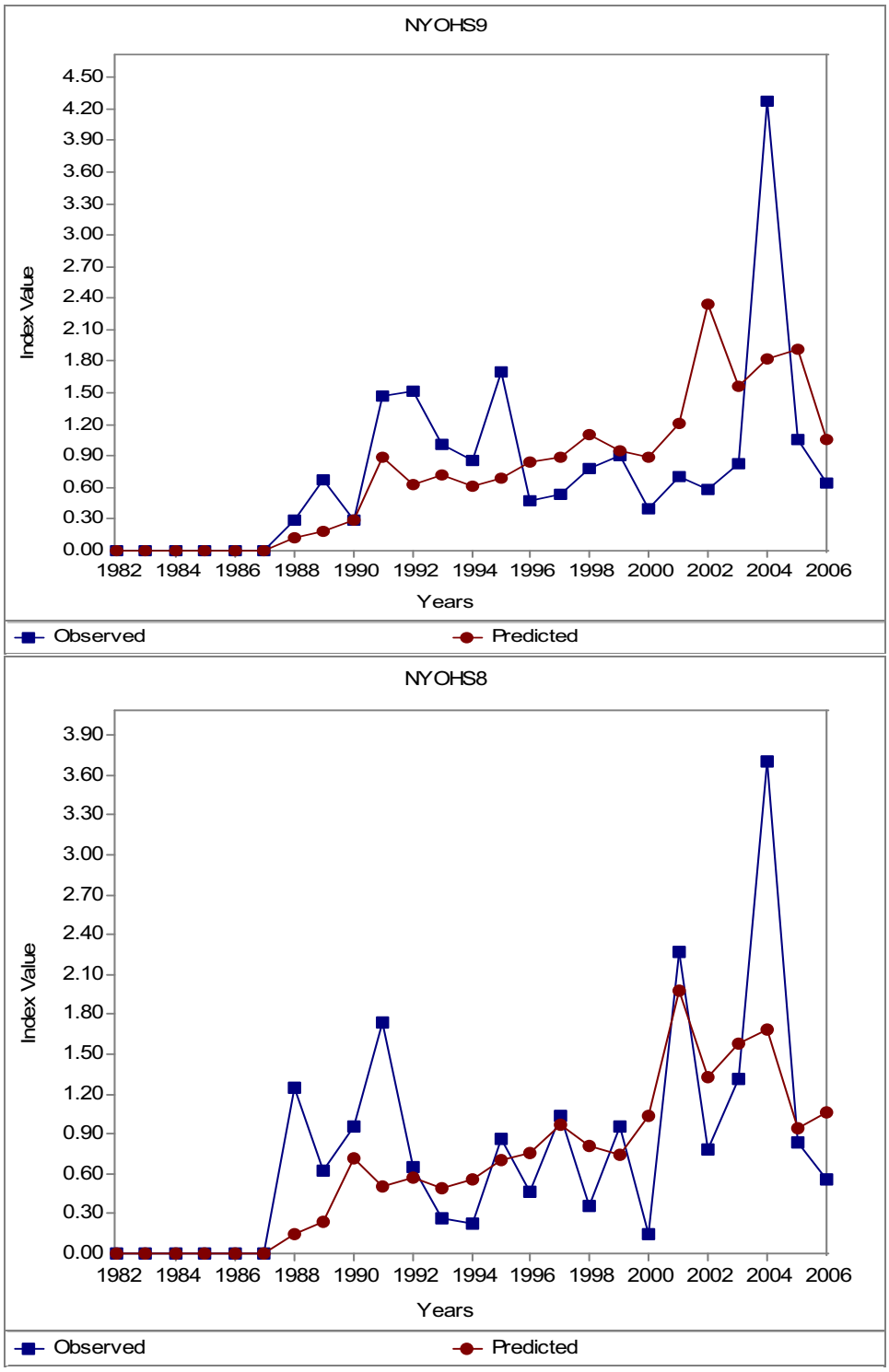

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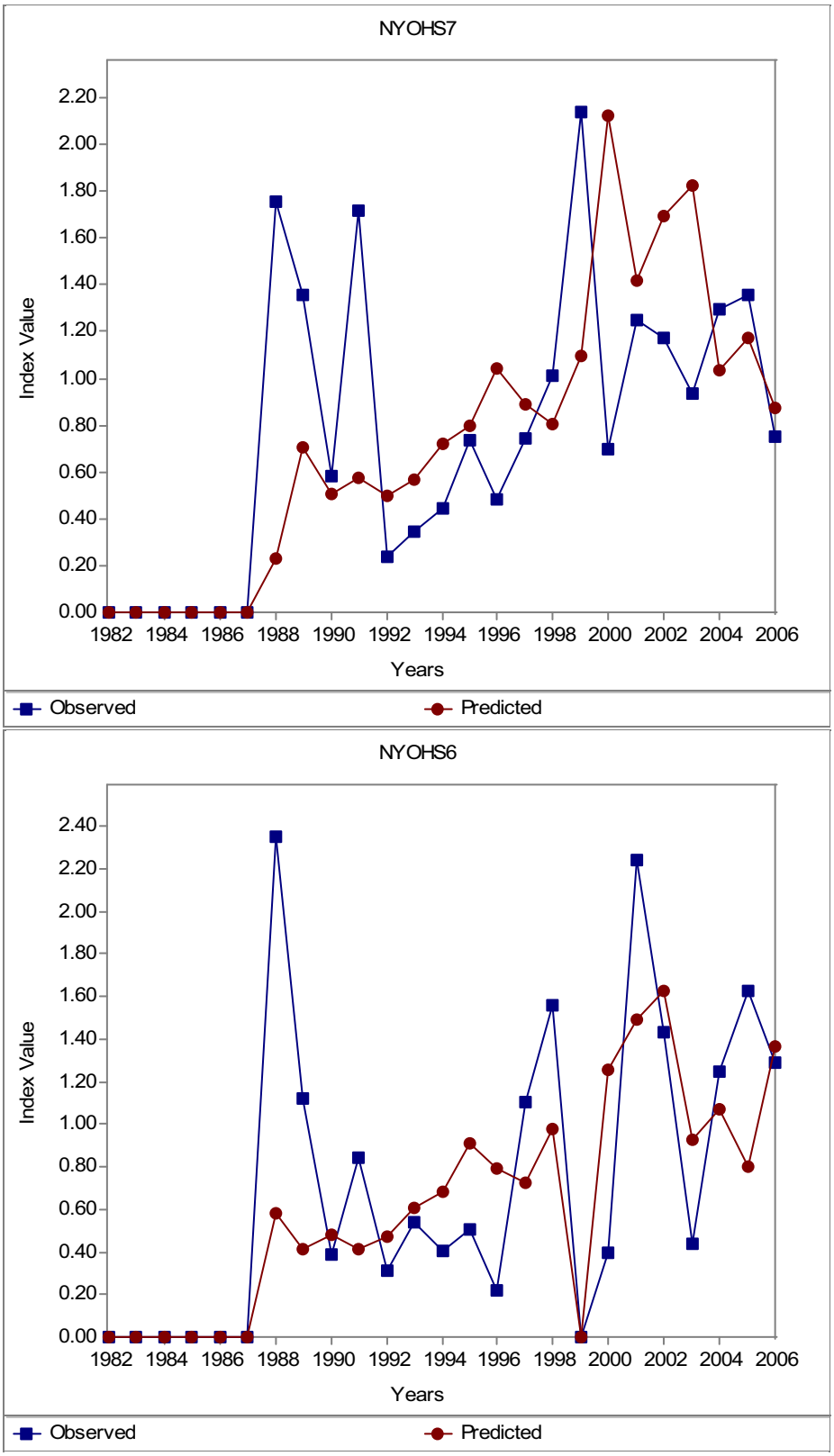

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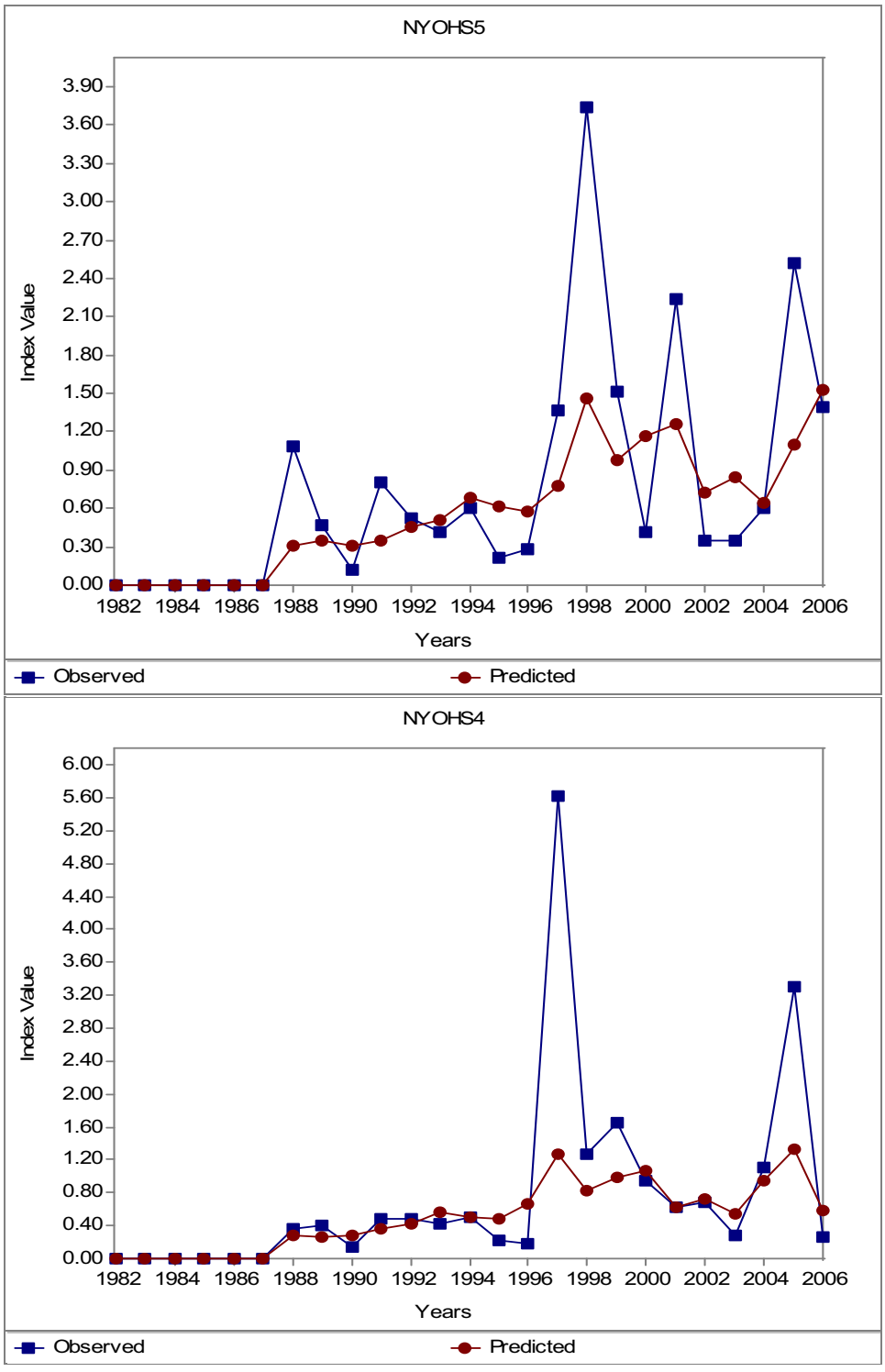

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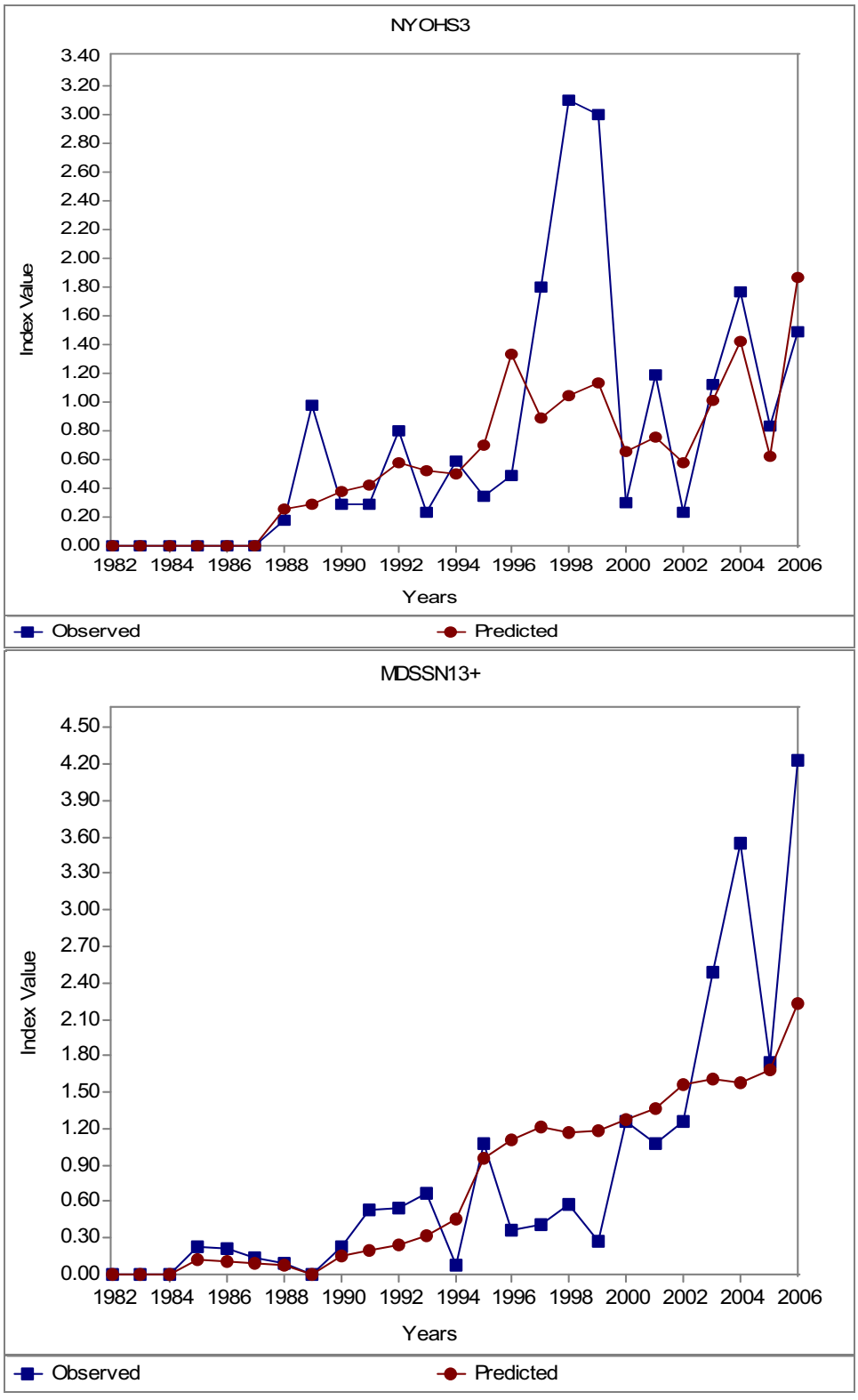

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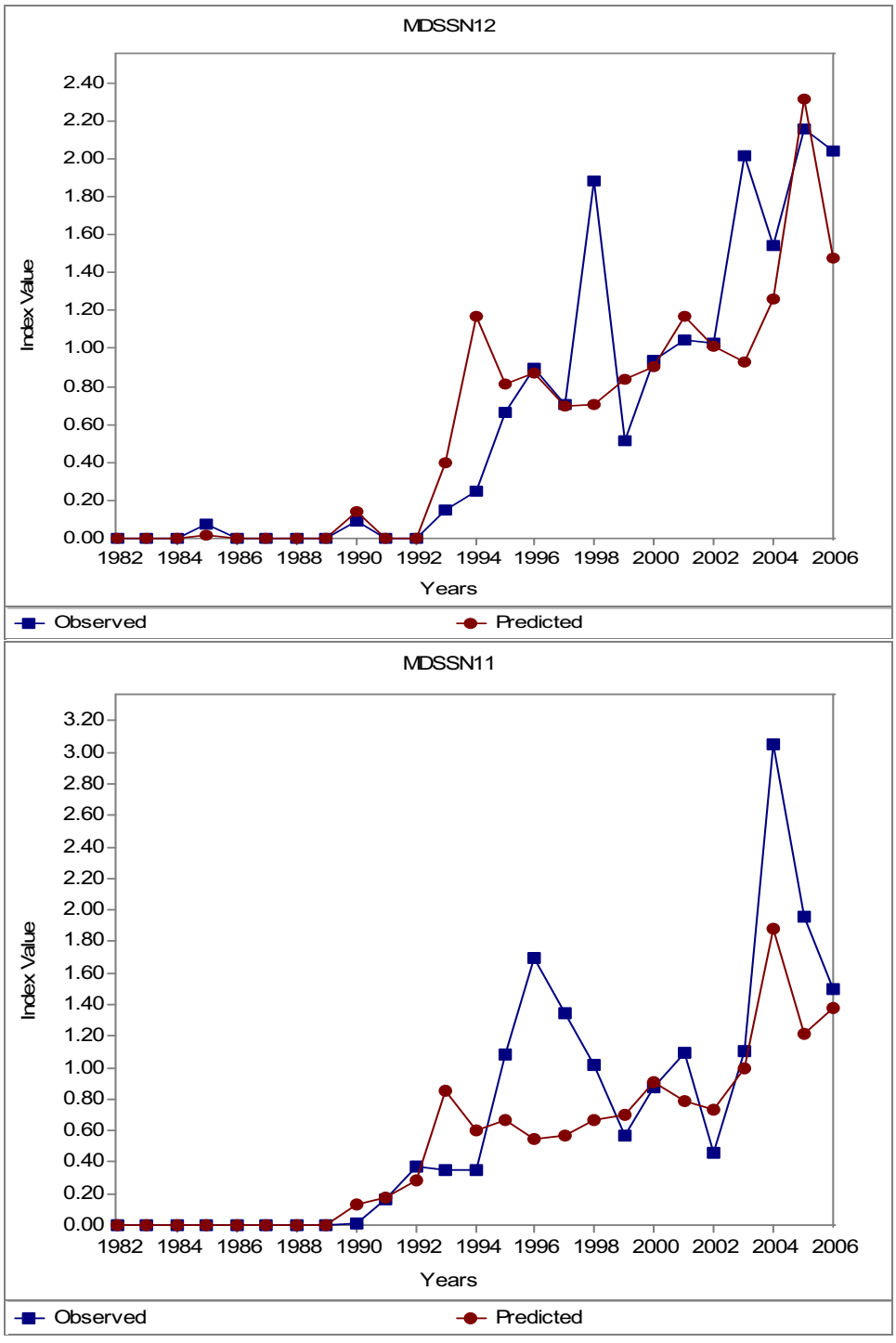

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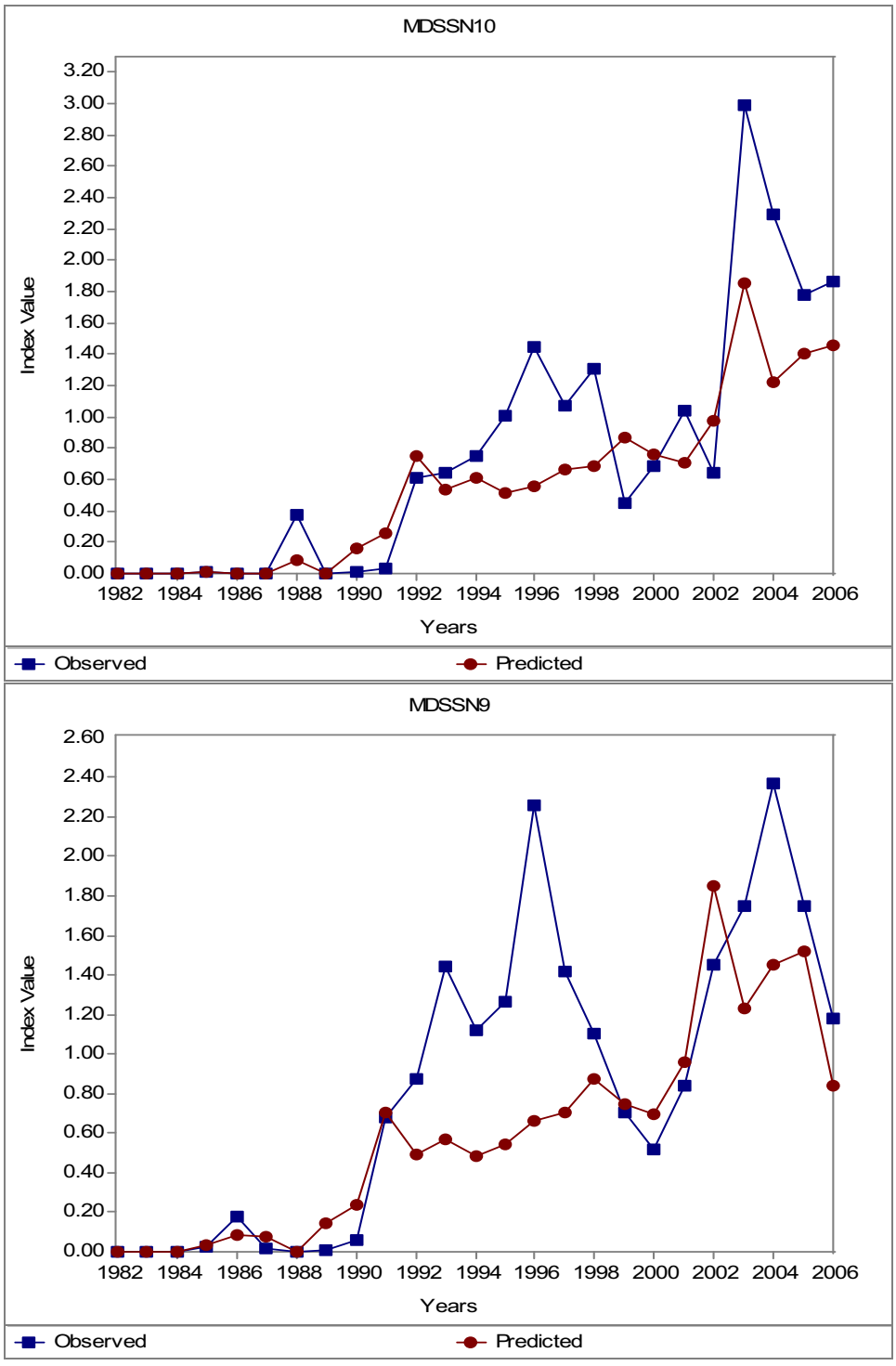

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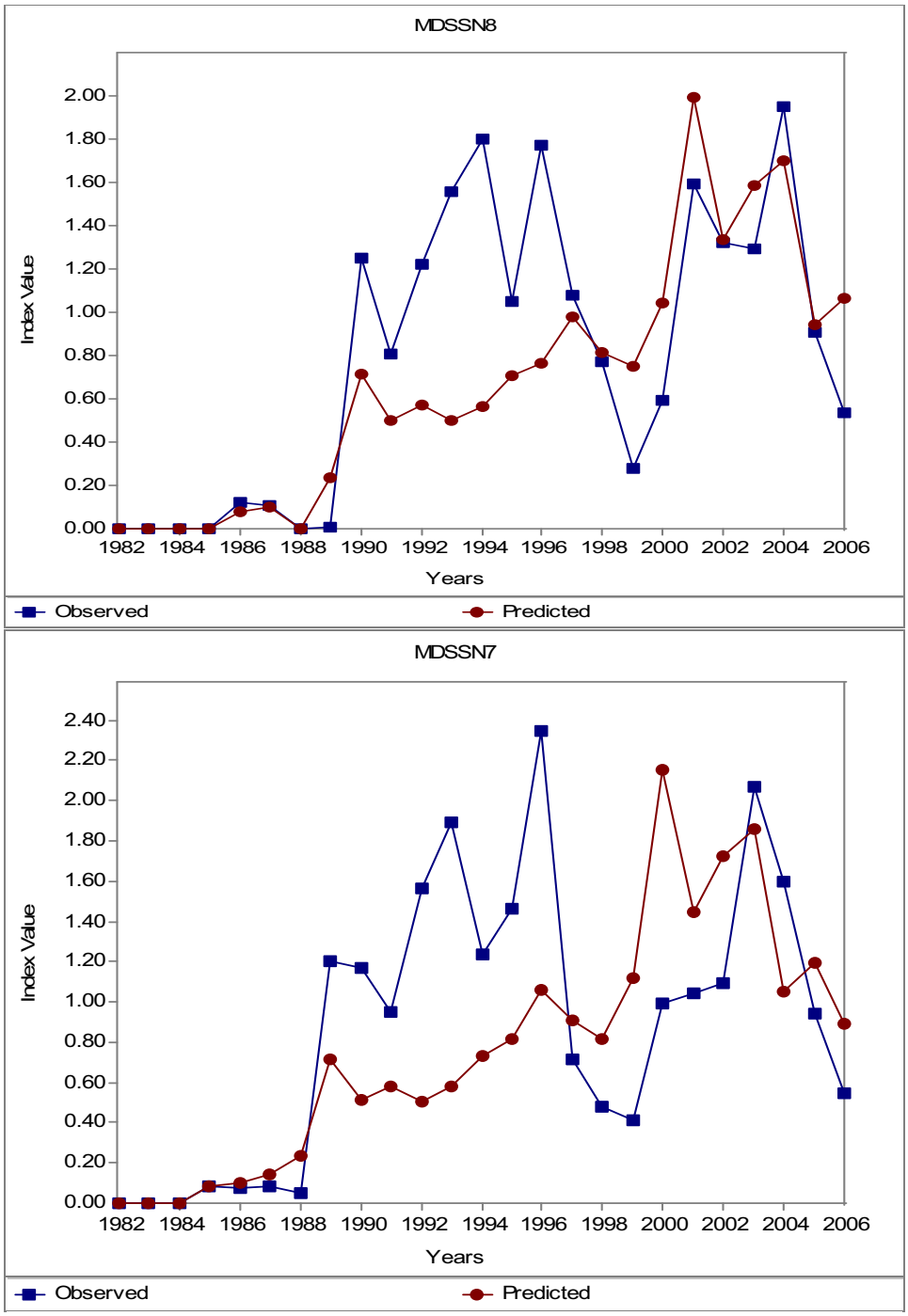

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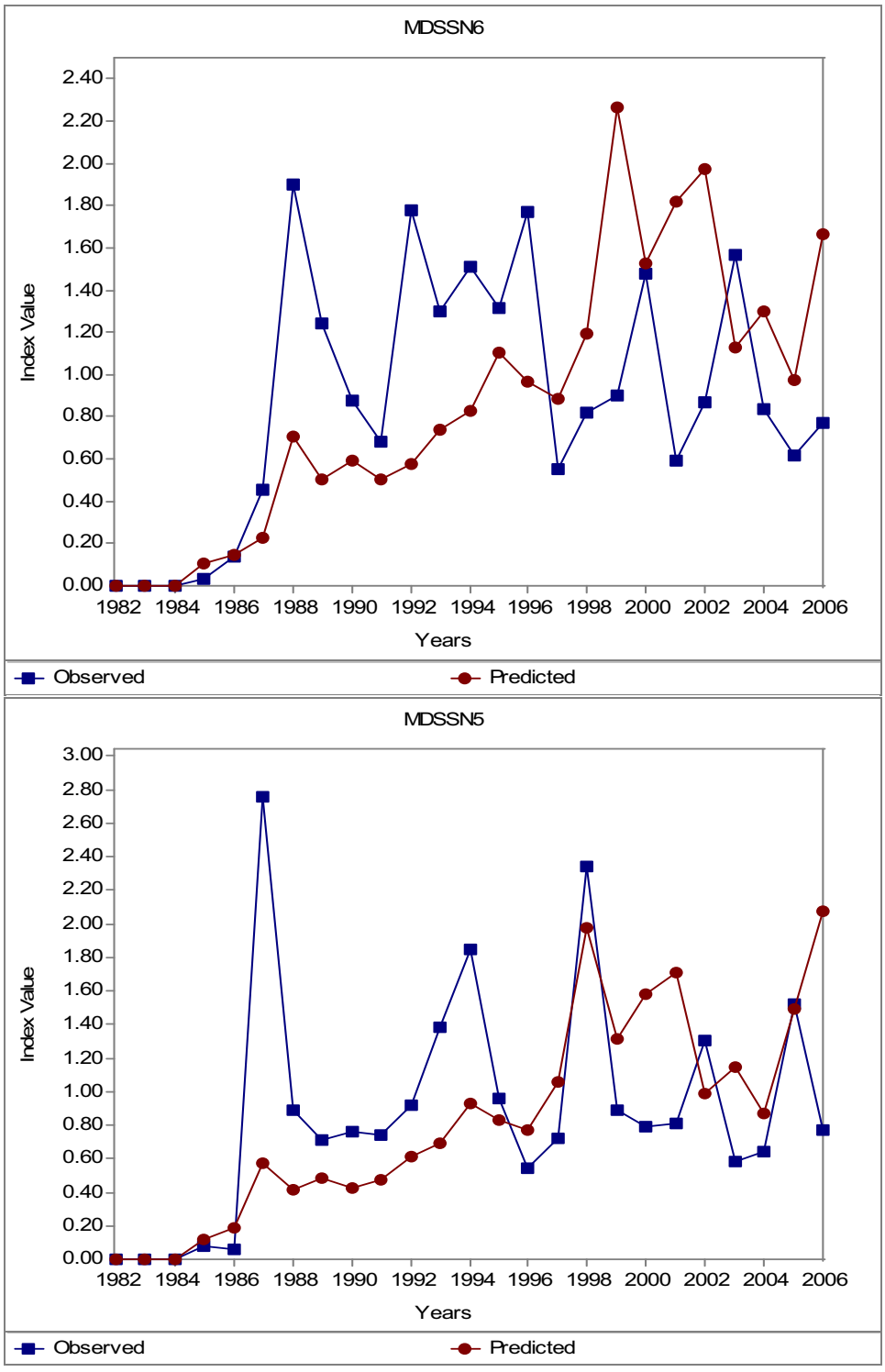

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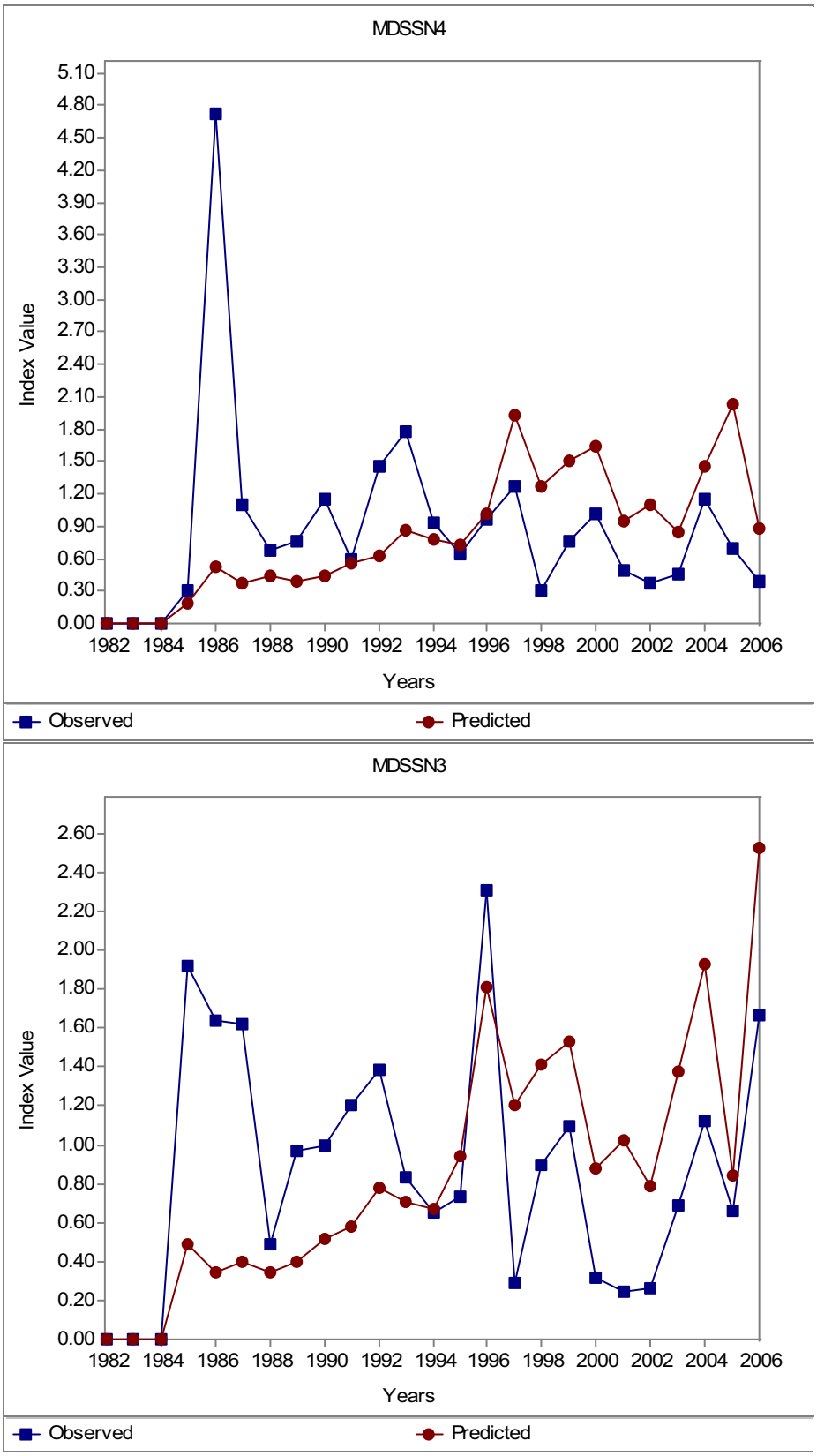

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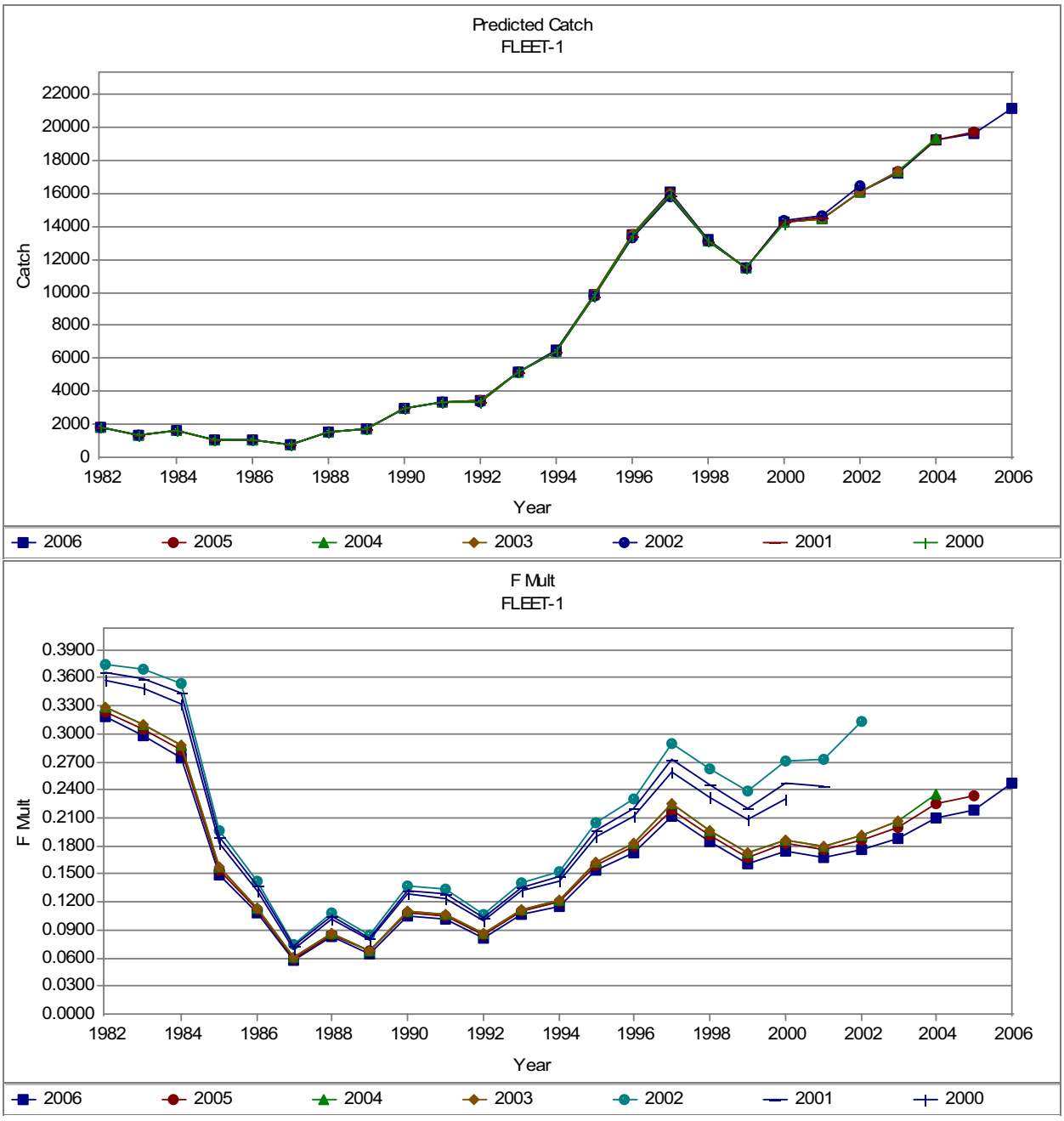

Figure 4. Retrospective patterns of catch and F estimates from ASAP model.

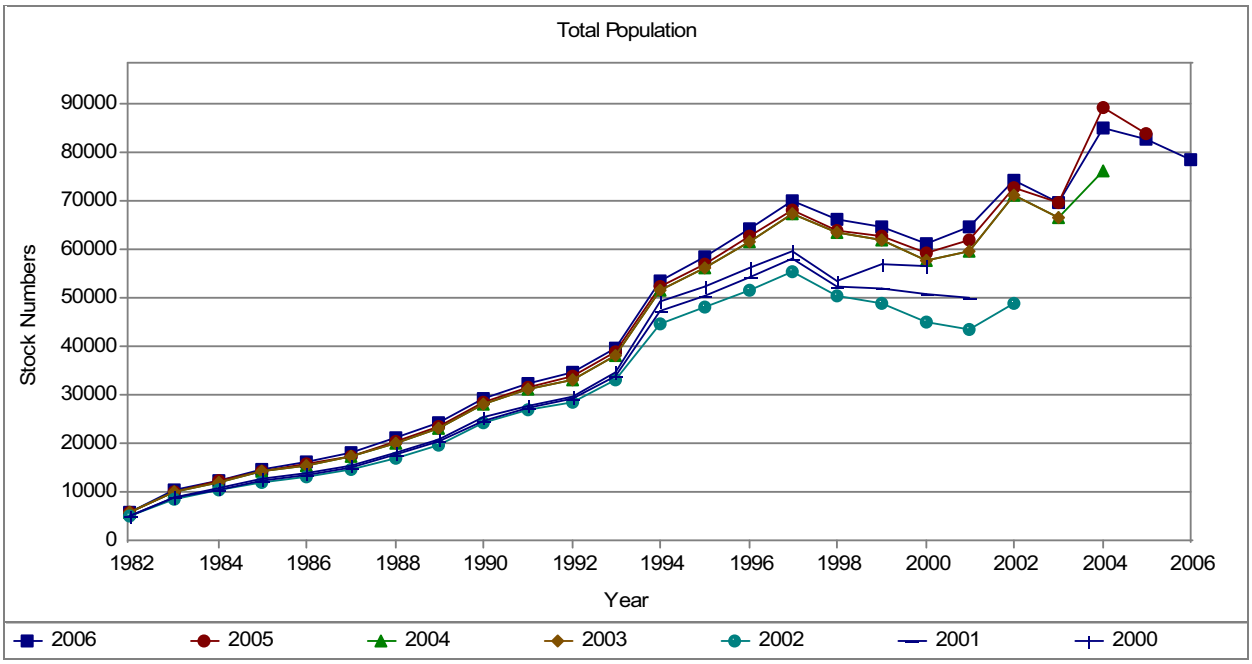

Figure 5. Retrospective patterns of total abundance from ASAP model.