

IPRenewal NPEmails

From: Nancy Decker <ndecker@asaac.com>
Sent: Thursday, April 21, 2016 10:11 AM
To: Wentzel, Michael
Cc: Dara Gray
Subject: [External_Sender] Email 5 for 2013 YCR
Attachments: 2013-Chapter 4.pdf

Nancy Decker

ASA *Solutions through Science*

ASA Analysis & Communication, Inc.

37 Turk Hill Road

Brewster, New York 10509

Tel: 845-279-9109

Email: ndecker@asaac.com

Hearing Identifier: IndianPointUnits2and3NonPublic_EX
Email Number: 5496

Mail Envelope Properties (BLUPR0201MB14250F7BE42AD95AD8E029A3B46E0)

Subject: [External_Sender] Email 5 for 2013 YCR
Sent Date: 4/21/2016 10:11:00 AM
Received Date: 4/21/2016 10:11:20 AM
From: Nancy Decker

Created By: ndecker@asaac.com

Recipients:

"Dara Gray" <dgray@entergy.com>
Tracking Status: None
"Wentzel, Michael" <Michael.Wentzel@nrc.gov>
Tracking Status: None

Post Office: BLUPR0201MB1425.namprd02.prod.outlook.com

Files	Size	Date & Time
MESSAGE	181	4/21/2016 10:11:20 AM
2013-Chapter 4.pdf	2563902	

Options

Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

CHAPTER 4

SPATIOTEMPORAL DISTRIBUTION OF SELECTED SPECIES OF HUDSON RIVER ESTUARY FISHES

This chapter presents graphs of the spatiotemporal distribution within the Hudson River for 16 selected species as well as graphs of the temporal, geographical, and annual abundance indices for these species. Length data for young-of-year fish of several species are plotted. Supporting tables for these graphs are provided in Appendices [C \(Species Composition\)](#), [D \(Density and Standing Crop Estimates\)](#), [E \(Temporal and Geographical Distribution Indices\)](#), [F \(Annual Abundance Indices\)](#), and [G \(Length Frequency Distribution\)](#).

4.1 SPECIES COLLECTED

Overall species composition for each year from 1974 to 2013 and species composition by survey for 2013 are tabulated.

Links to Tables	Table	Supporting Appendix Tables
Fish species collected for 1974 to 2013	4-1	--
Species composition of fish by survey for 2013	4-2	C-1 , C-2 , C-3

4.2 STRIPED BASS

Links to Graphs	Graph	Supporting Appendix Tables
Spatiotemporal distribution of eggs, yolk-sac, and post yolk-sac larval fish for 2013 LRS	4-1	D-1 to D-6
Spatiotemporal distribution of young-of-year fish for 2013 LRS/FJS/BSS	4-2	D-7 to D-12
Spatiotemporal distribution of yearling fish for 2013 LRS/FJS/BSS	4-3	D-13 to D-18
Spatiotemporal distribution of older-than-yearling fish for 2013 LRS/FJS/BSS	4-4	D-19 to D-24
Temporal distribution indices for LRS for 1974 to 2013	4-5	E-1
Geographical distribution indices for LRS for 1974 to 2013	4-6	E-2
Geographical distribution indices for BSS for 1974 to 2013	4-7	E-3
Annual abundance indices	4-8	F-1
Weekly length statistics for young-of-year fish for 2013 LRS/FJS/BSS	4-9	G-1 to G-3

4.3 WHITE PERCH

Links to Graphs	Graph	Supporting Appendix Tables
Spatiotemporal distribution of eggs, yolk-sac, and post yolk-sac larval fish for 2013 LRS	4-10	D-25 to D-30
Spatiotemporal distribution of young-of-year fish for 2013 LRS/FJS/BSS	4-11	D-31 to D-36
Spatiotemporal distribution of yearling fish for 2013 LRS/FJS/BSS	4-12	D-37 to D-42
Spatiotemporal distribution of older-than-yearling fish for 2013 LRS/FJS/BSS	4-13	D-43 to D-48
Temporal distribution indices for LRS for 1974 to 2013	4-14	E-4
Geographical distribution indices for LRS for 1974 to 2013	4-15	E-5
Geographical distribution indices for BSS for 1974 to 2013	4-16	E-6
Annual abundance indices	4-17	F-2
Weekly length statistics for young-of-year fish for 2013 LRS/FJS/BSS	4-18	G-4 to G-6

4.4 ATLANTIC TOMCOD

Links to Graphs	Graph	Supporting Appendix Tables
Spatiotemporal distribution of eggs, yolk-sac, and post yolk-sac larval fish for 2013 LRS	4-19	D-49 to D-54
Spatiotemporal distribution of young-of-year fish for 2013 LRS/FJS/BSS	4-20	D-55 to D-60
Spatiotemporal distribution of yearling and older fish for 2013 LRS/FJS/BSS	4-21	D-61 to D-66
Temporal distribution indices for LRS for 1974 to 2013	4-22	E-7
Geographical distribution indices for LRS for 1974 to 2013	4-23	E-8
Geographical distribution indices for FJS for 1979 to 2013	4-24	E-9
Annual abundance indices	4-25	F-3
Weekly length statistics for young-of-year fish for 2013 LRS/FJS/BSS	4-26	G-7 to G-9

4.5 BAY ANCHOVY

Links to Graphs	Graph	Supporting Appendix Tables
Spatiotemporal distribution of eggs, yolk-sac, and post yolk-sac larval fish for 2013 LRS	4-27	D-67 to D-72
Spatiotemporal distribution of young-of-year fish for 2013 LRS/FJS/BSS	4-28	D-73 to D-78
Spatiotemporal distribution of yearling and older fish for 2013 LRS/FJS/BSS	4-29	D-79 to D-84
Temporal distribution indices for LRS for 1988 to 2013	4-30	E-10
Geographical distribution indices for LRS for 1988 to 2013	4-31	E-11
Geographical distribution indices for BSS for 1974 to 2013	4-32	E-12
Annual abundance indices	4-33	F-4
Weekly length statistics for young-of-year fish for 2013 LRS/FJS/BSS	4-34	G-10 to G-12

4.6 AMERICAN SHAD

Links to Graphs	Graph	Supporting Appendix Tables
Spatiotemporal distribution of eggs, yolk-sac, and post yolk-sac larval fish for 2013 LRS	4-35	D-85 to D-90
Spatiotemporal distribution of young-of-year fish for 2013 LRS/FJS/BSS	4-36	D-91 to D-96
Spatiotemporal distribution of yearling and older fish for 2013 LRS/FJS/BSS	4-37	D-97 to D-102
Temporal distribution indices for LRS for 1974 to 2013	4-38	E-13
Geographical distribution indices for LRS for 1974 to 2013	4-39	E-14
Geographical distribution indices for BSS for 1974 to 2013	4-40	E-15
Annual abundance indices	4-41	F-5
Weekly length statistics for young-of-year fish for 2013 LRS/FJS/BSS	4-42	G-13 to G-15

4.7 RIVER HERRINGS (*Alosa* spp.)

Links to Graphs	Graph	Supporting Appendix Tables
Spatiotemporal distribution of eggs, yolk-sac, and post yolk-sac larval fish for 2013 LRS	4-43	D-103 to D-108
Spatiotemporal distribution of young-of-year fish for 2013 LRS/FJS/BSS	4-44	D-109 to D-114
Temporal distribution indices for LRS for 1974 to 2013	4-45	E-16
Geographical distribution indices for LRS for 1974 to 2013	4-46	E-17
Geographical distribution indices for BSS for 1974 to 2013	4-47	E-18

4.8 ALEWIFE

Links to Graphs	Graph	Supporting Appendix Tables
Spatiotemporal distribution of young-of-year fish for 2013 LRS/FJS/BSS	4-48	D-115 to D-120
Spatiotemporal distribution of yearling and older fish for 2013 LRS/FJS/BSS	4-49	D-121 to D-126
Geographical distribution indices for BSS for 1974 to 2013	4-50	E-19
Annual abundance indices	4-51	F-6
Weekly length statistics for young-of-year fish for 2013 FJS/BSS	4-52	G-16 to G-17

4.9 BLUEBACK HERRING

Links to Graphs	Graph	Supporting Appendix Tables
Spatiotemporal distribution of young-of-year fish for 2013 LRS/FJS/BSS	4-53	D-127 to D-132
Spatiotemporal distribution of yearling and older fish for 2013 LRS/FJS/BSS	4-54	D-133 to D-138
Geographical distribution indices for BSS for 1974 to 2013	4-55	E-20
Annual abundance indices	4-56	F-7
Weekly length statistics for young-of-year fish for 2013 FJS/BSS	4-57	G-18 to G-19

4.10 GIZZARD SHAD

Links to Graphs	Graph	Supporting Appendix Tables
Spatiotemporal distribution of young-of-year fish for 2013 LRS/FJS/BSS	4-58	D-139 to D-144
Spatiotemporal distribution of yearling and older fish for 2013 LRS/FJS/BSS	4-59	D-145 to D-150
Geographical distribution indices for BSS for 1974 to 2013	4-60	E-21

4.11 RAINBOW SMELT

Links to Graphs	Graph	Supporting Appendix Tables
Spatiotemporal distribution of eggs, yolk-sac, and post yolk-sac larval fish for 2013 LRS/FJS/BSS	4-61	D-151 to D-152
Spatiotemporal distribution of yearling and older fish for 2013 LRS/FJS/BSS	--	D-153 to D-158
Temporal distribution indices for LRS for 1974 to 2013	4-62	E-22
Geographical distribution indices for LRS for 1974 to 2013	4-63	E-23
Geographical distribution indices for FJS for 1979 to 2013	4-64	E-24
Annual abundance indices	4-65	F-8

4.12 HOGCHOKER

Links to Graphs	Graph	Supporting Appendix Tables
Spatiotemporal distribution of eggs, yolk-sac, and post yolk-sac larval fish for 2013 LRS	4-66	D-159 to D-164
Spatiotemporal distribution of young-of-year fish for 2013 LRS/FJS/BSS	4-67	D-165 to D-170
Spatiotemporal distribution of yearling and older fish for 2013 LRS/FJS/BSS	4-68	D-171 to D-176
Geographical distribution indices for FJS for 1979 to 2013	4-69	E-25
Annual abundance indices	4-70	F-9

4.13 SPOTTAIL SHINER

Links to Graphs	Graph	Supporting Appendix Tables
Spatiotemporal distribution of young-of-year fish for 2013 LRS/FJS/BSS	4-71	D-177 to D-182
Spatiotemporal distribution of yearling and older fish for 2013 LRS/FJS/BSS	4-72	D-183 to D-188
Geographical distribution indices for BSS for 1974 to 2013	4-73	E-26
Annual abundance indices	4-74	F-10
Weekly length statistics for young-of-year fish for 2013 FJS/BSS	4-75	G-20 to G-21

4.14 ATLANTIC STURGEON

Links to Table/Graph	Table/Graph	Supporting Appendix Tables
Collections of fish for 2013 LRS/FJS/BSS	4-3	--
Spatiotemporal distribution of yolk-sac, post yolk-sac larval, and young-of-year fish for 2013 LRS/FJS/BSS	4-76	D-189 to D-194
Spatiotemporal distribution of yearling and older fish for 2013 LRS/FJS/BSS	4-77	D-195 to D-200

4.15 SHORTNOSE STURGEON

Links to Table/Graph	Table/Graph	Supporting Appendix Tables
Collections of fish for 2013 LRS/FJS/BSS	4-4	--
Collections of unidentified sturgeon for 2013 LRS/FJS/BSS	4-5	--
Spatiotemporal distribution of yolk-sac, post yolk-sac larval, and young-of-year fish for 2013 LRS/FJS/BSS	--	D-201 to D-206
Spatiotemporal distribution of yearling and older fish for 2013 LRS/FJS/BSS	4-78	D-207 to D-212

4.16 WHITE CATFISH

Links to Graphs	Graph	Supporting Appendix Tables
Spatiotemporal distribution of young-of-year fish for 2013 LRS/FJS/BSS	4-79	D-213 to D-218
Spatiotemporal distribution of yearling and older fish for 2013 LRS/FJS/BSS	4-80	D-219 to D-224
Geographical distribution indices for FJS for 1979 to 2013	4-81	E-27
Annual abundance indices	4-82	F-11
Weekly length statistics for young-of-year fish for 2013 FJS/BSS	4-83	G-22 to G-23

4.17 WEAKFISH

Links to Graphs	Graph	Supporting Appendix Tables
Spatiotemporal distribution of young-of-year fish for 2013 LRS/FJS/BSS	4-84	D-225 to D-230
Spatiotemporal distribution of yearling and older fish for 2013 LRS/FJS/BSS	4-85	D-231 to D-236
Geographical distribution indices for FJS for 1979 to 2013	4-86	E-28
Annual abundance indices	4-87	F-12
Weekly length statistics for young-of-year fish for 2013 FJS/BSS	4-88	G-24 to G-25

4.18 BLUEFISH

Links to Graphs	Graph	Supporting Appendix Tables
Spatiotemporal distribution of young-of-year fish for 2013 LRS/FJS/BSS	4-89	D-237 to D-242
Geographical distribution indices for BSS for 1974 to 2013	4-90	E-29
Annual abundance indices	4-91	F-13

[Link to References](#)

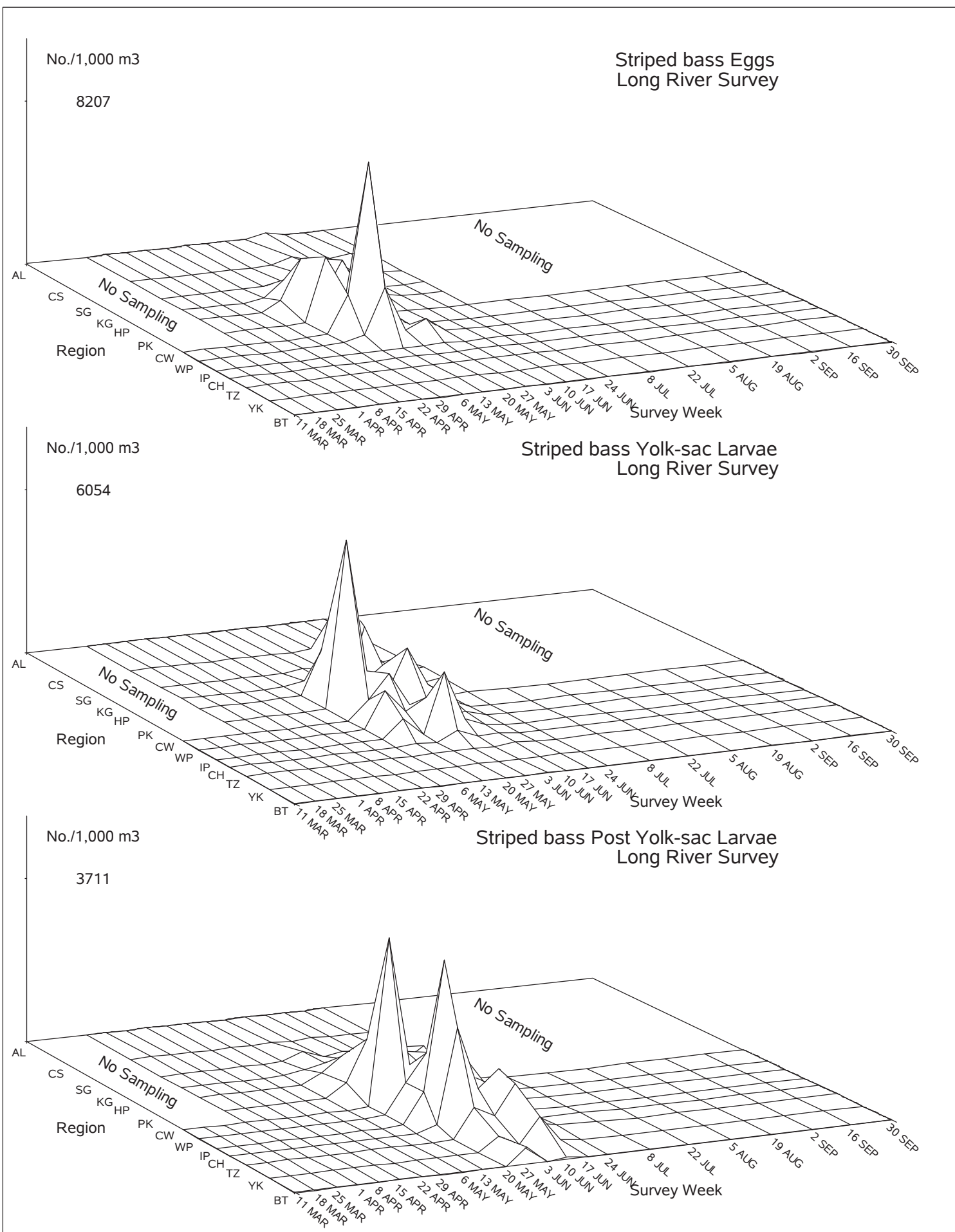


Figure 4-1. Spatiotemporal distribution of eggs, yolk-sac, and post yolk-sac larval striped bass in the Hudson River estuary based on the 2013 Long River Survey.

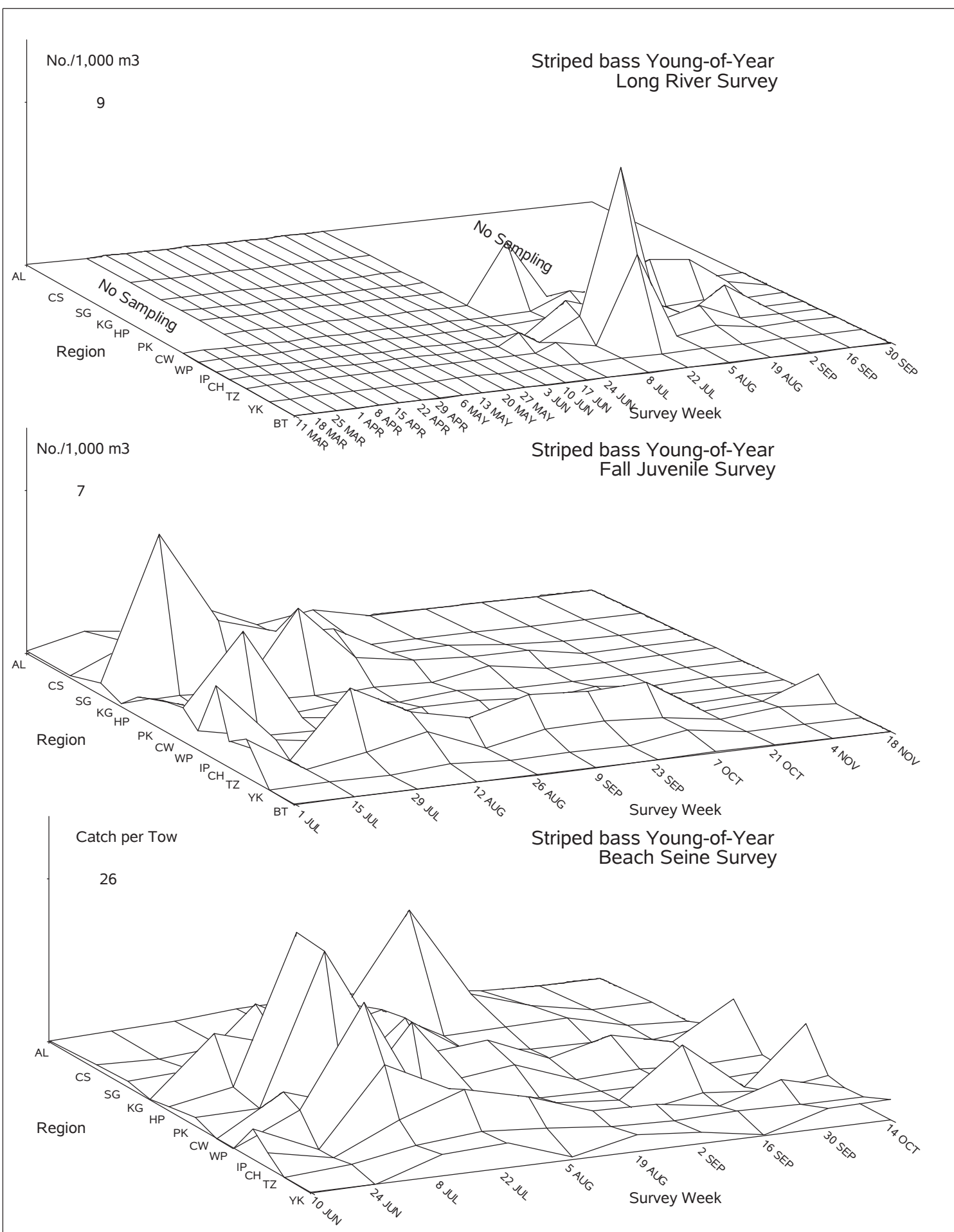


Figure 4-2. Spatiotemporal distribution of young-of-year striped bass in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

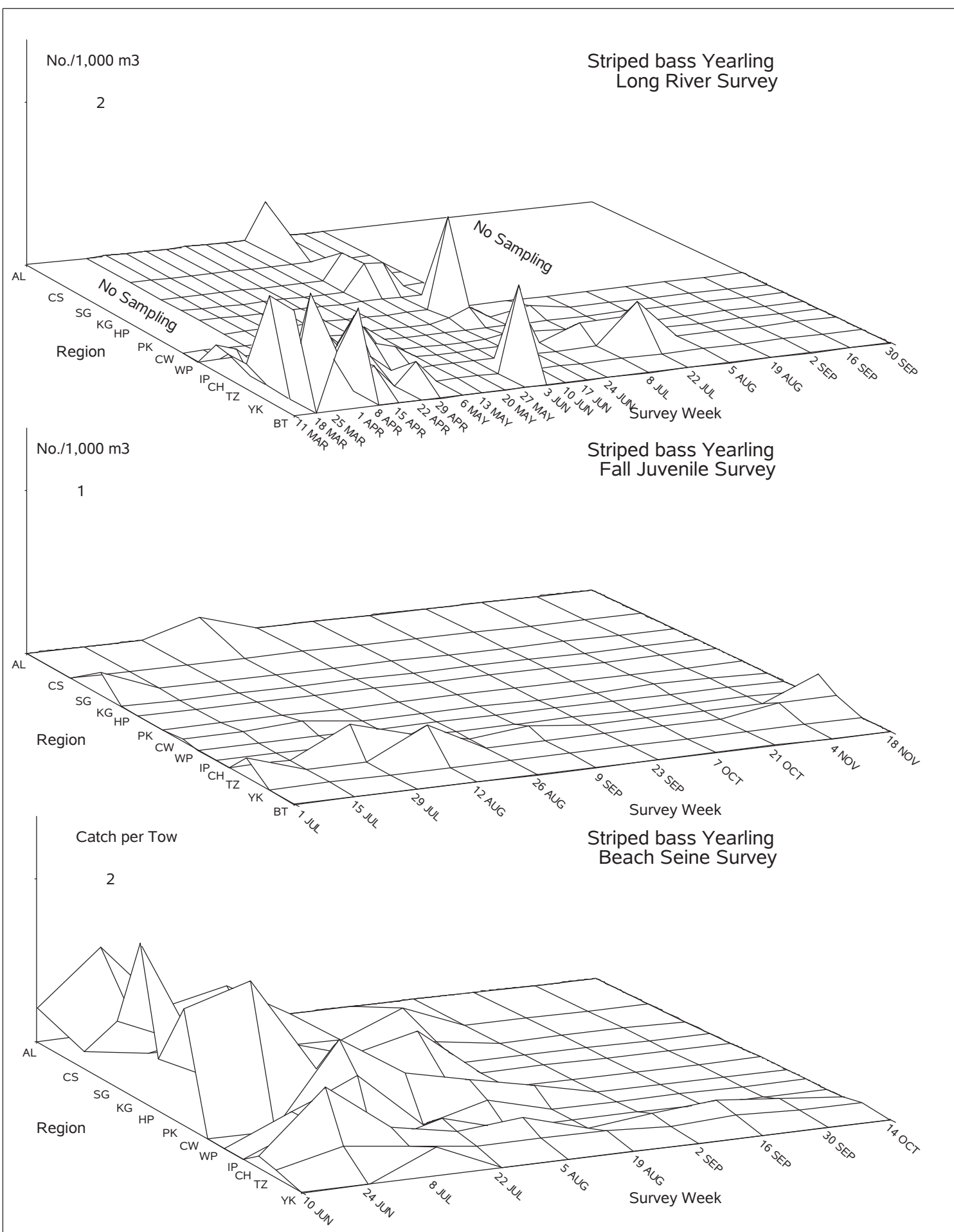


Figure 4-3. Spatiotemporal distribution of yearling striped bass in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

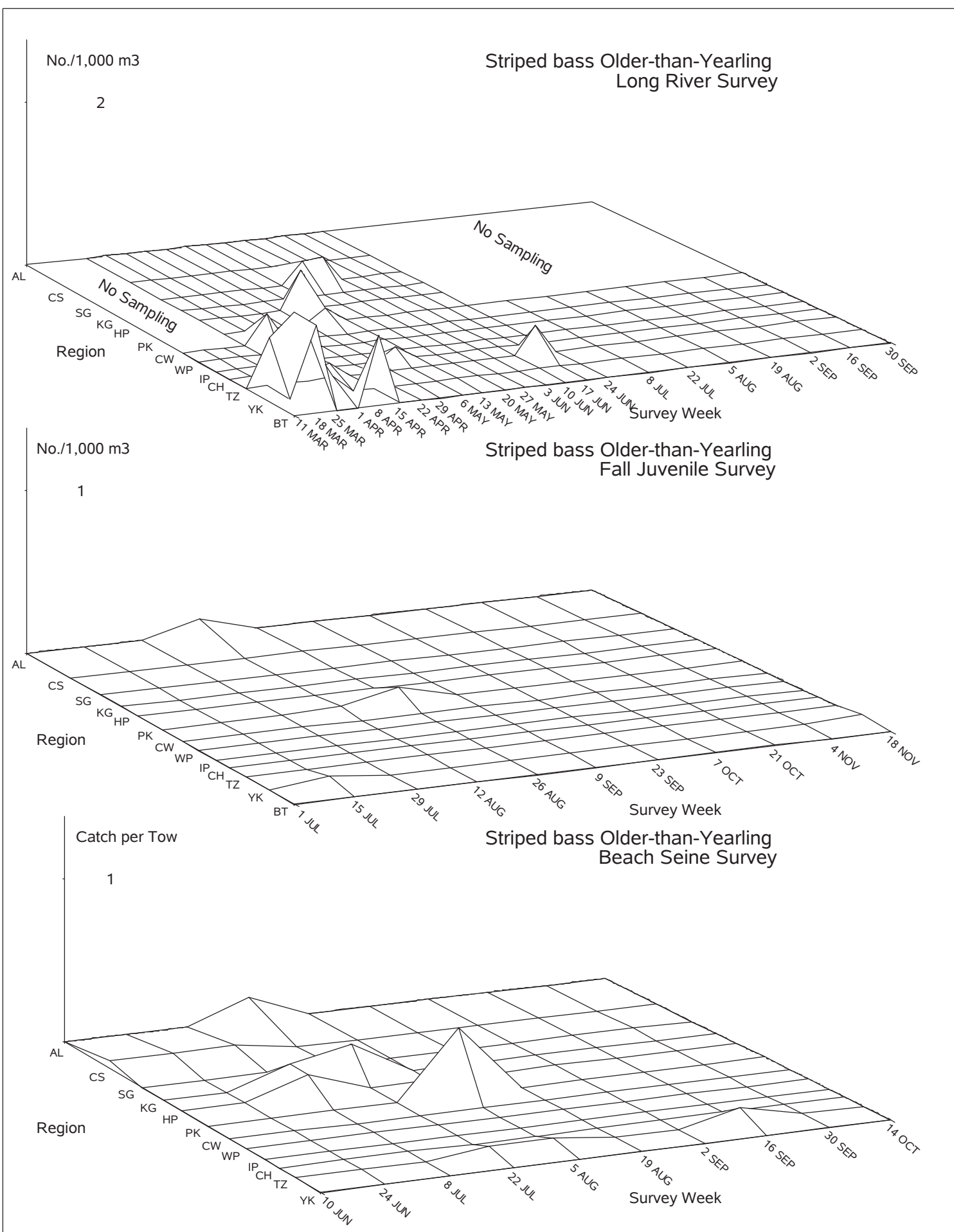


Figure 4-4. Spatiotemporal distribution of older-than-yearling striped bass in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

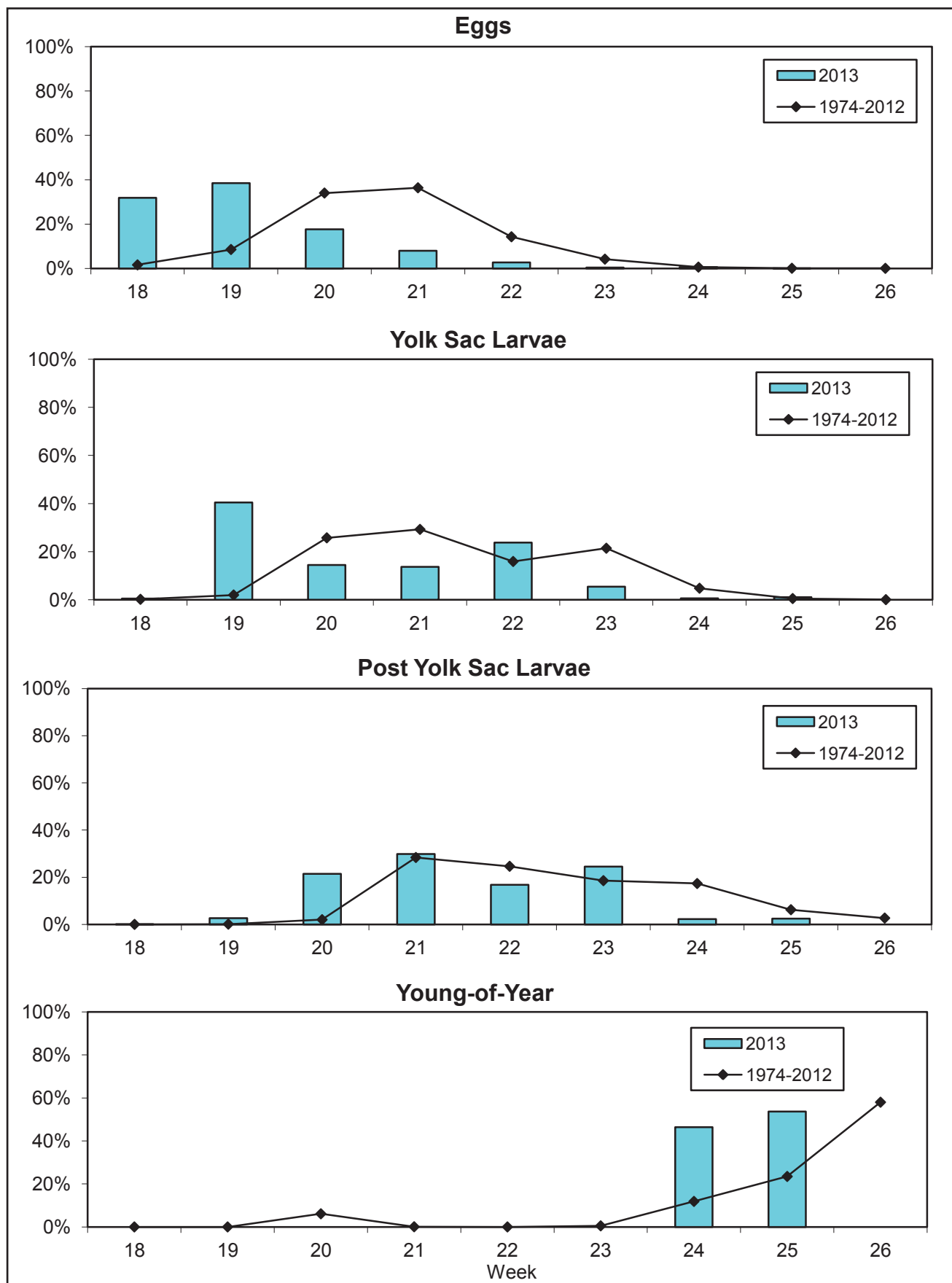


Figure 4-5. Temporal distribution indices for striped bass collected during Long River surveys of the Hudson River estuary, 1974-2013.

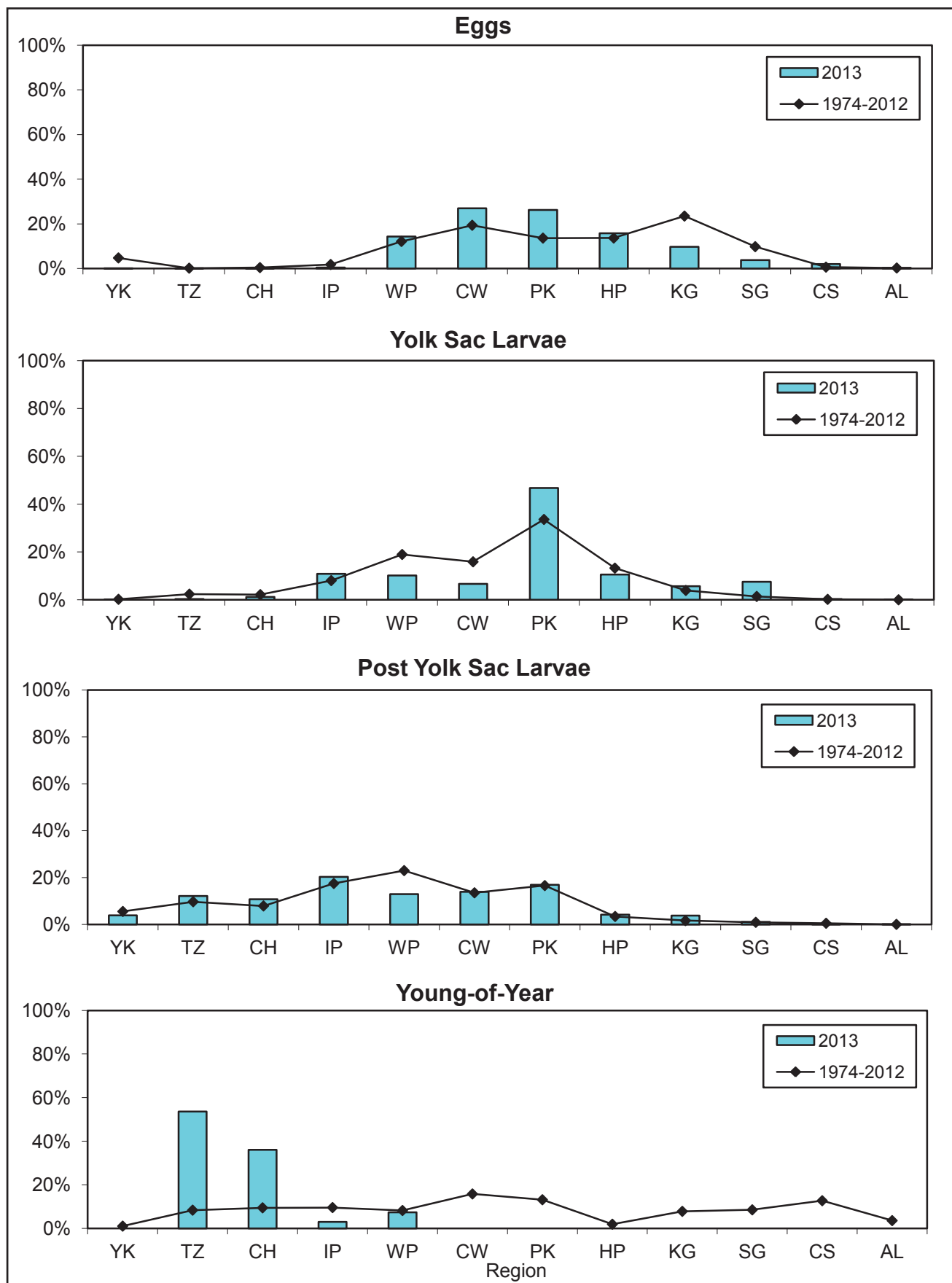


Figure 4-6. Geographic distribution indices for striped bass collected during Long River surveys of the Hudson River estuary, 1974-2013.

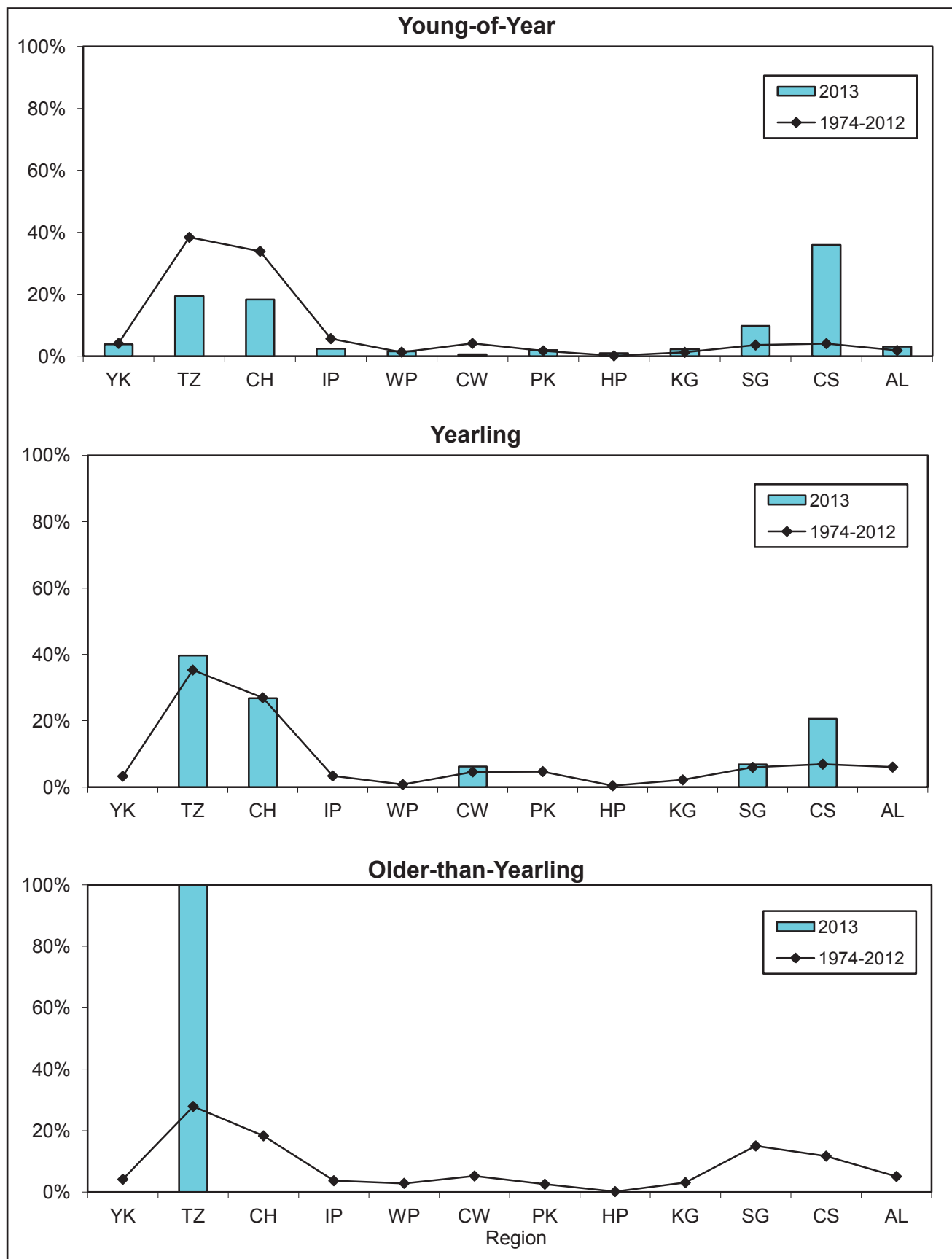


Figure 4-7. Geographic distribution indices for striped bass collected during Beach Seine surveys of the Hudson River estuary, 1974-2013.

Striped bass

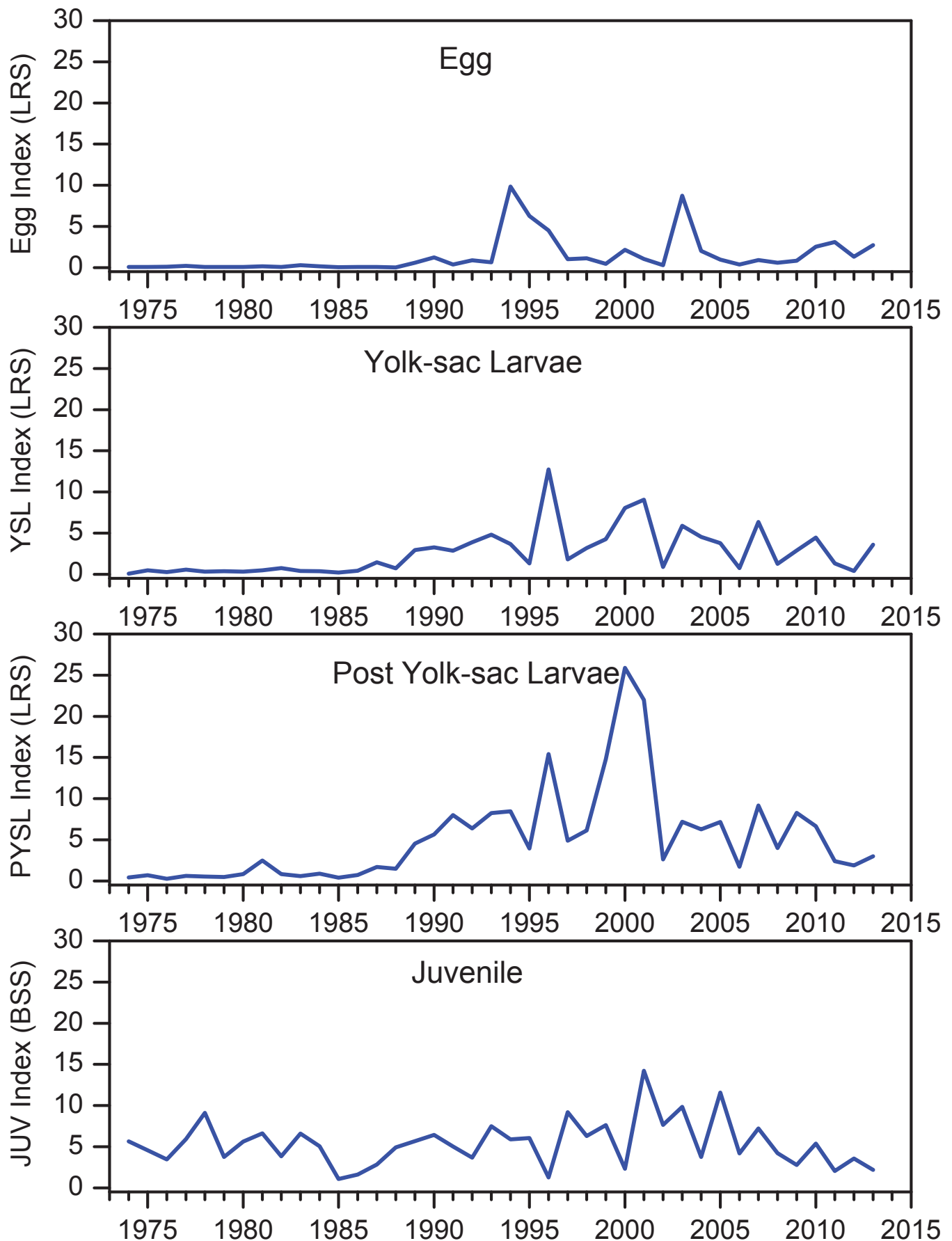


Figure 4-8. Striped bass indices of annual abundance based on Long River Survey and Beach Seine Survey, 1974-2013.

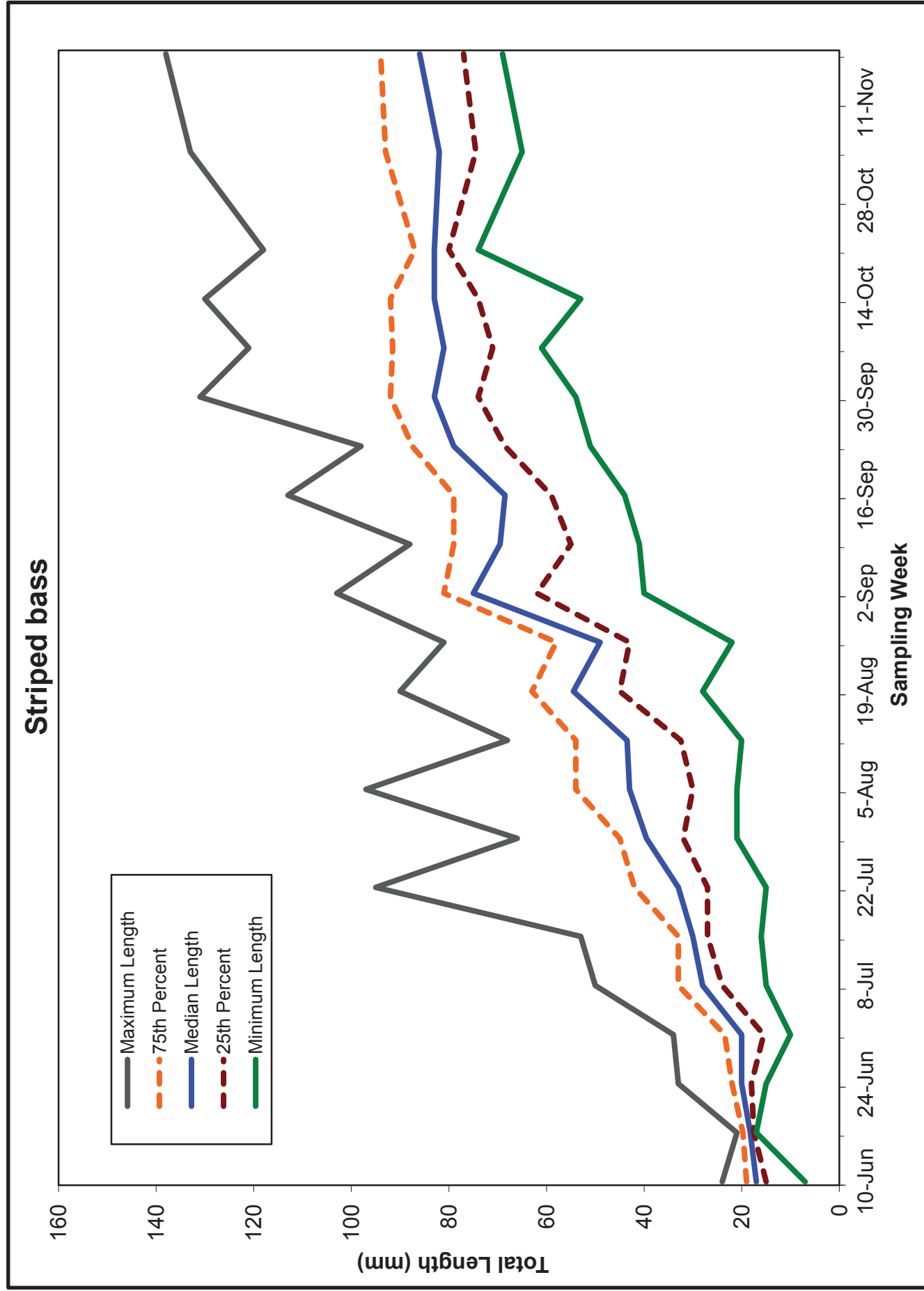


Figure 4-9. Weekly length statistics for young-of-year striped bass in the Hudson River estuary, 2013.

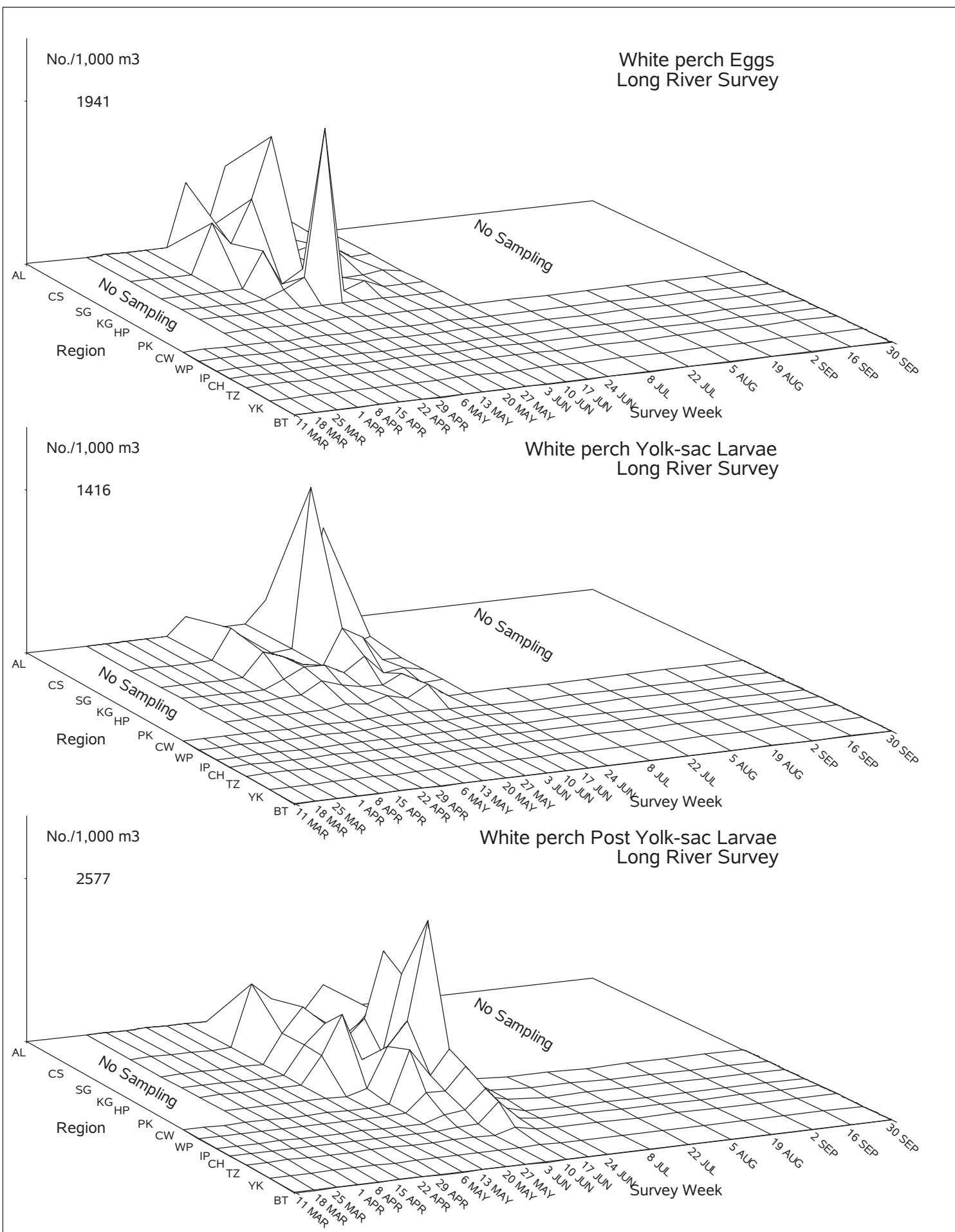


Figure 4-10. Spatiotemporal distribution of eggs, yolk-sac, and post yolk-sac larval white perch in the Hudson River estuary based on the 2013 Long River Survey.

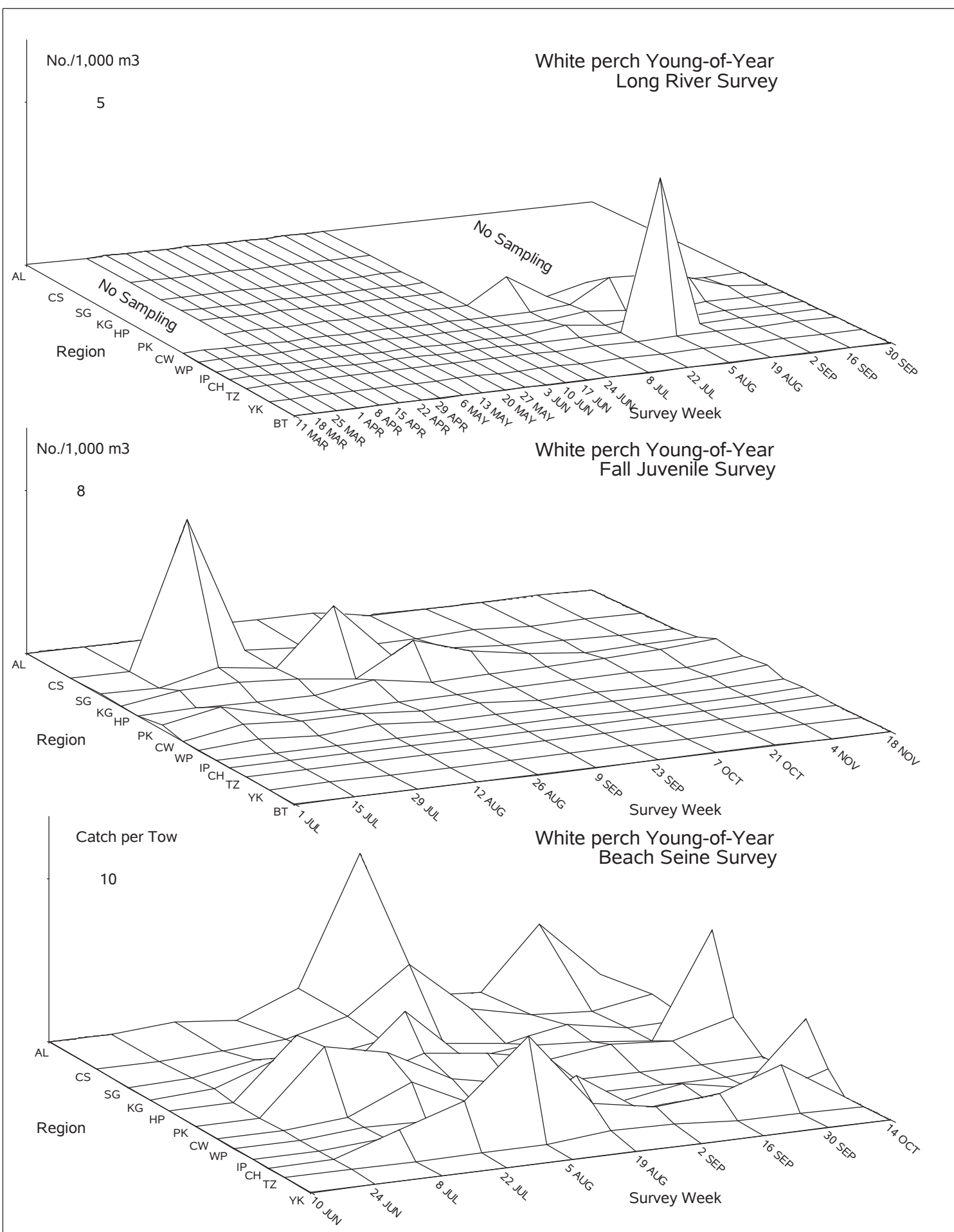


Figure 4-11. Spatiotemporal distribution of young-of-year white perch in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

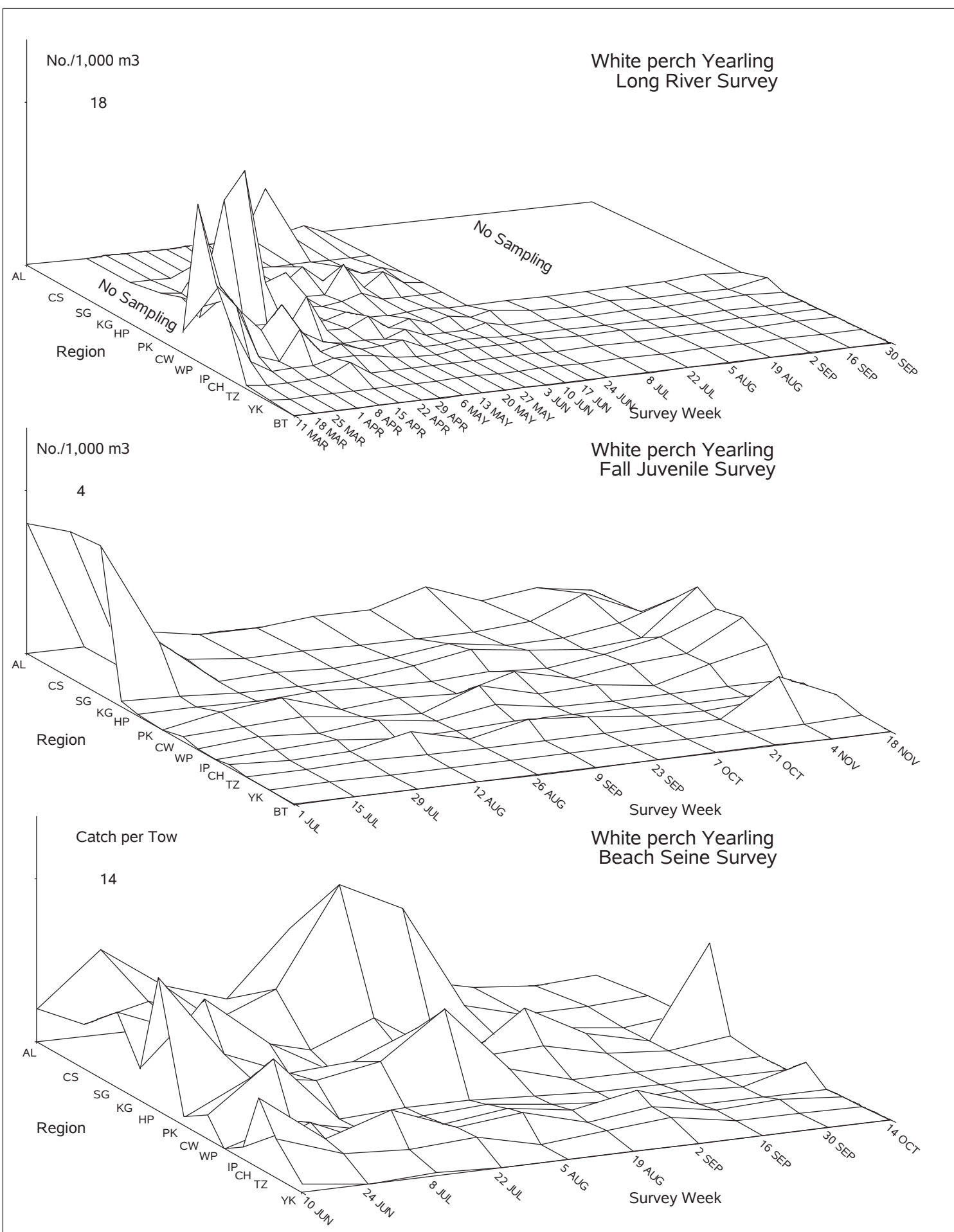


Figure 4-12. Spatiotemporal distribution of yearling white perch in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

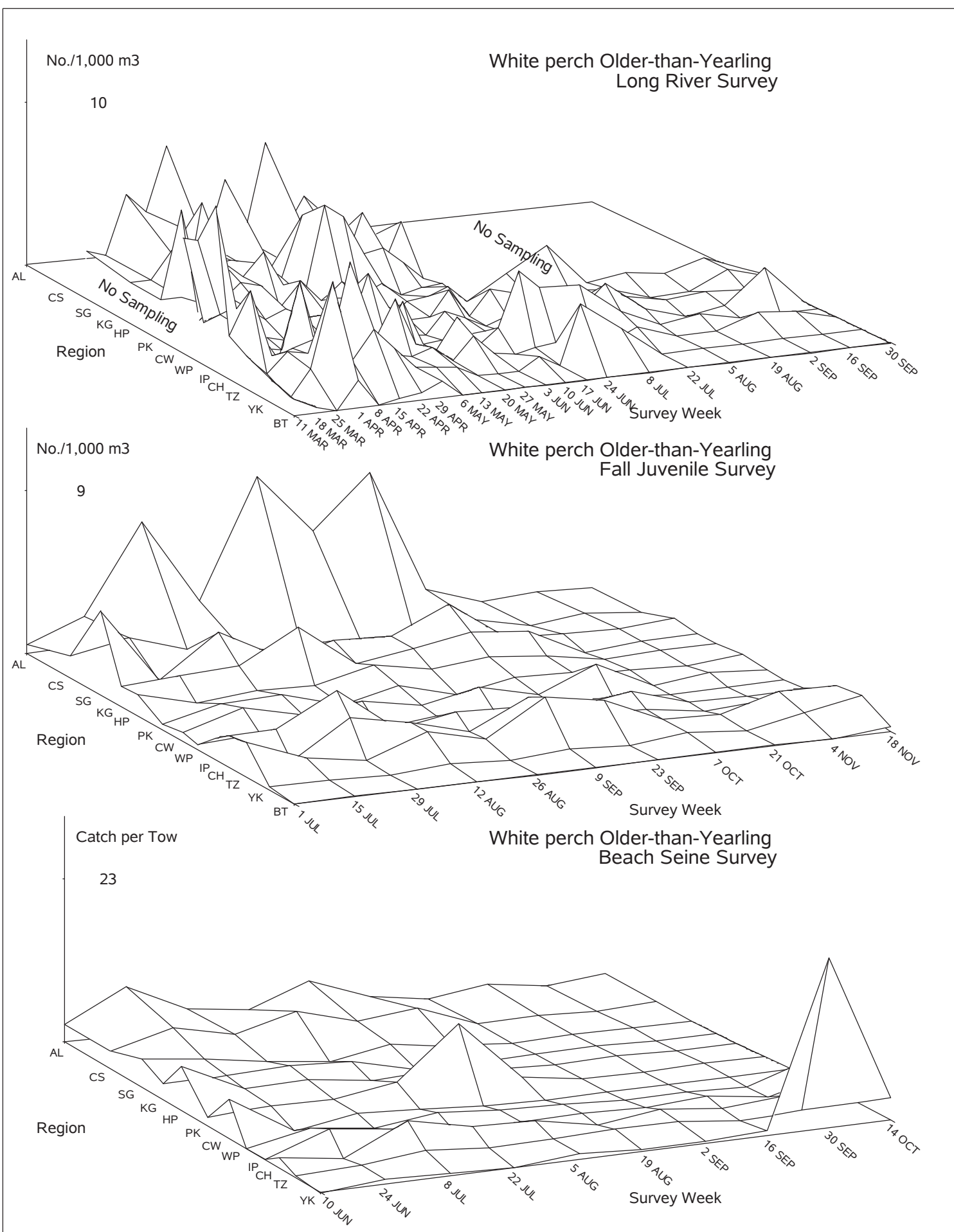


Figure 4-13. Spatiotemporal distribution of older-than-yearling white perch in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

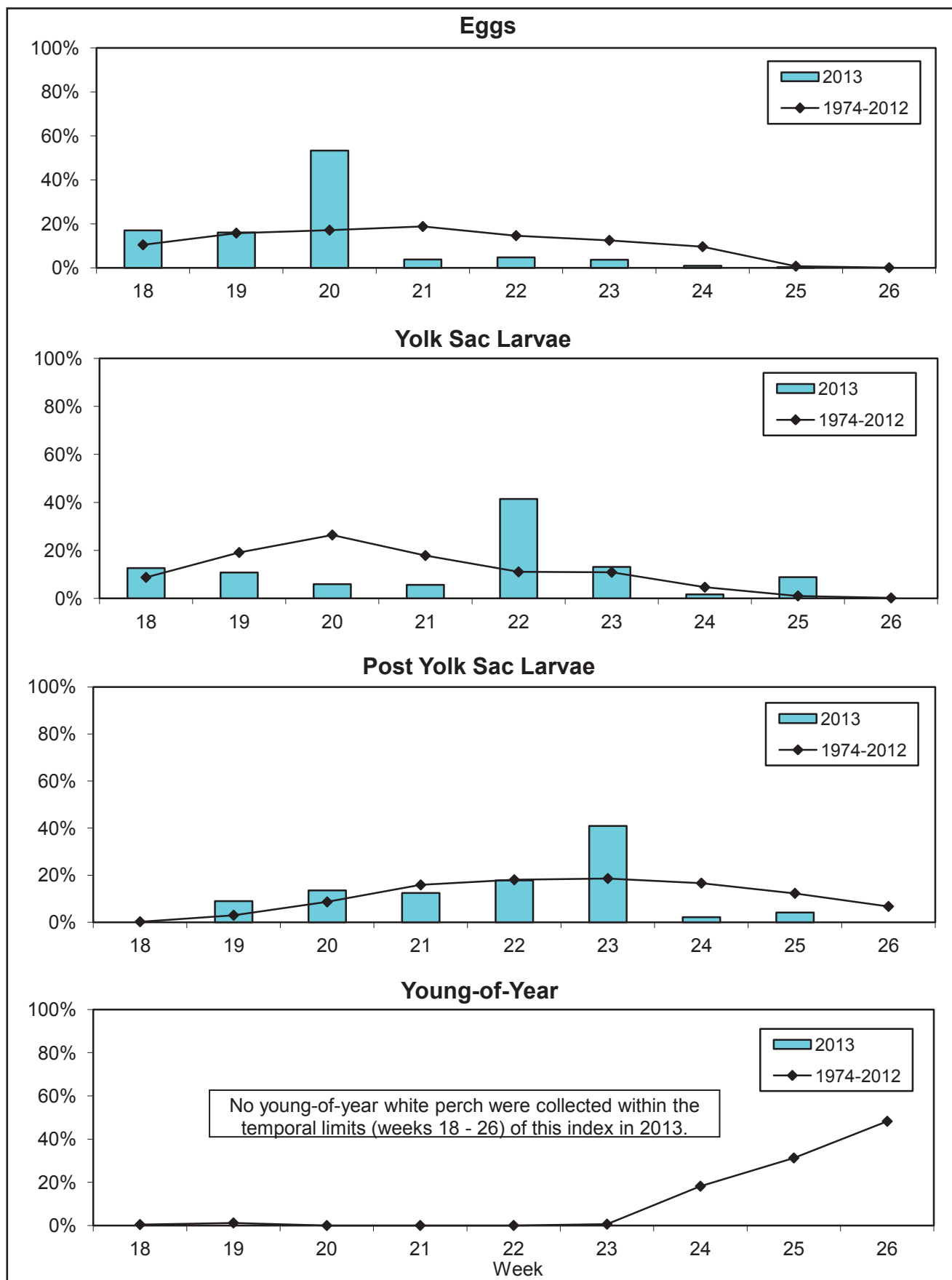


Figure 4-14. Temporal distribution indices for white perch collected during Long River surveys of the Hudson River estuary, 1974-2013.

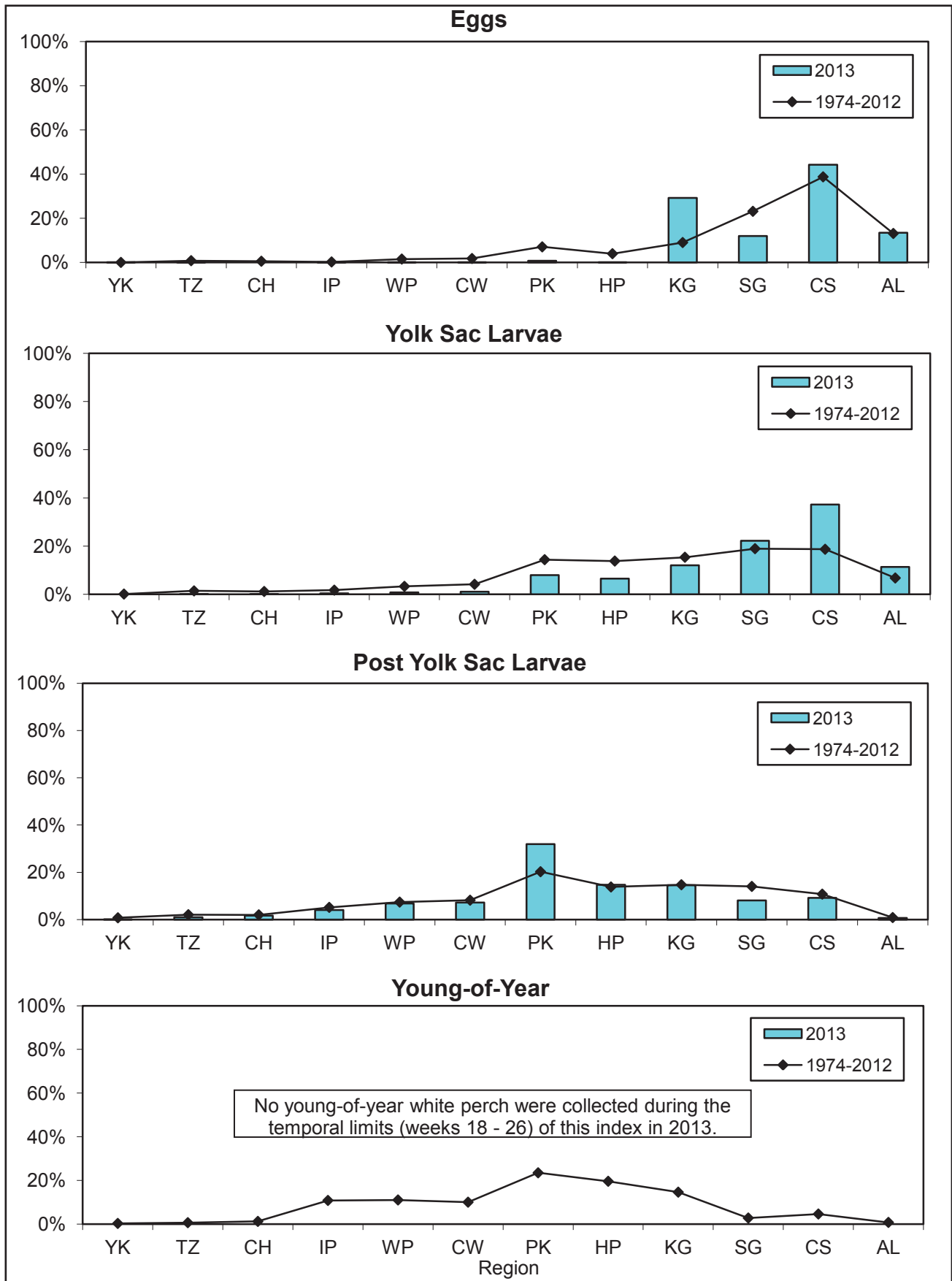


Figure 4-15. Geographic distribution indices for white perch collected during Long River surveys of the Hudson River estuary, 1974-2013.

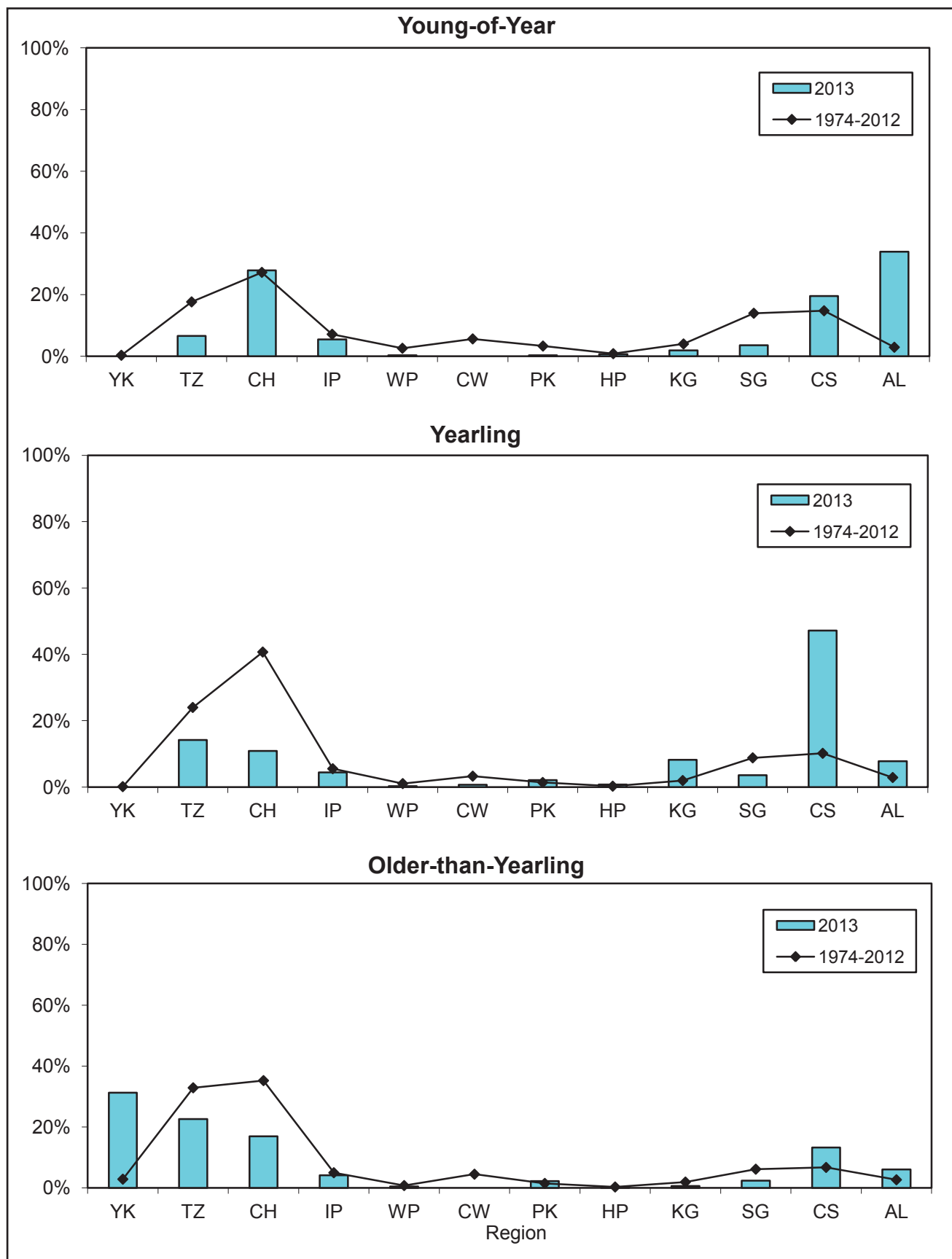


Figure 4-16. Geographic distribution indices for white perch collected during Beach Seine surveys of the Hudson River estuary, 1974-2013.

White perch

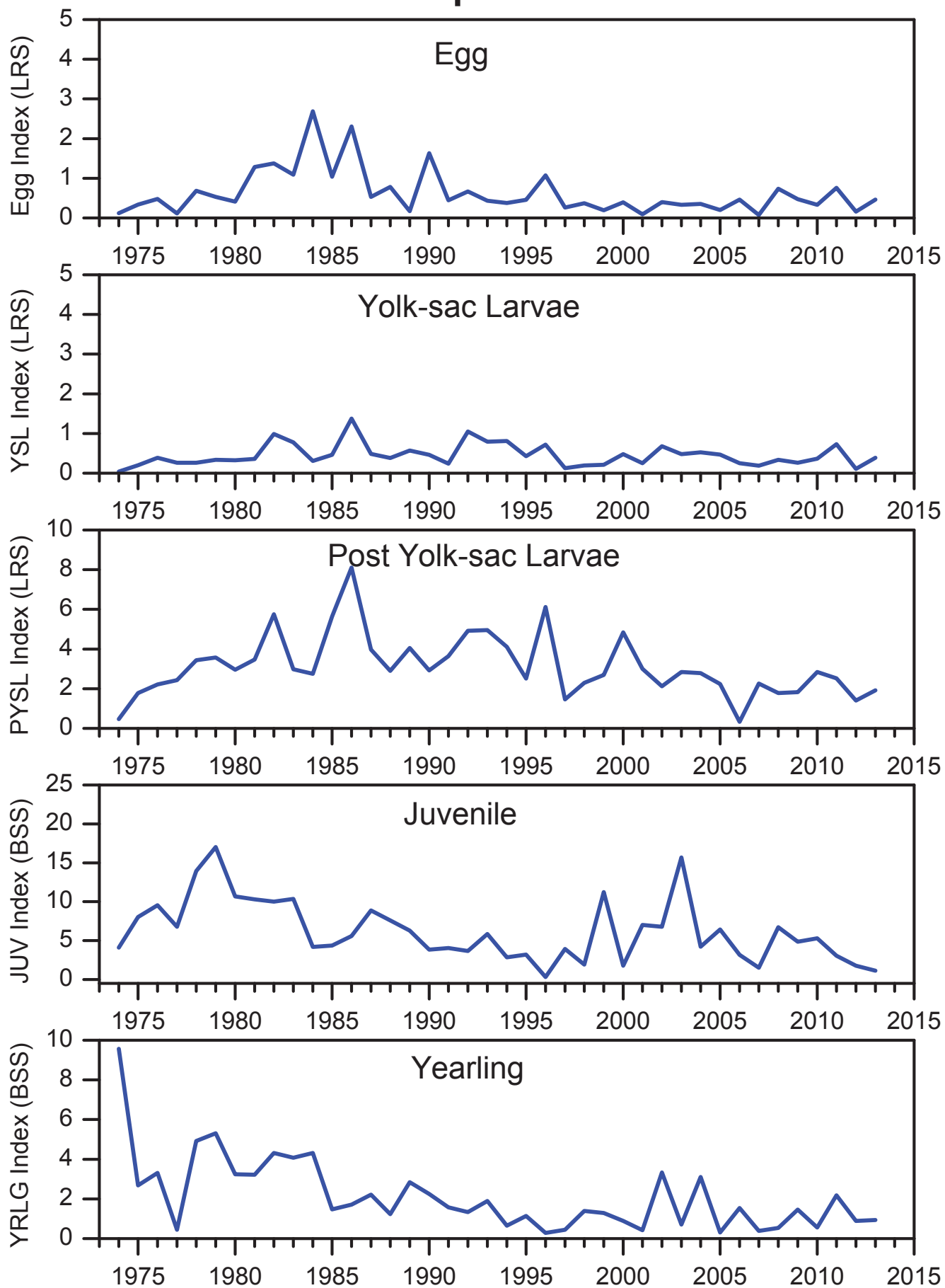


Figure 4-17. White perch indices of annual abundance based on Long River Survey and Beach Seine Survey, 1974-2013.

White perch

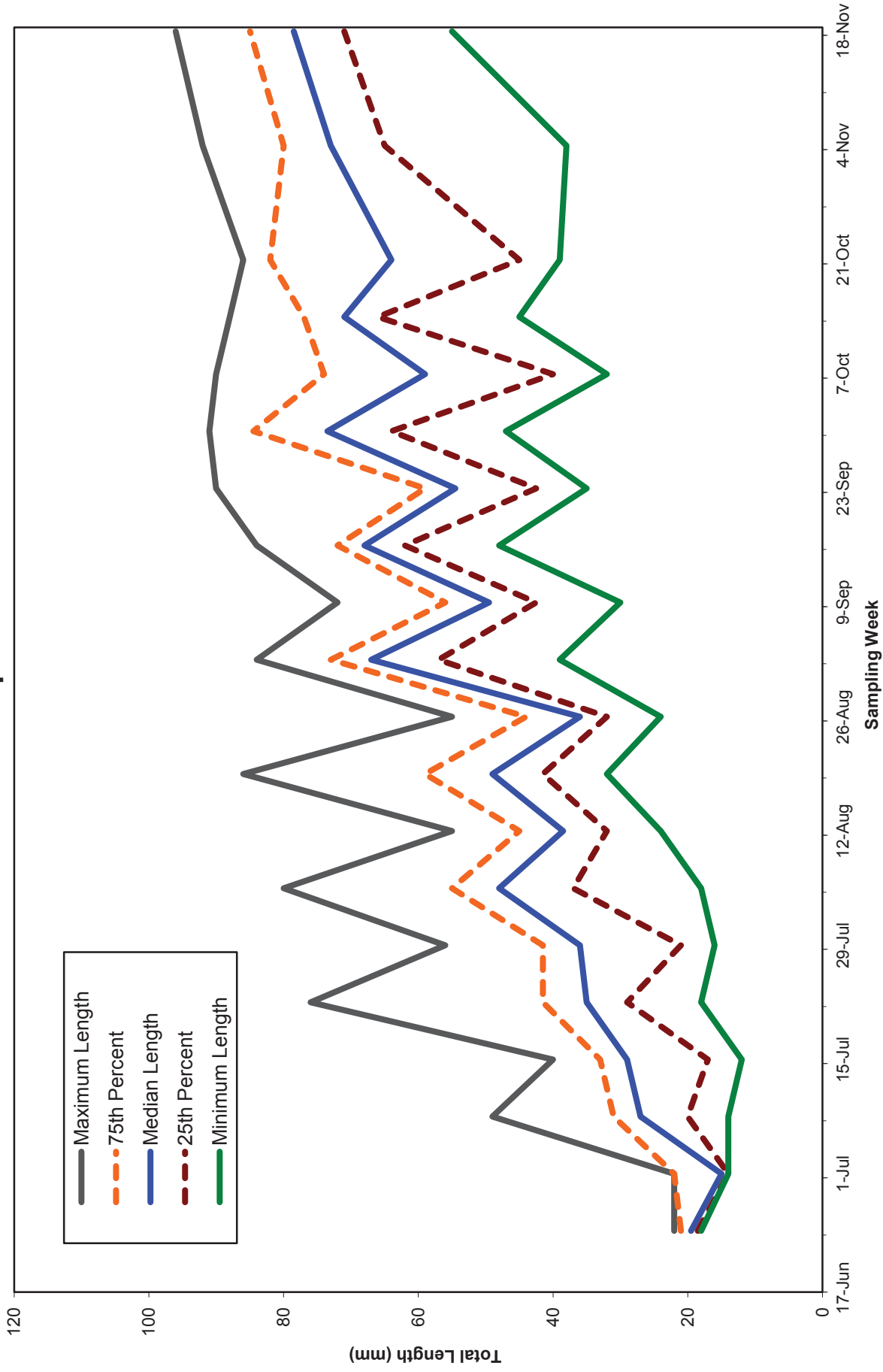


Figure 4-18. Weekly length statistics for young-of-year white perch in the Hudson River estuary, 2013.

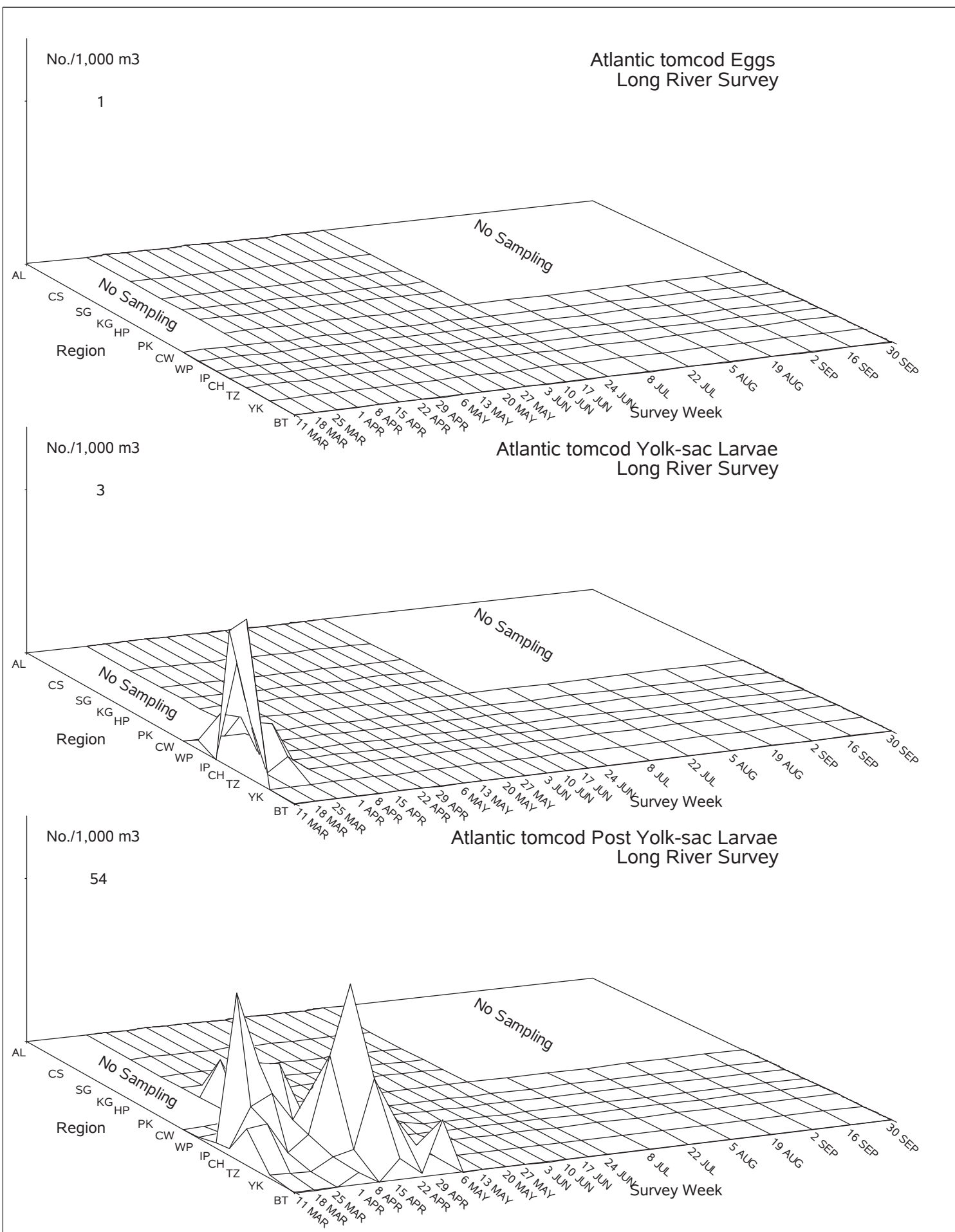


Figure 4-19. Spatiotemporal distribution of eggs, yolk-sac, and post yolk-sac larval Atlantic tomcod in the Hudson River estuary based on the 2013 Long River Survey.

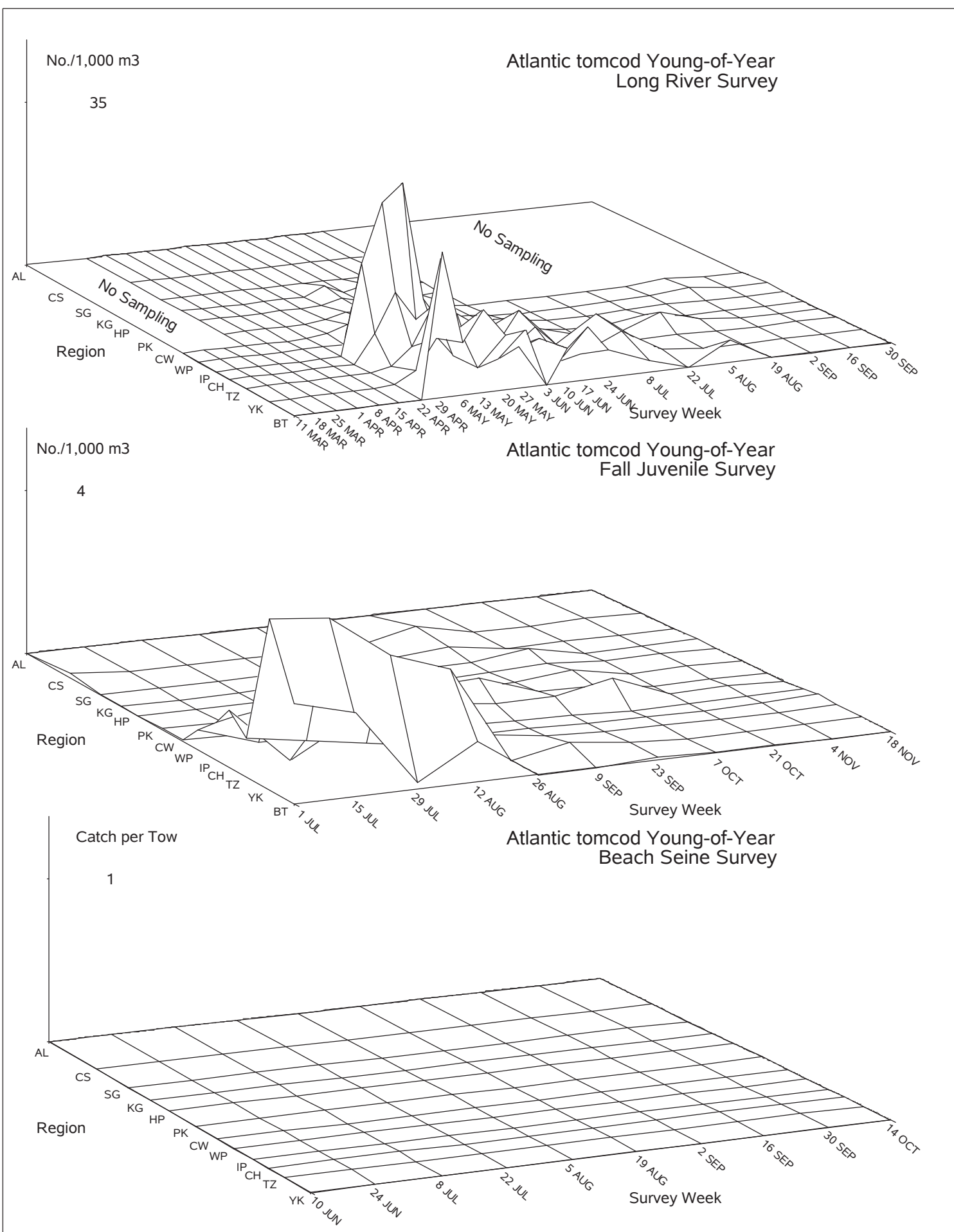


Figure 4-20. Spatiotemporal distribution of young-of-year Atlantic tomcod in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

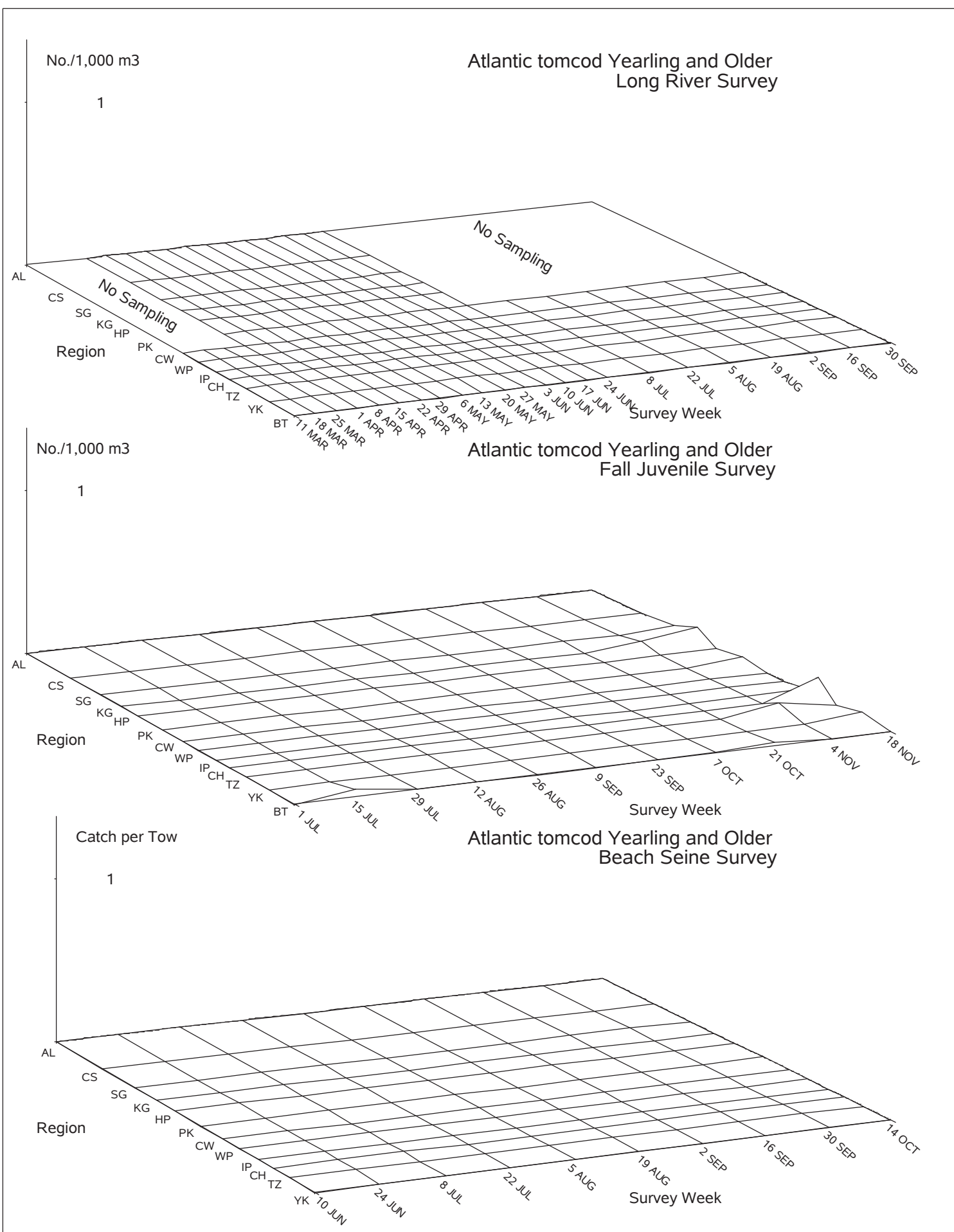


Figure 4-21. Spatiotemporal distribution of yearling and older Atlantic tomcod in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

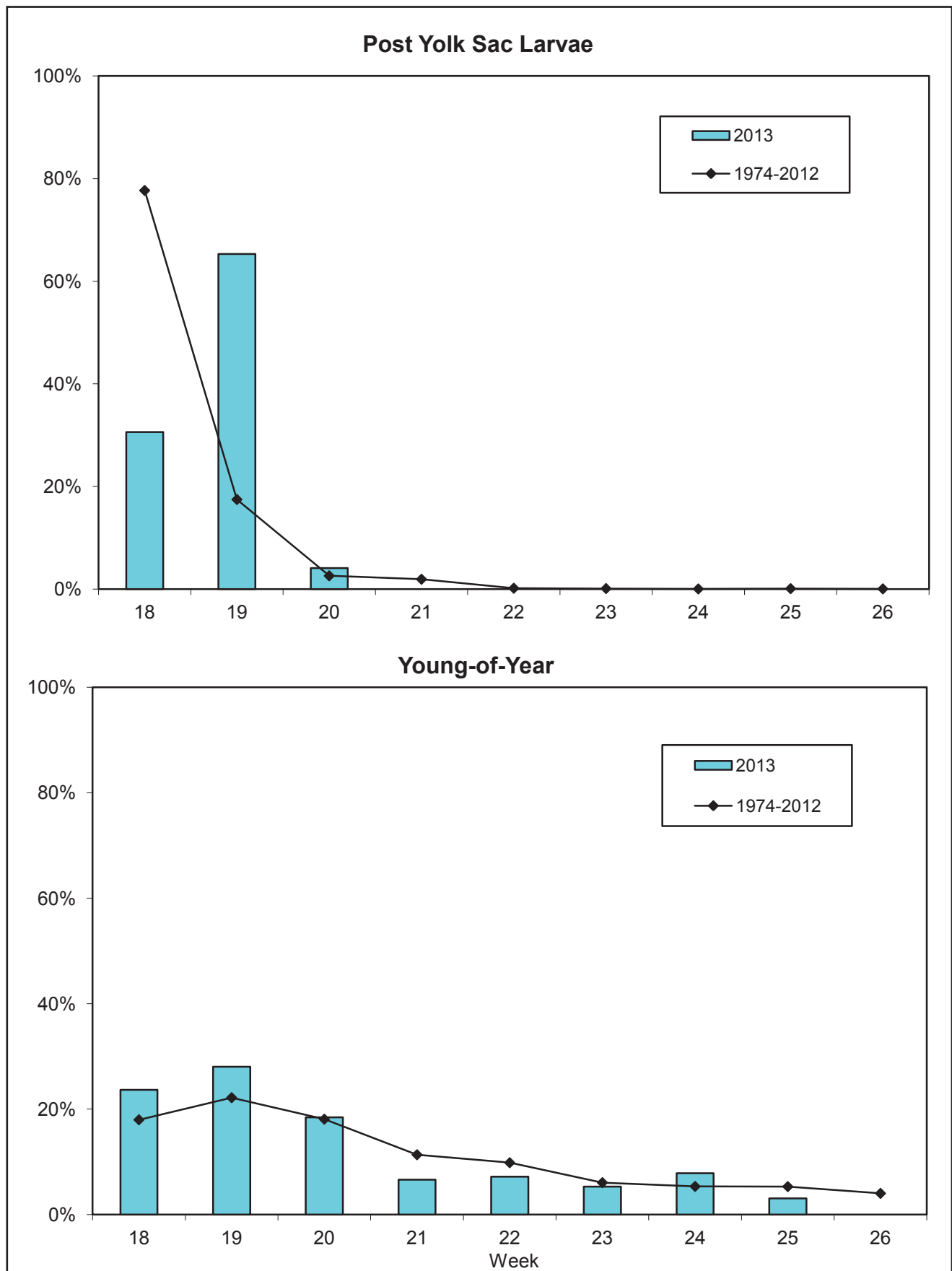


Figure 4-22. Temporal distribution indices for Atlantic tomcod collected during Long River surveys of the Hudson River estuary, 1974-2013.

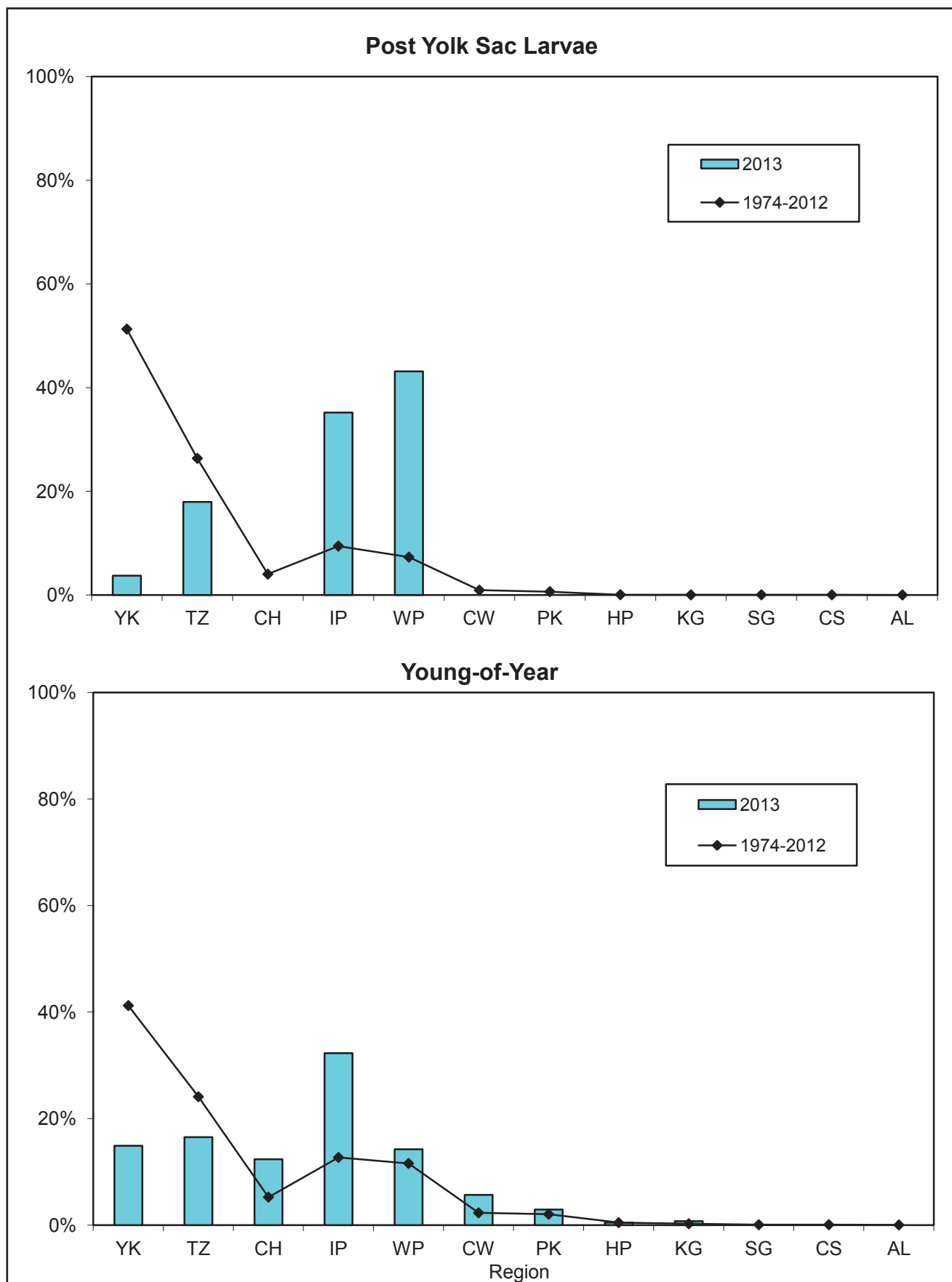


Figure 4-23. Geographic distribution indices for Atlantic tomcod collected during Long River surveys of the Hudson River estuary, 1974-2013.

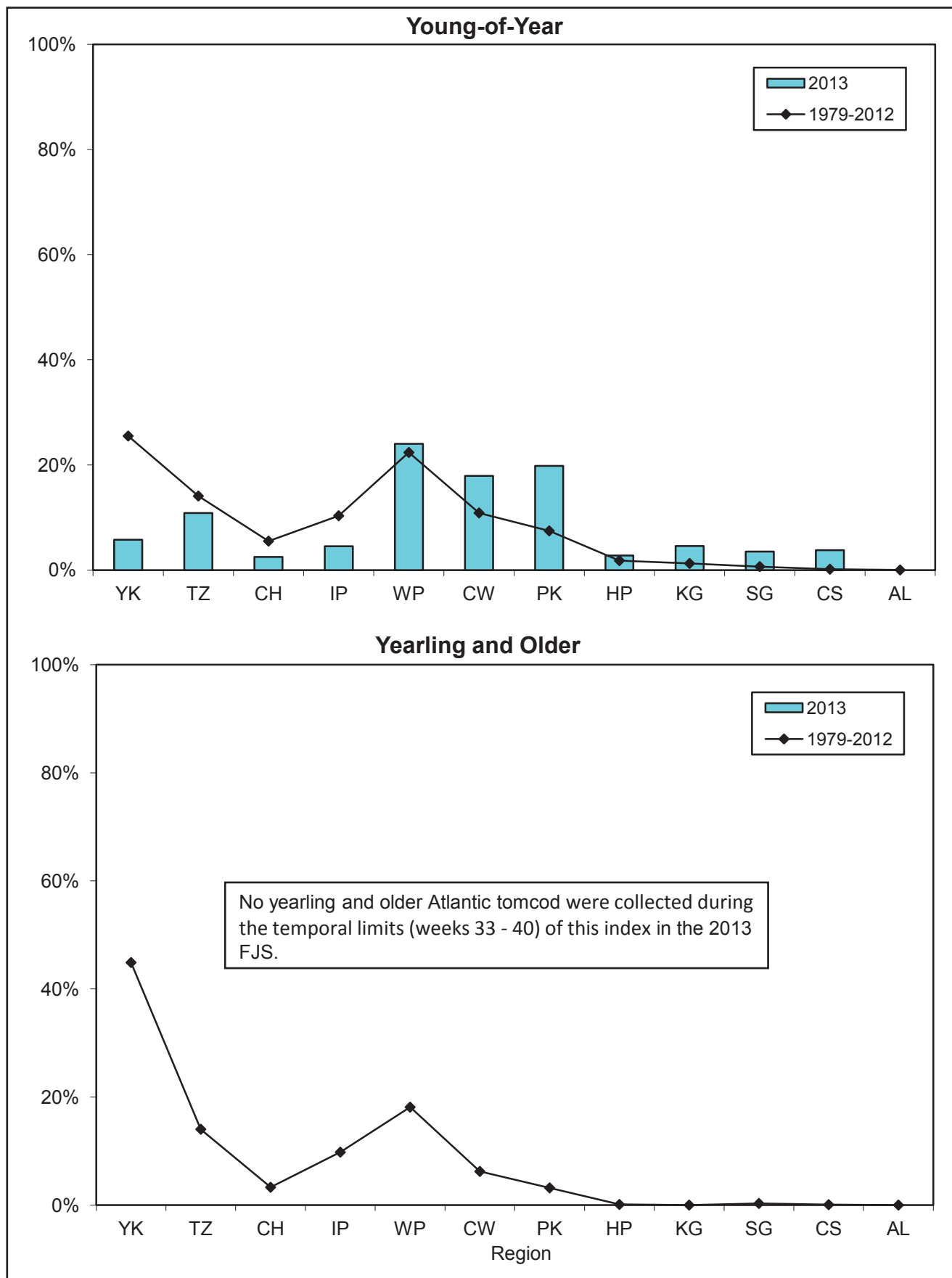


Figure 4-24. Geographic distribution indices for Atlantic tomcod collected during Fall Juvenile surveys of the Hudson River estuary, 1979-2013.

Atlantic tomcod

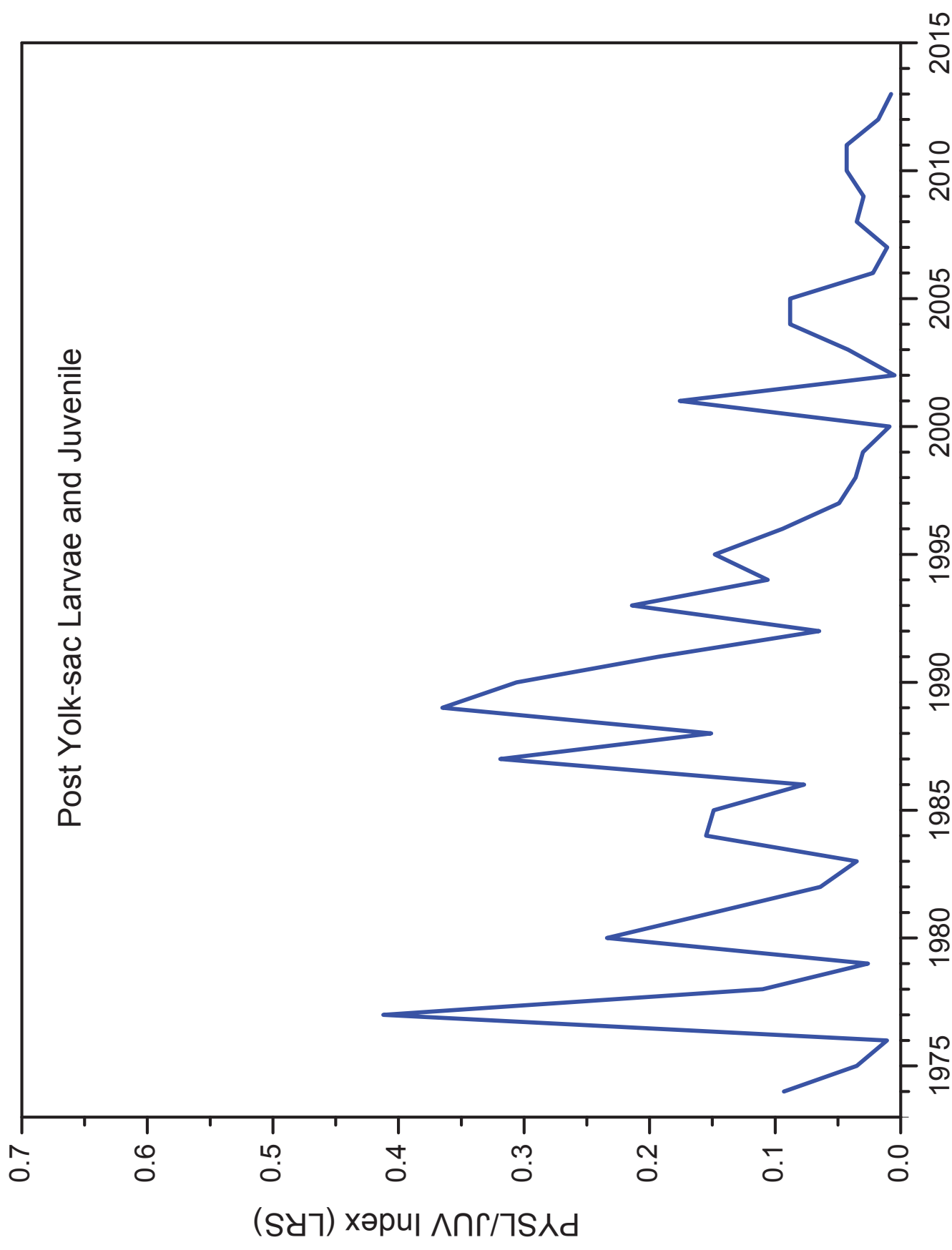


Figure 4-25. Atlantic tomcod indices of annual abundance based on Long River Survey, 1974-2013.

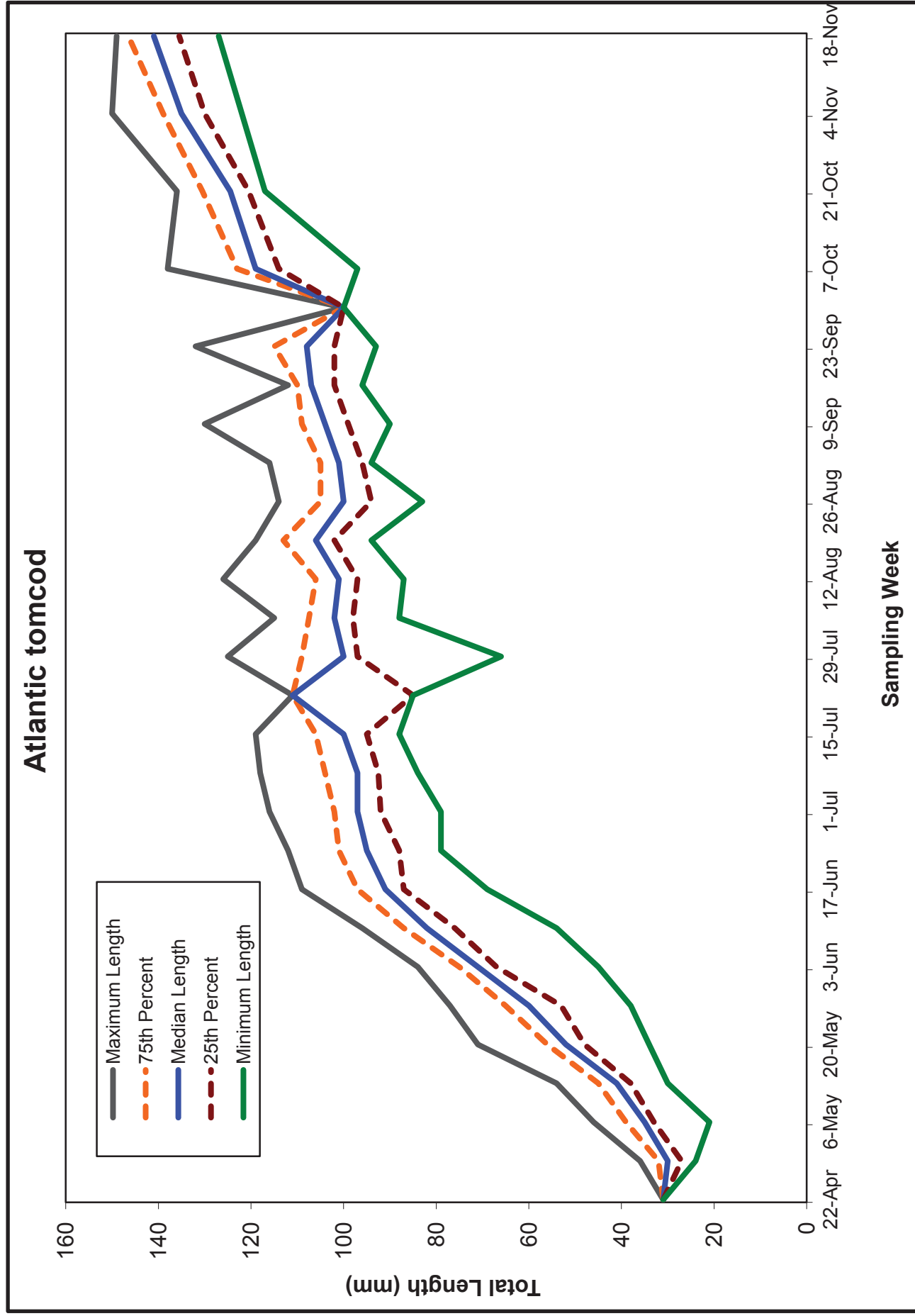


Figure 4-26. Weekly length statistics for young-of-year Atlantic tomcod in the Hudson River estuary, 2013.

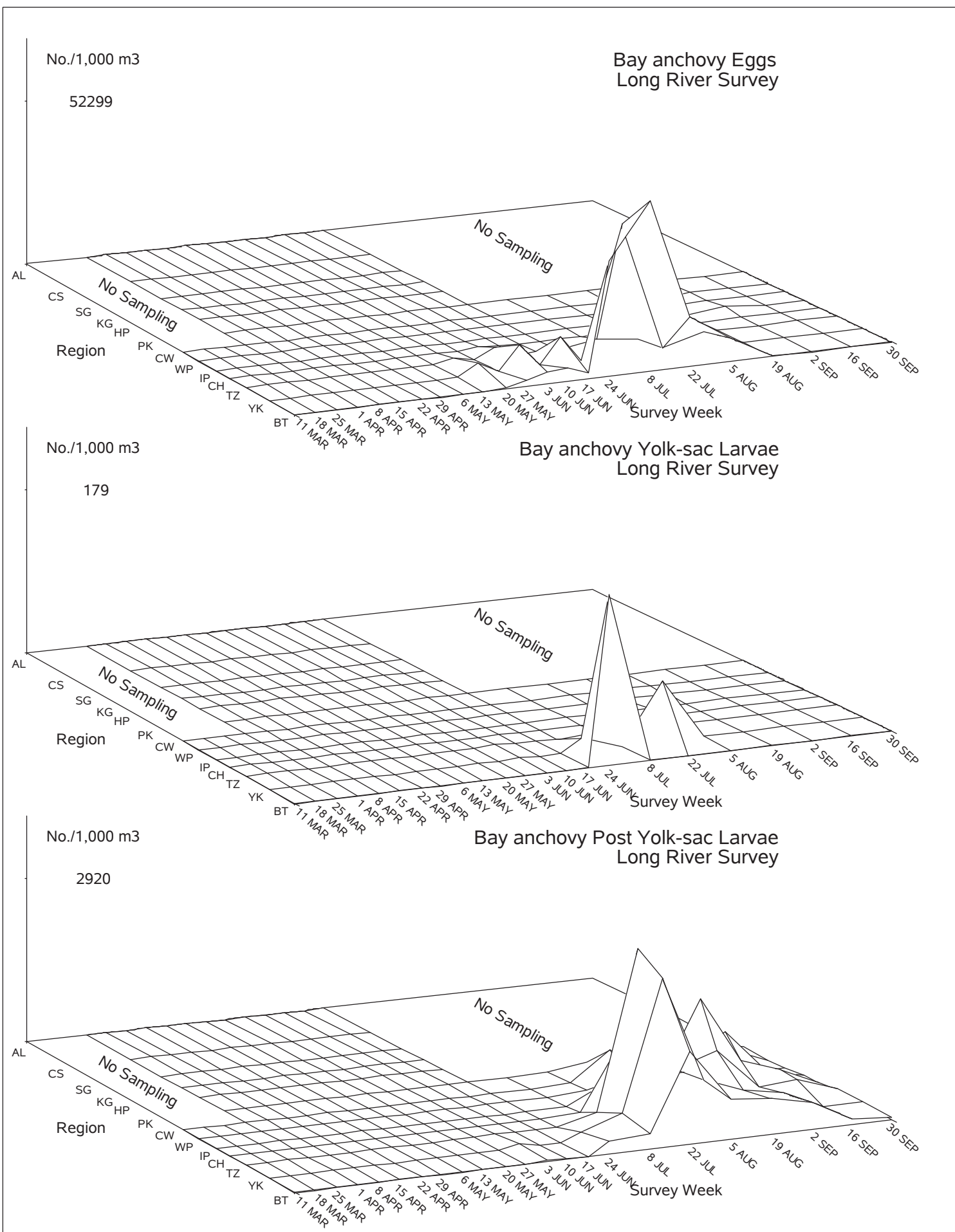


Figure 4-27. Spatiotemporal distribution of eggs, yolk-sac, and post yolk-sac larval bay anchovy in the Hudson River estuary based on the 2013 Long River Survey.

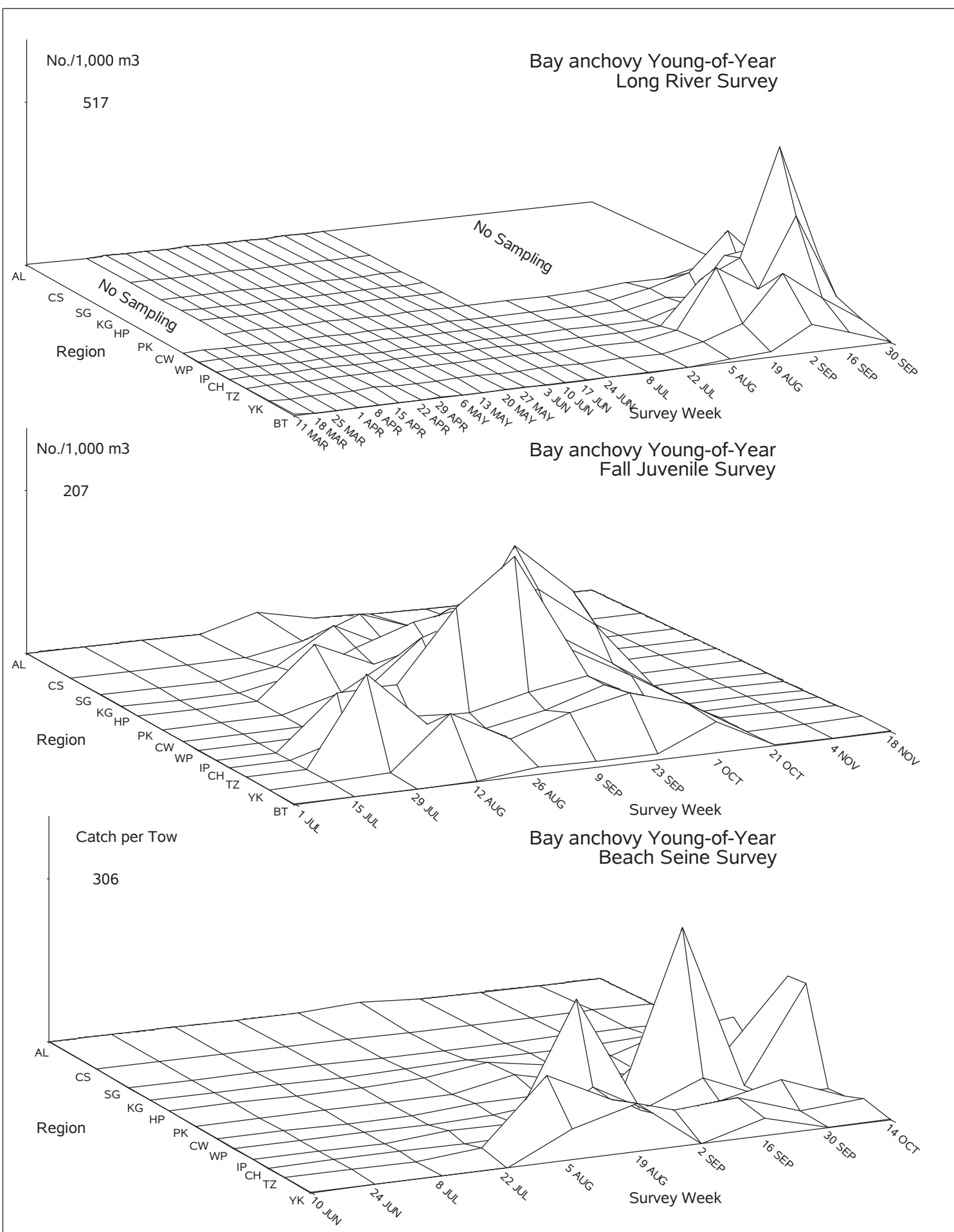


Figure 4-28. Spatiotemporal distribution of young-of-year bay anchovy in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

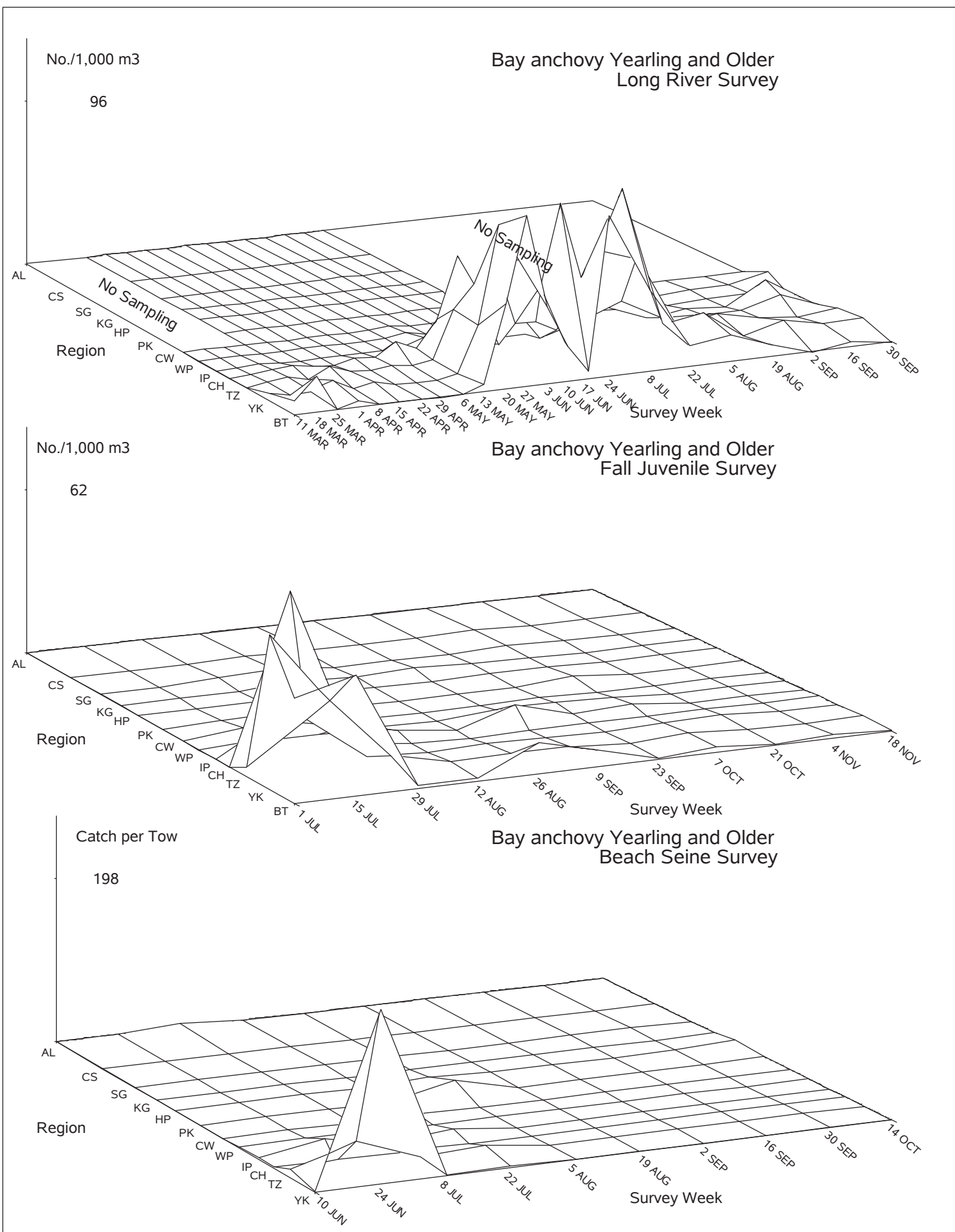


Figure 4-29. Spatiotemporal distribution of yearling and older bay anchovy in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

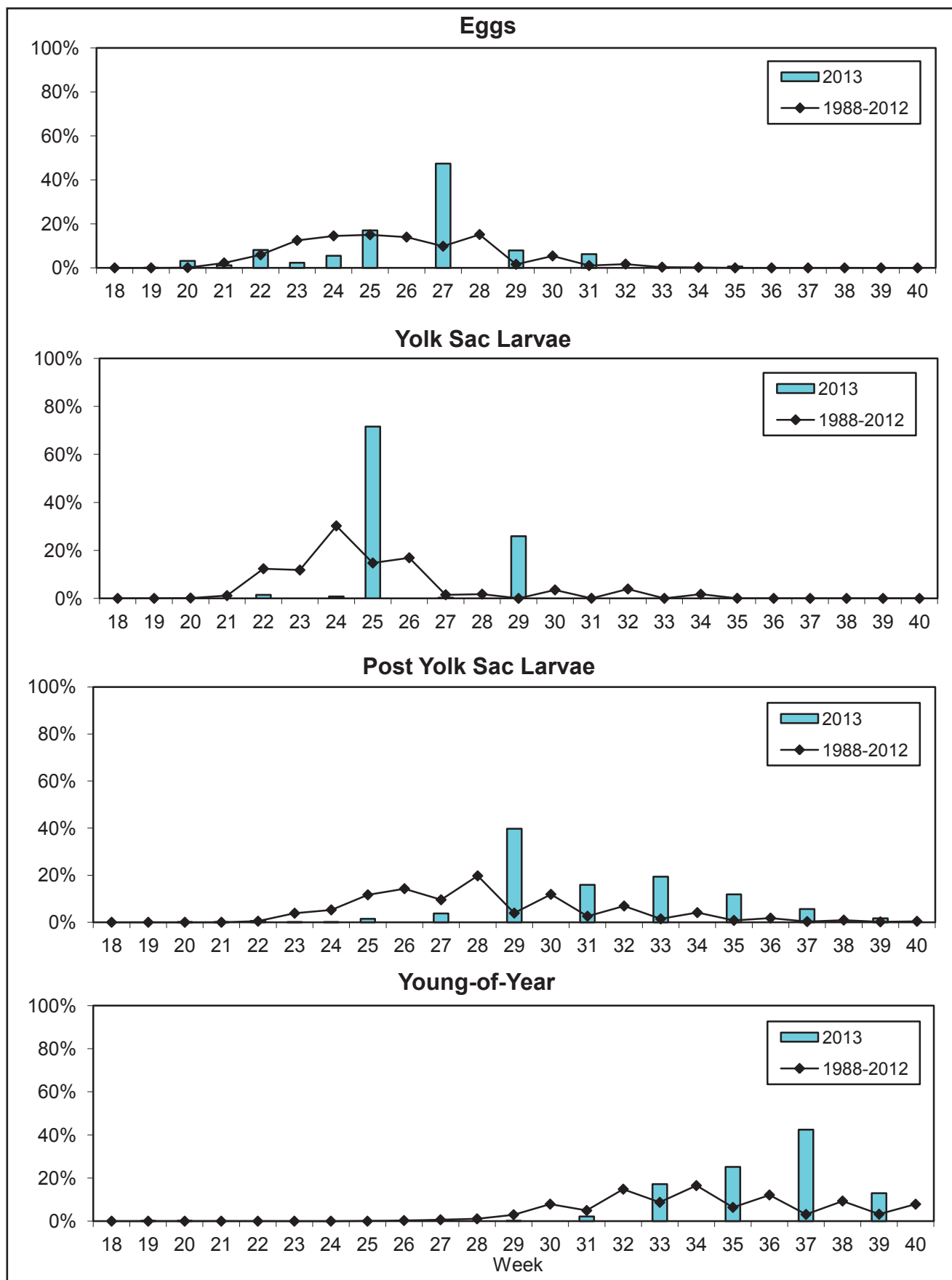


Figure 4-30. Temporal distribution indices for bay anchovy collected during Long River surveys of the Hudson River estuary, 1988-2013.

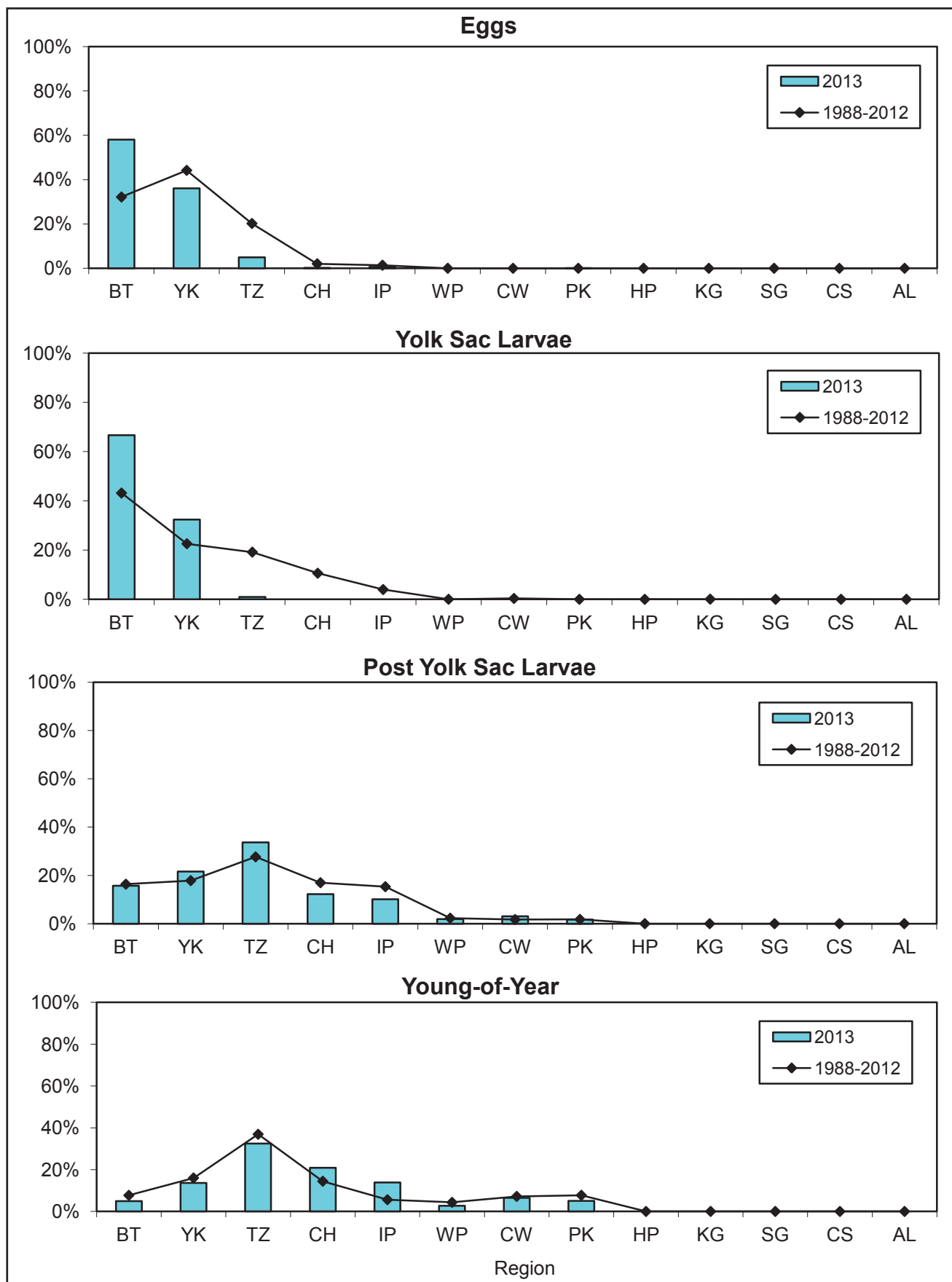


Figure 4-31. Geographic distribution indices for bay anchovy collected during Long River surveys of the Hudson River estuary, 1988-2013.

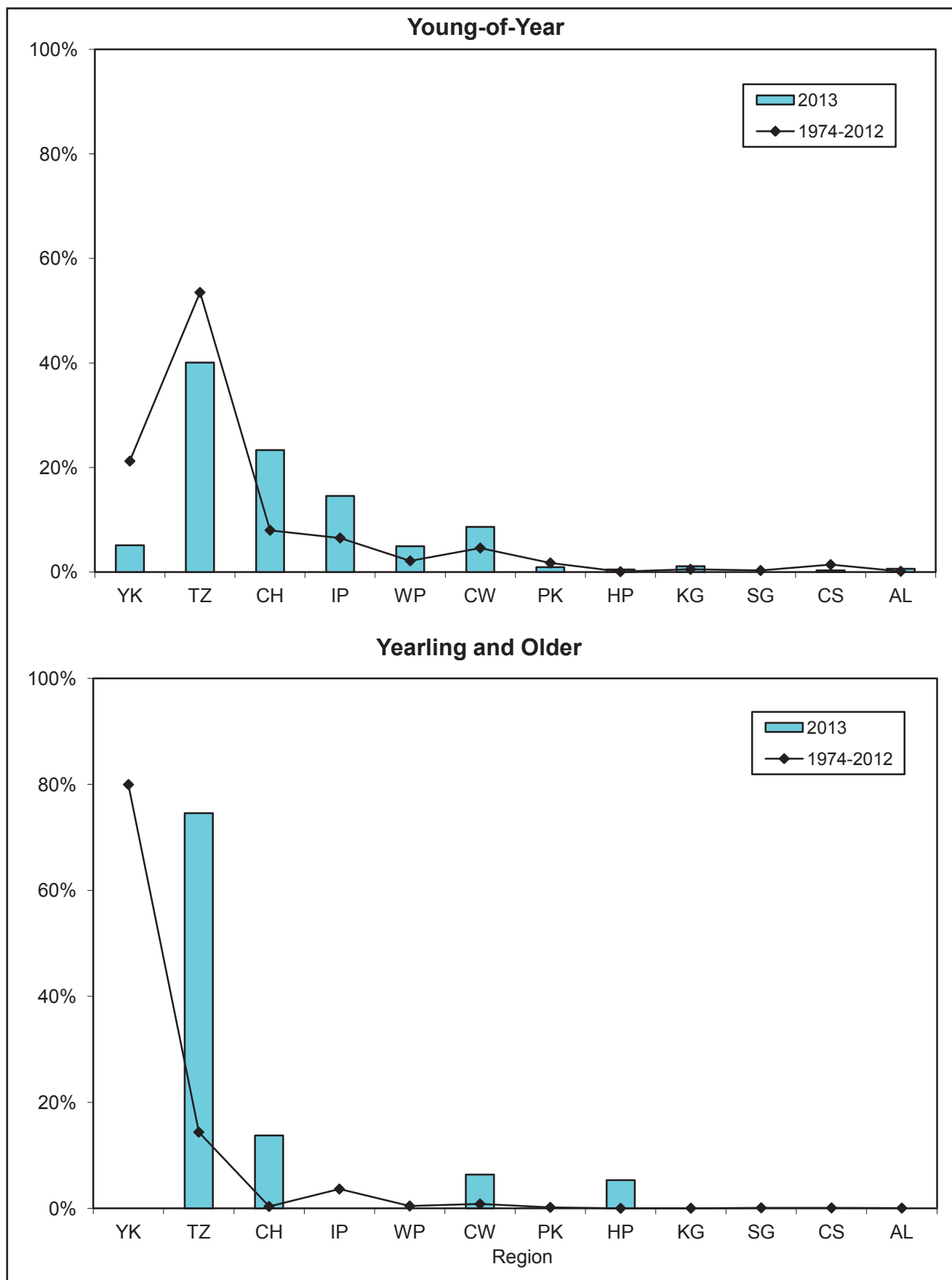


Figure 4-32. Geographic distribution indices for bay anchovy collected during Beach Seine surveys of the Hudson River estuary, 1974-2013.

Bay anchovy

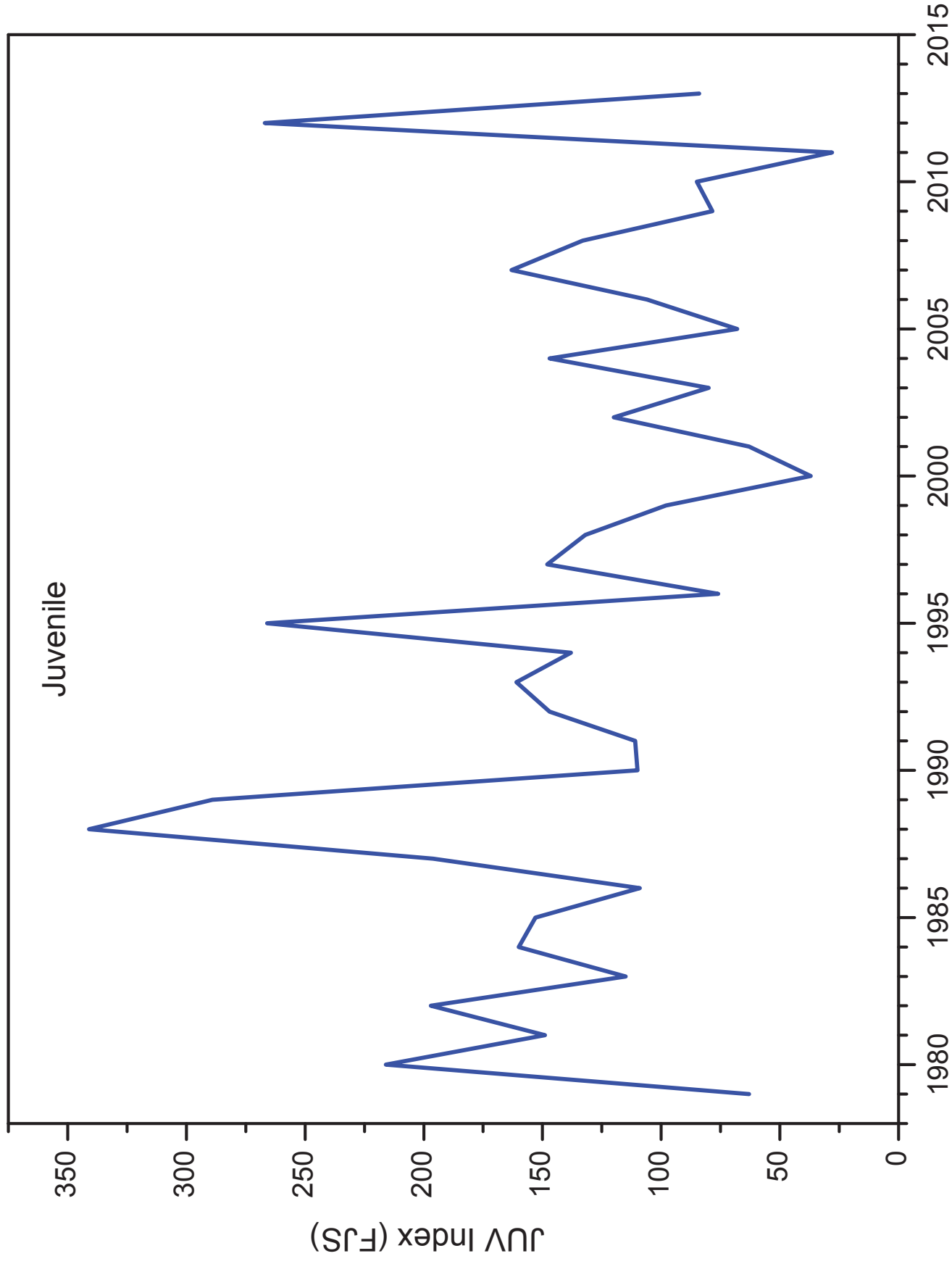


Figure 4-33. Bay anchovy indices of annual abundance based on Fall Juvenile Survey, 1979-2013.

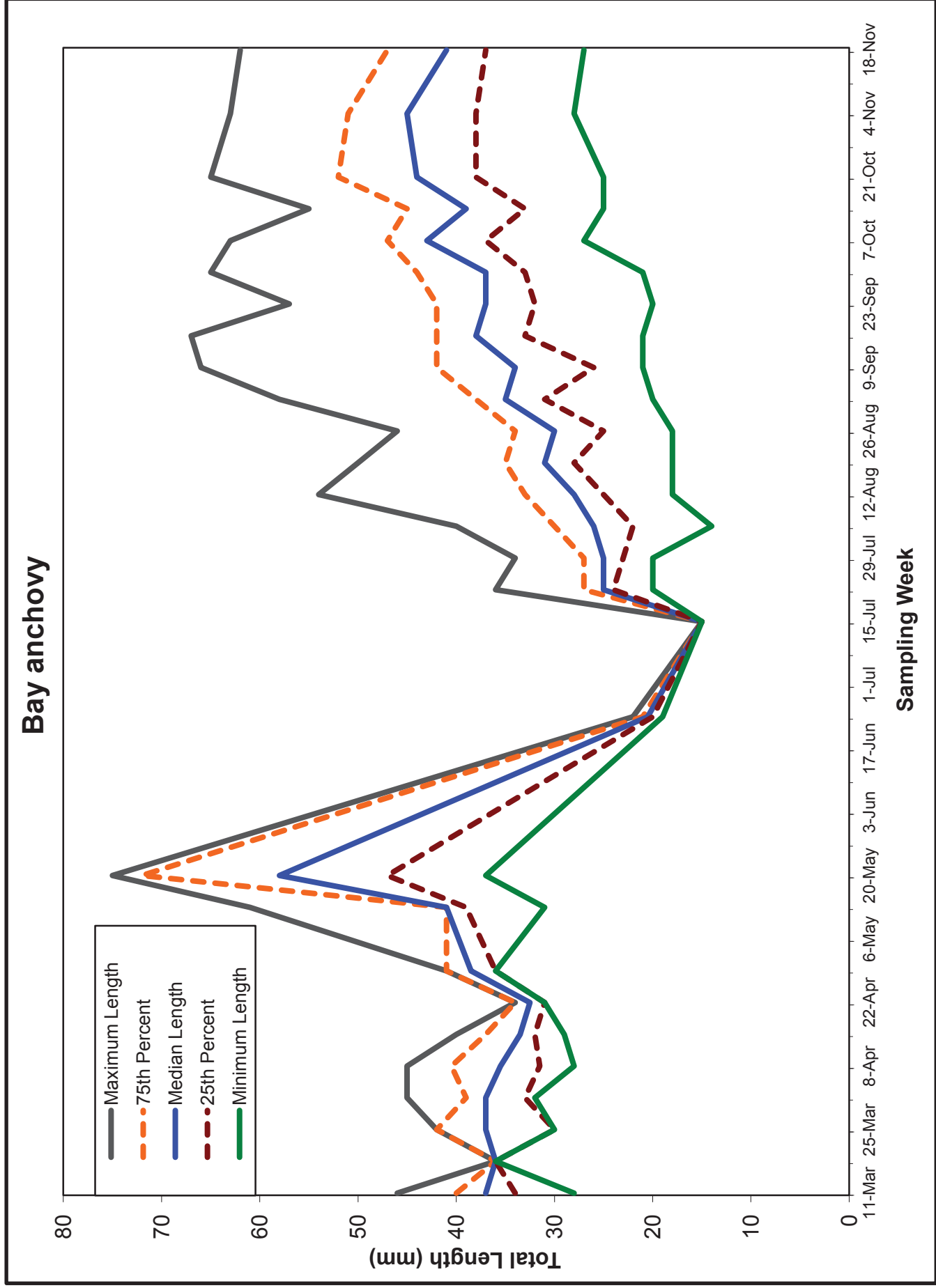


Figure 4-34. Weekly length statistics for young-of-year bay anchovy in the Hudson River estuary, 2013.

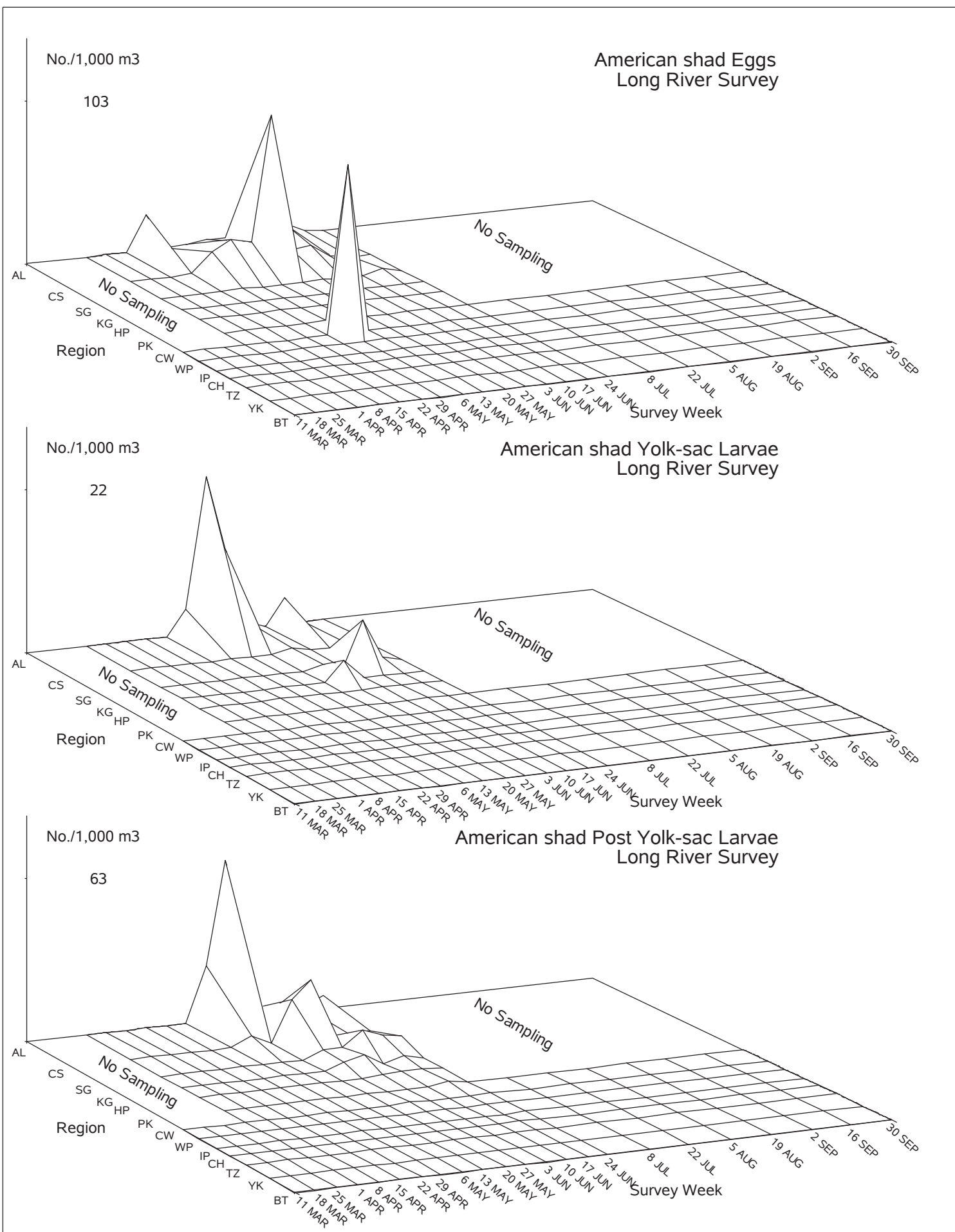


Figure 4-35. Spatiotemporal distribution of eggs, yolk-sac, and post yolk-sac larval American shad in the Hudson River estuary based on the 2013 Long River Survey.

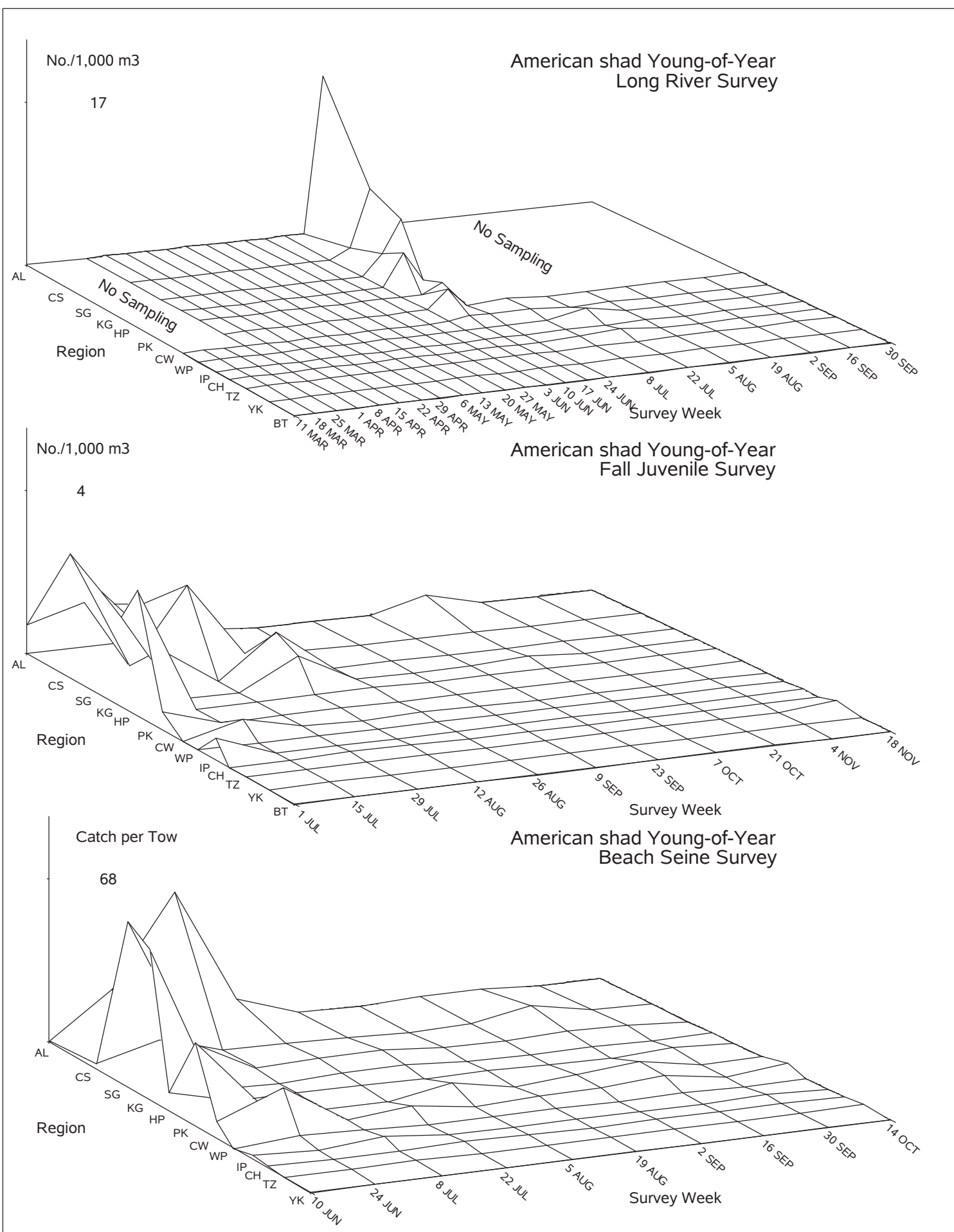


Figure 4-36. Spatiotemporal distribution of young-of-year American shad in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

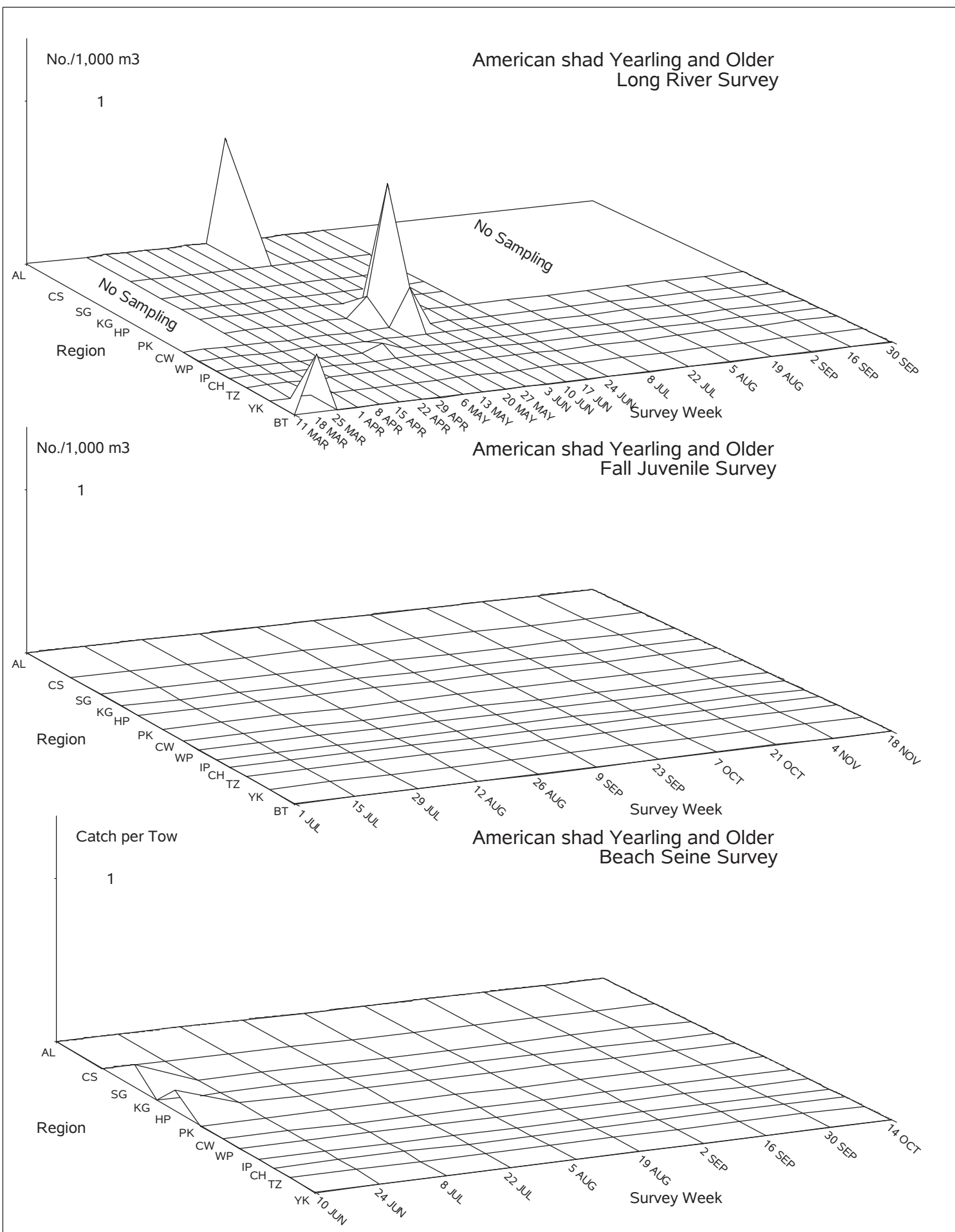


Figure 4-37. Spatiotemporal distribution of yearling and older American shad in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

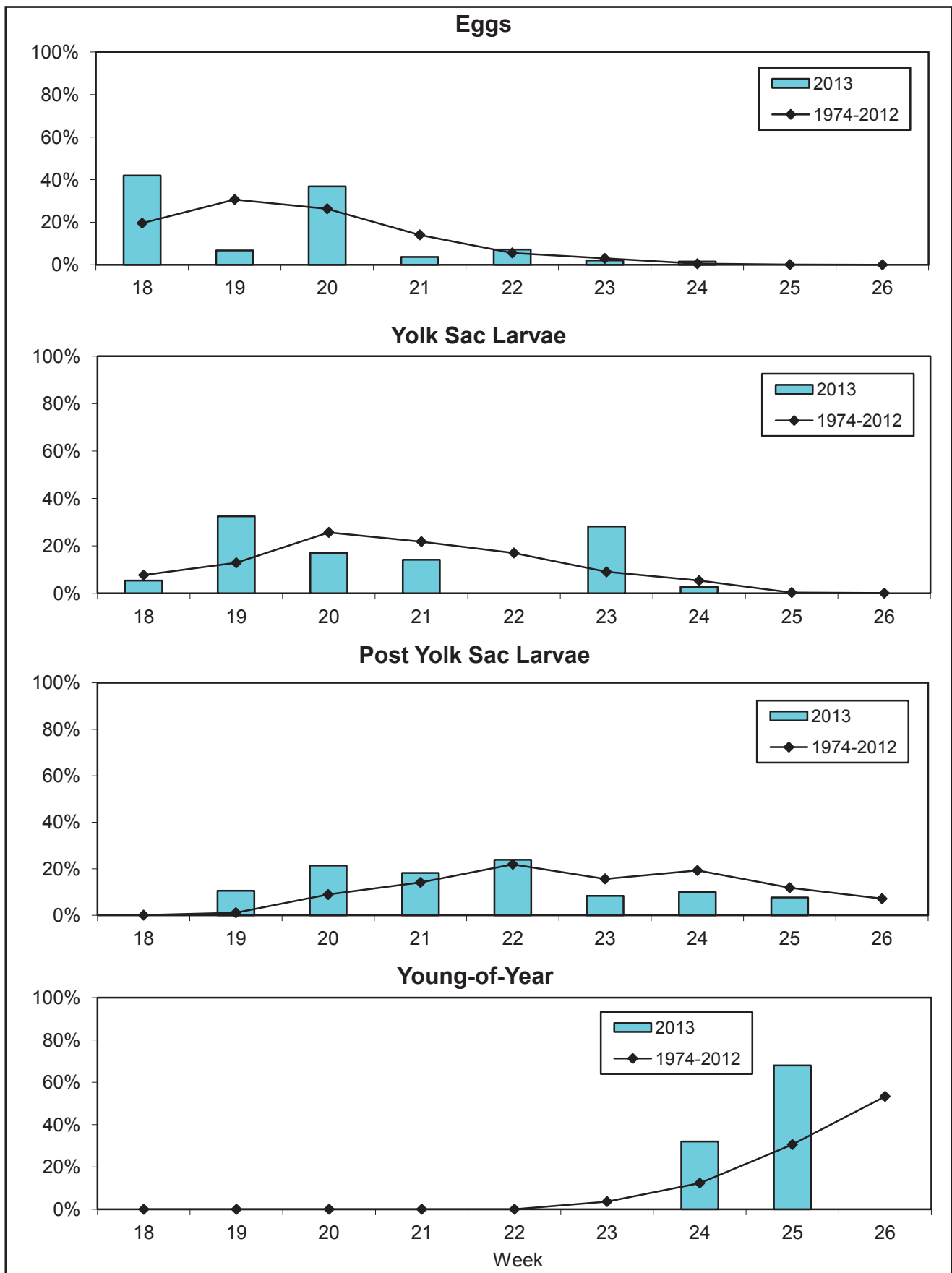


Figure 4-38. Temporal distribution indices for American shad collected during Long River surveys of the Hudson River estuary, 1974-2013.

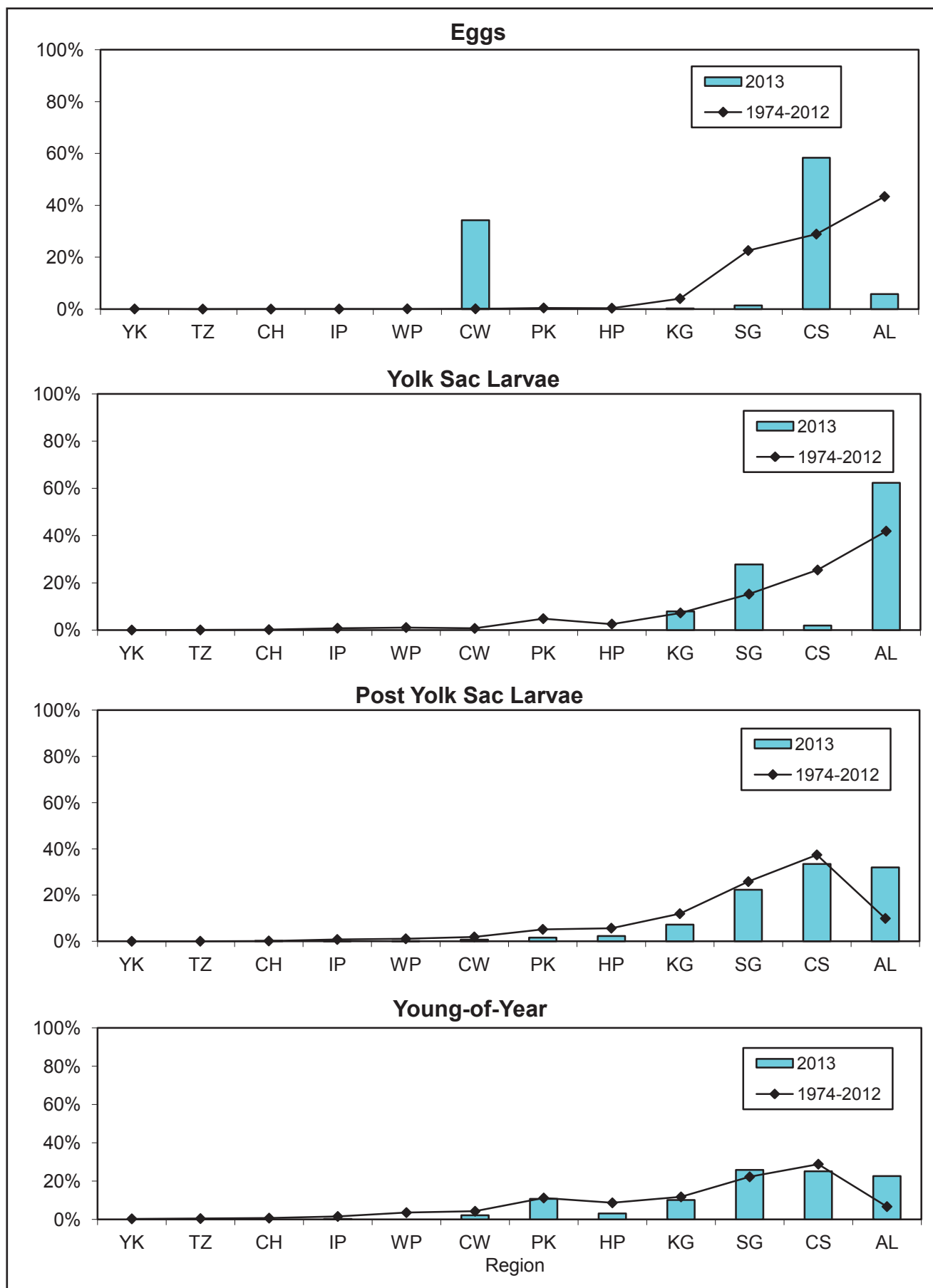


Figure 4-39. Geographic distribution indices for American shad collected during Long River surveys of the Hudson River estuary, 1974-2013.

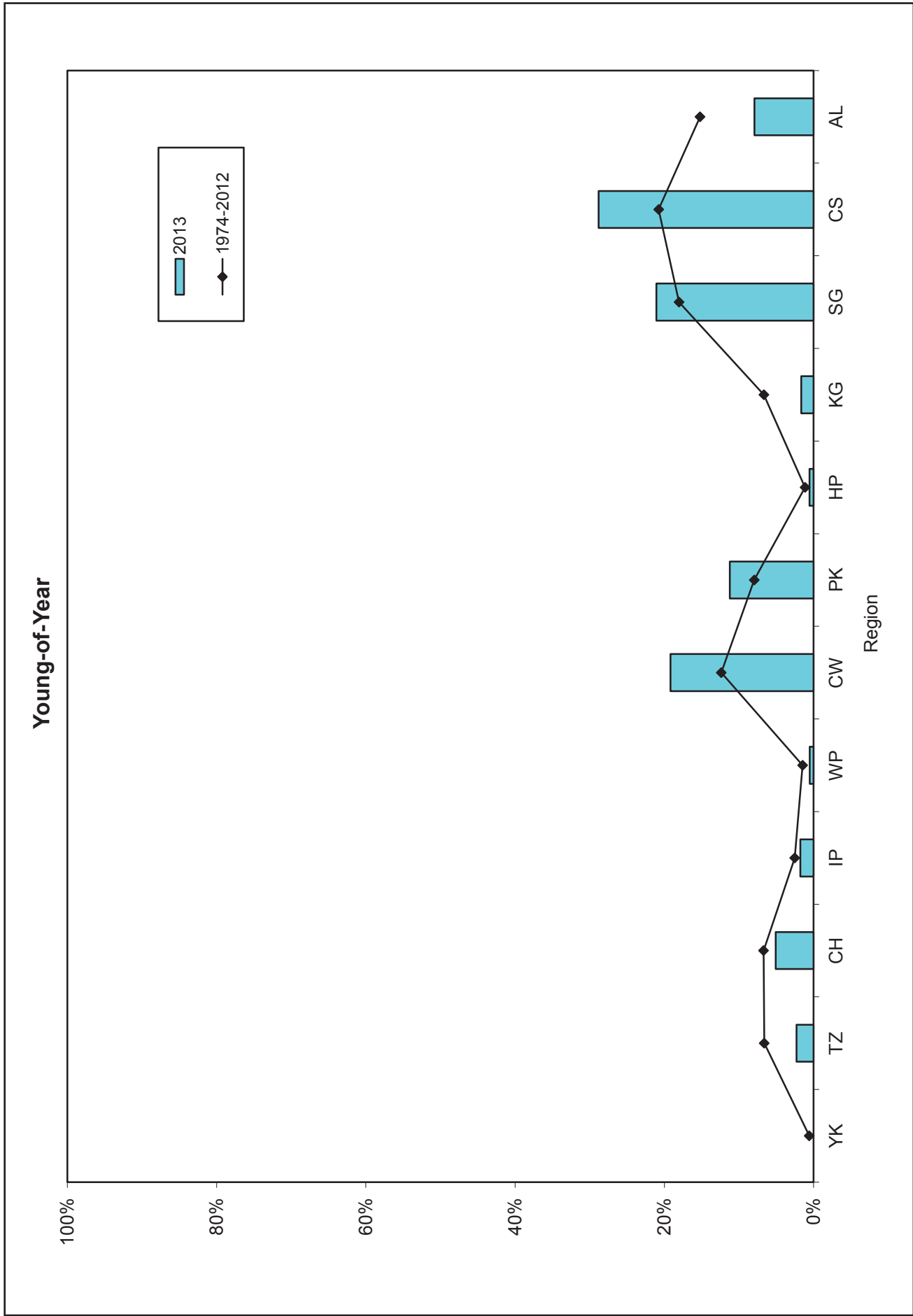


Figure 4-40. Geographic distribution indices for American shad collected during Beach Seine surveys of the Hudson River estuary, 1974-2013.

American shad

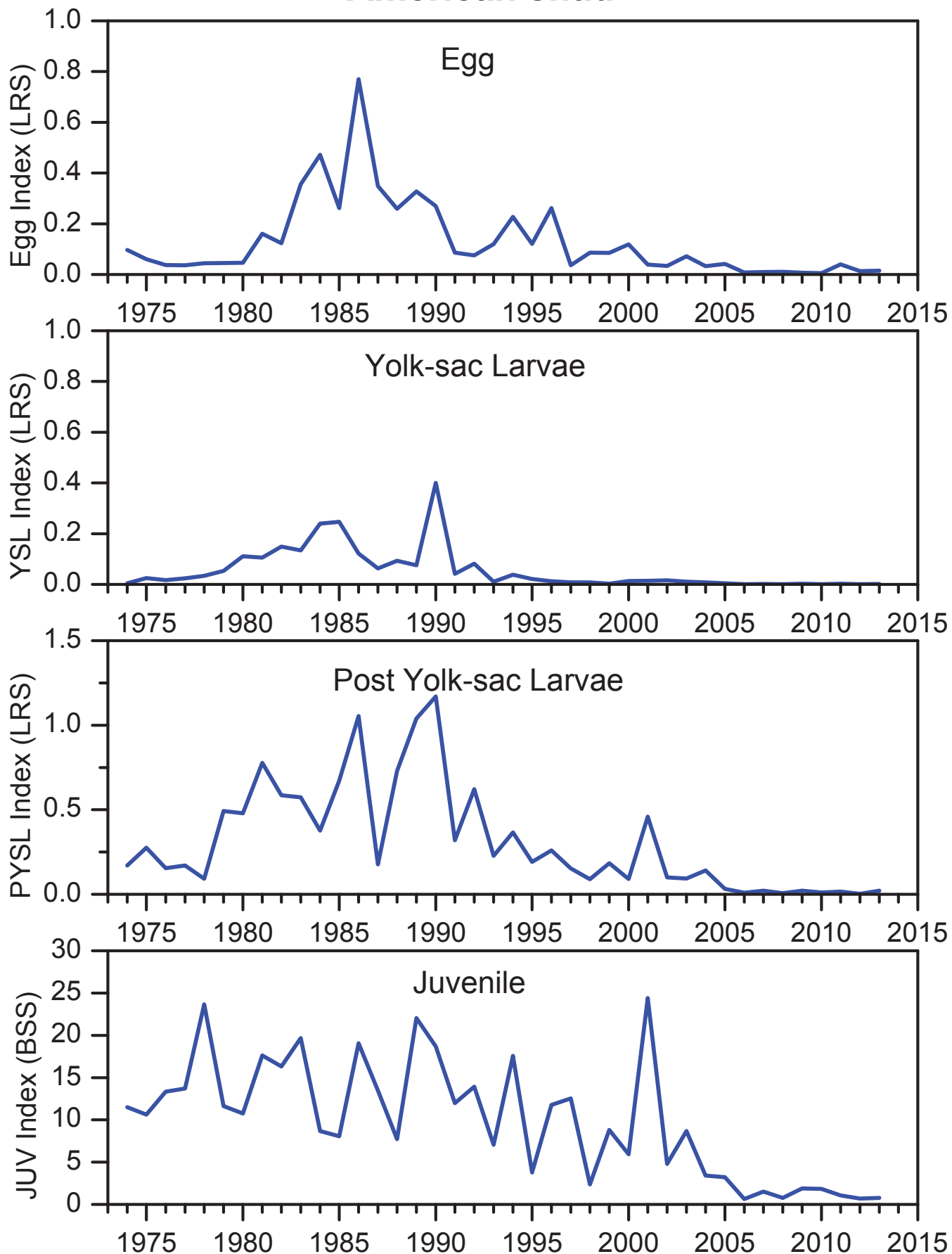


Figure 4-41. American shad indices of annual abundance based on Long River Survey and Beach Seine Survey, 1974-2013.

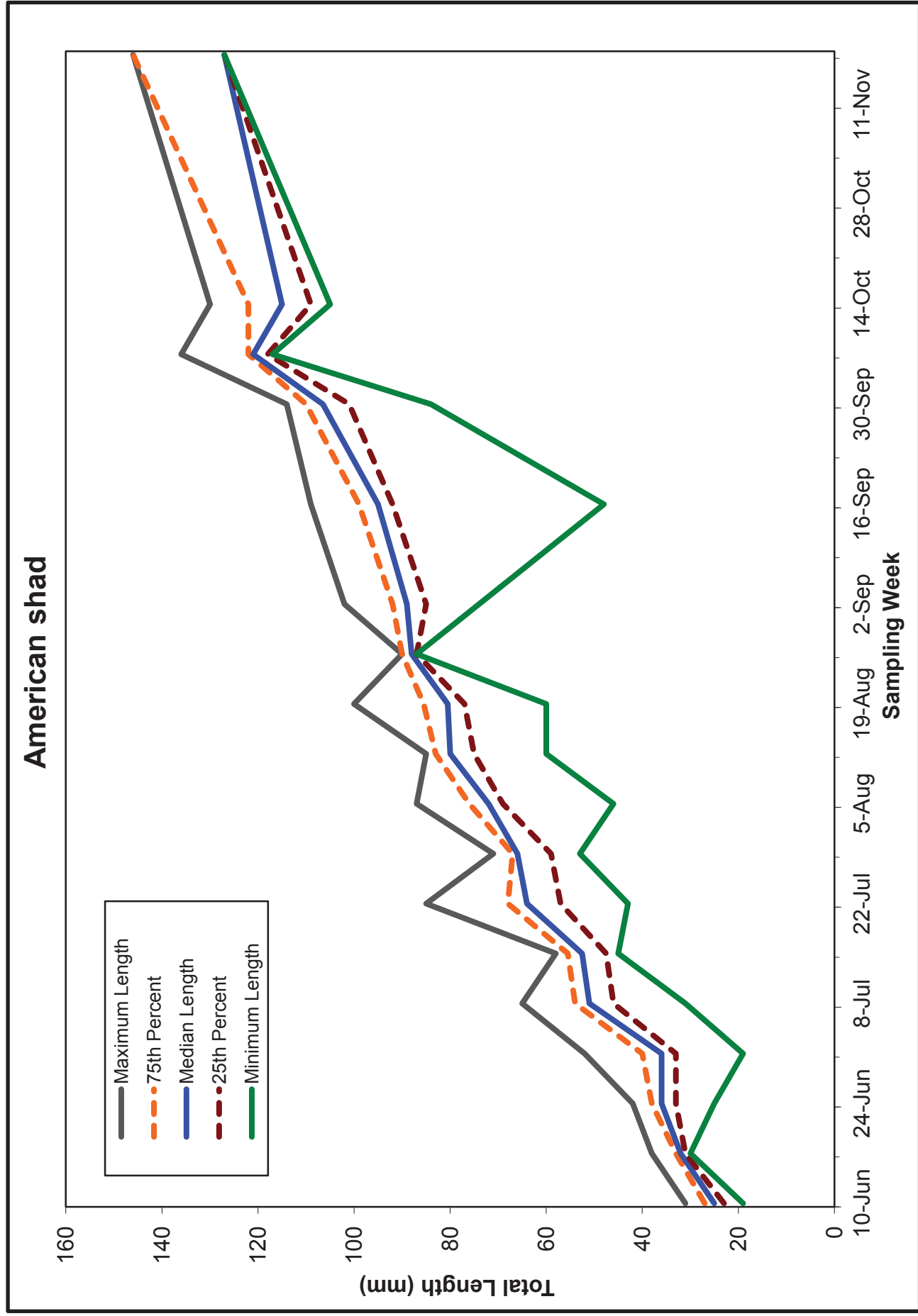


Figure 4-42. Weekly length statistics for young-of-year American shad in the Hudson River estuary, 2013.

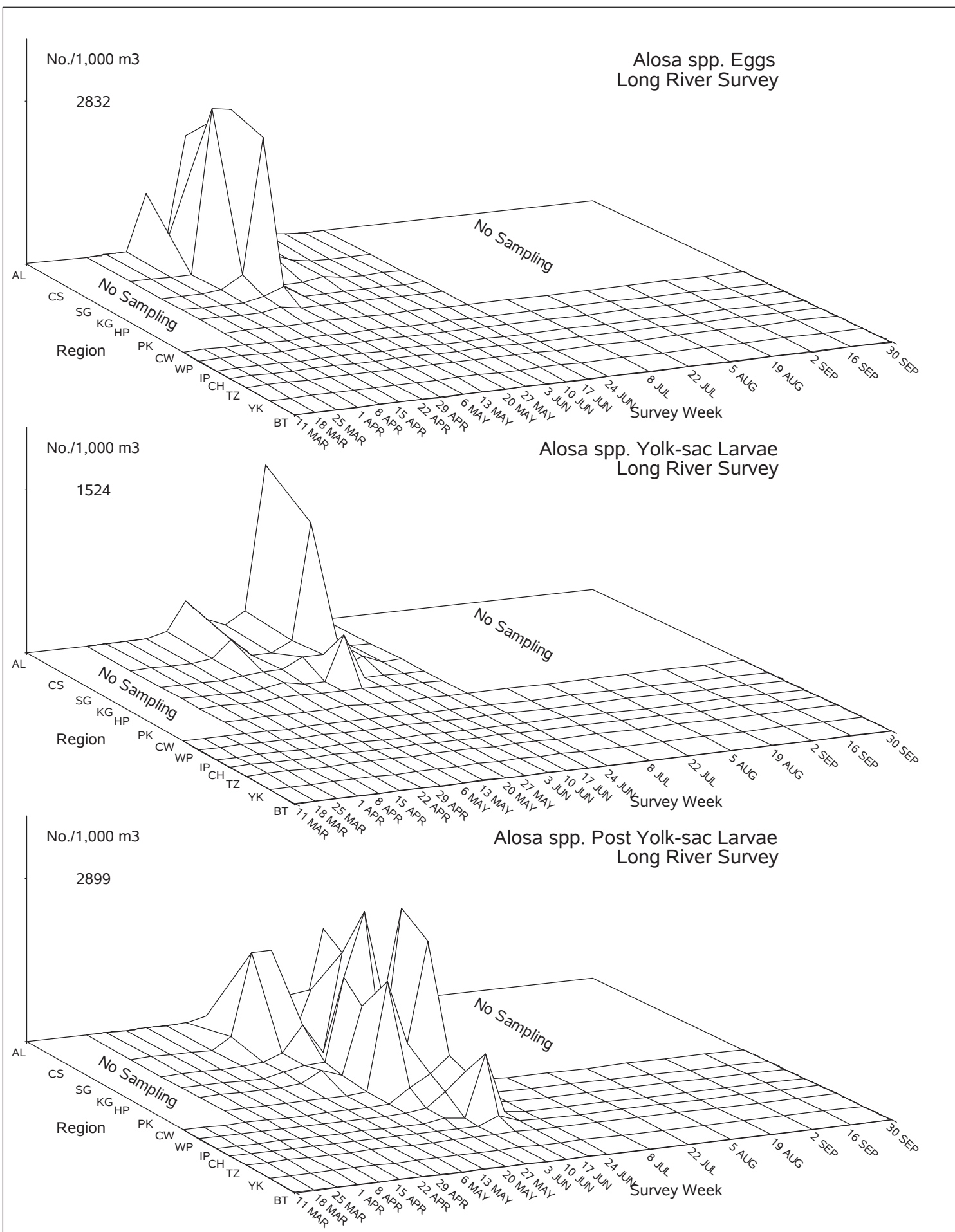


Figure 4-43. Spatiotemporal distribution of eggs, yolk-sac, and post yolk-sac larval *Alosa* spp. in the Hudson River estuary based on the 2013 Long River Survey.

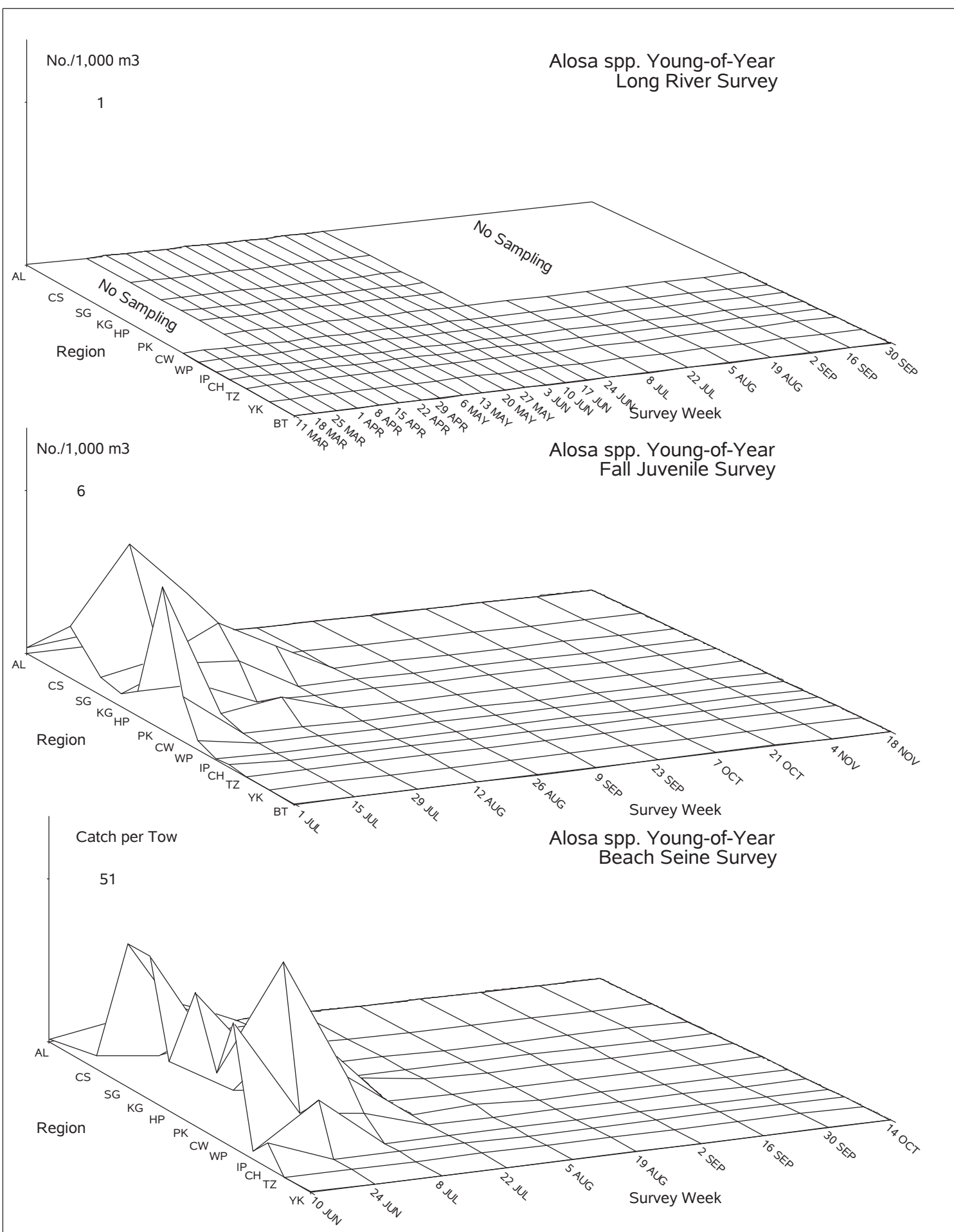


Figure 4-44. Spatiotemporal distribution of young-of-year *Alosa* spp. in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

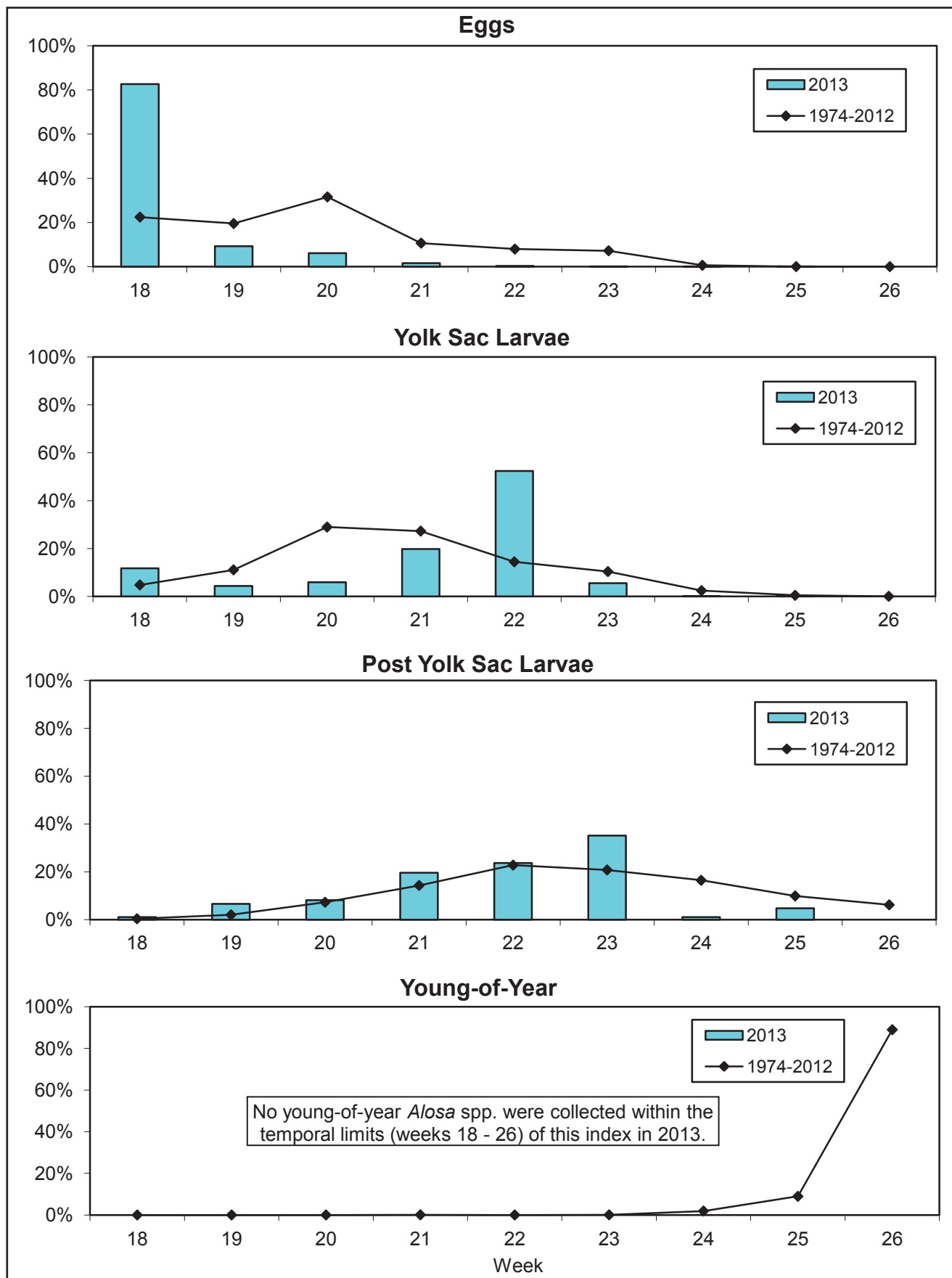


Figure 4-45. Temporal distribution indices for *Alosa* spp. collected during Long River surveys of the Hudson River estuary, 1974-2013.

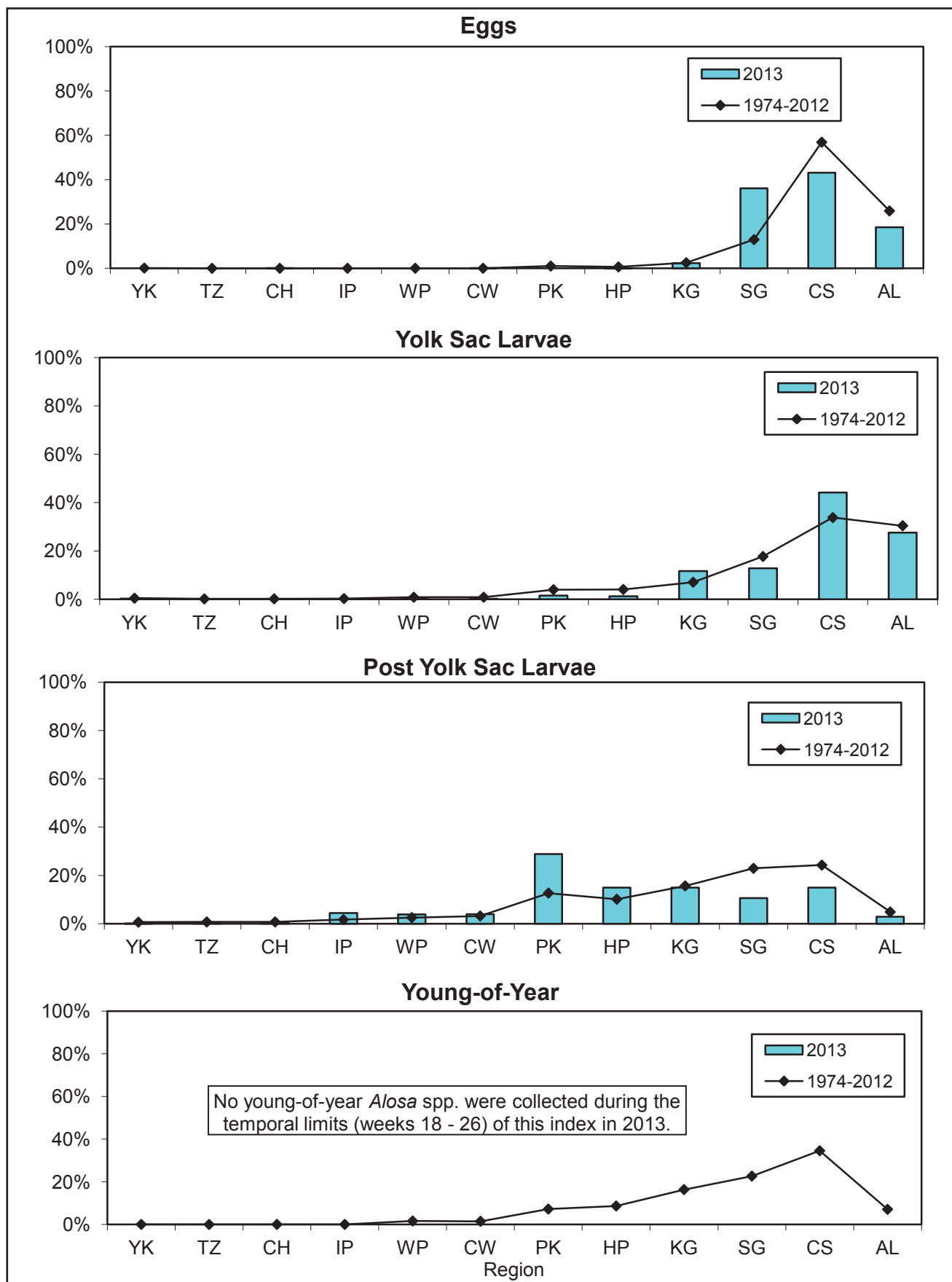


Figure 4-46. Geographic distribution indices for *Alosa* spp. collected during Long River surveys of the Hudson River estuary, 1974-2013.

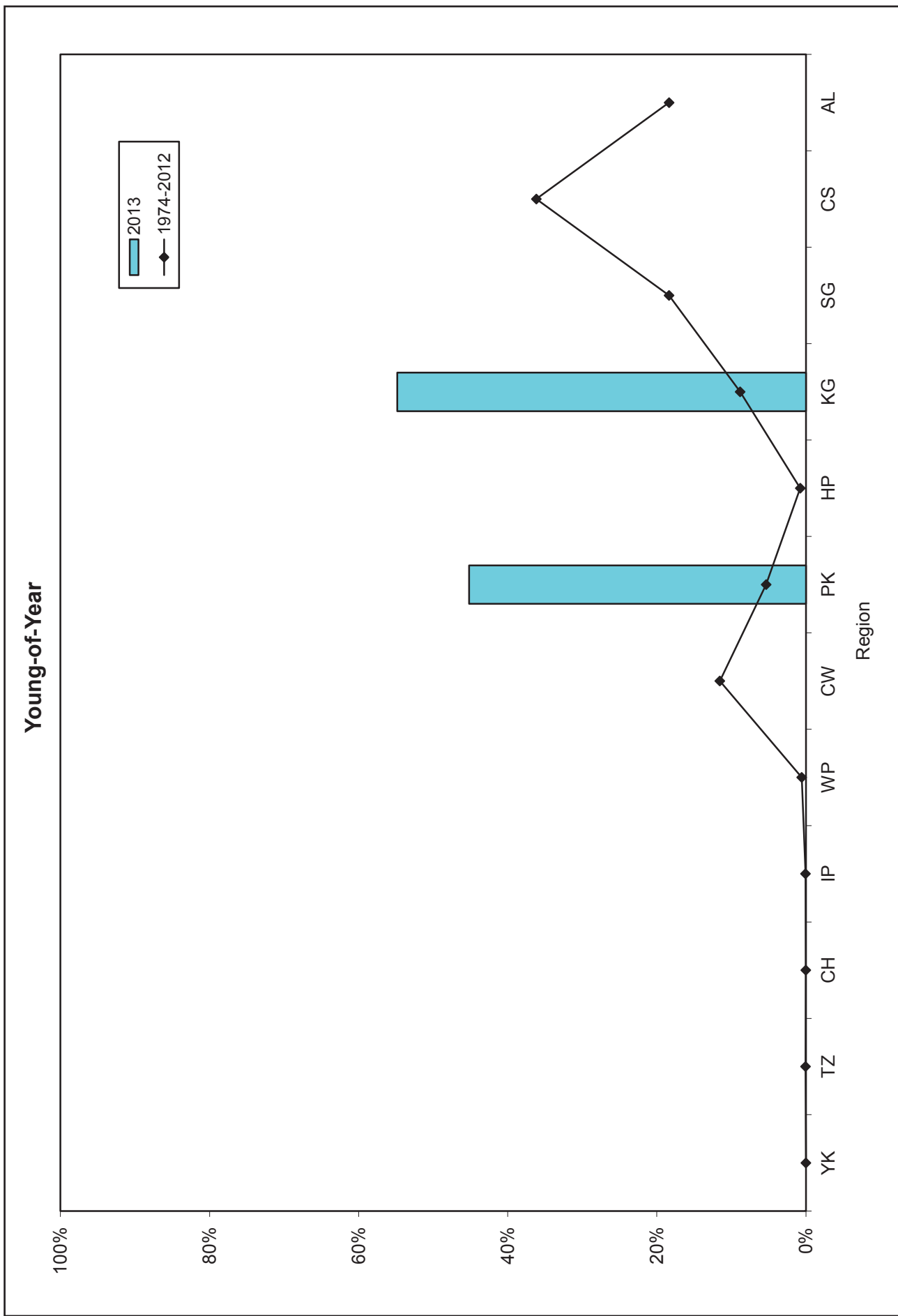


Figure 4-47. Geographic distribution indices for *Alosa* spp. collected during Beach Seine surveys of the Hudson River estuary, 1974-2013.

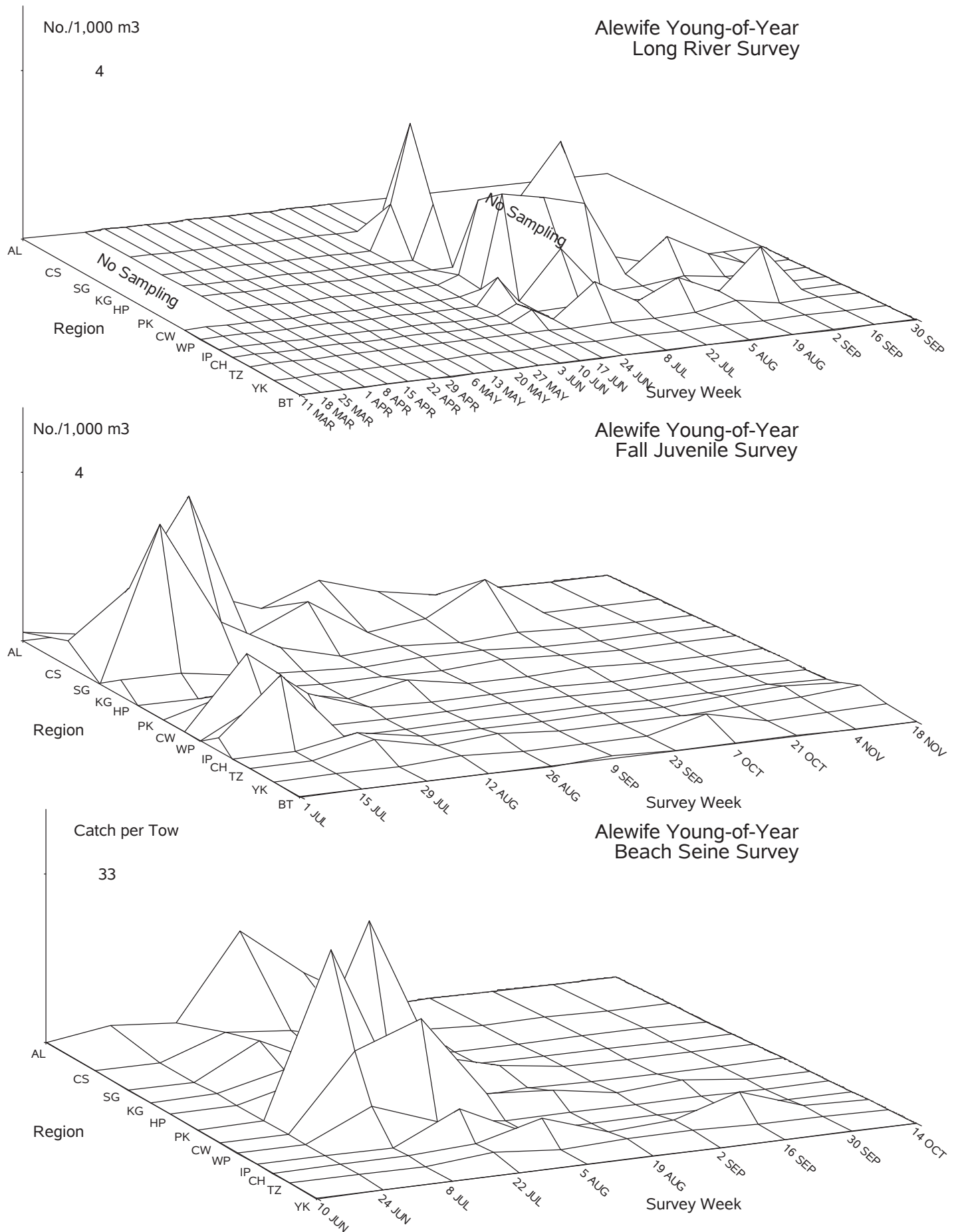


Figure 4-48. Spatiotemporal distribution of young-of-year alewife in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

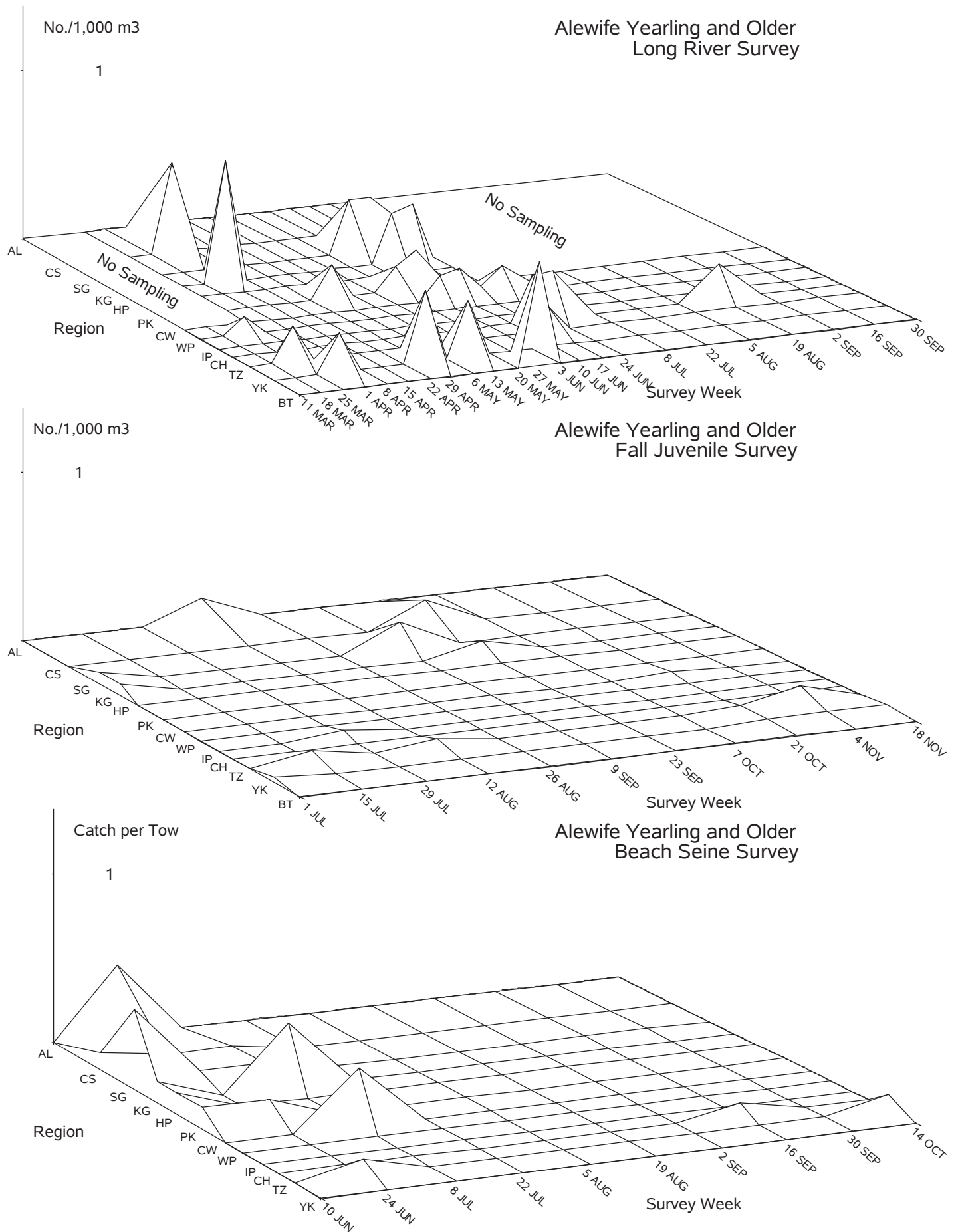


Figure 4-49. Spatiotemporal distribution of yearling and older alewife in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

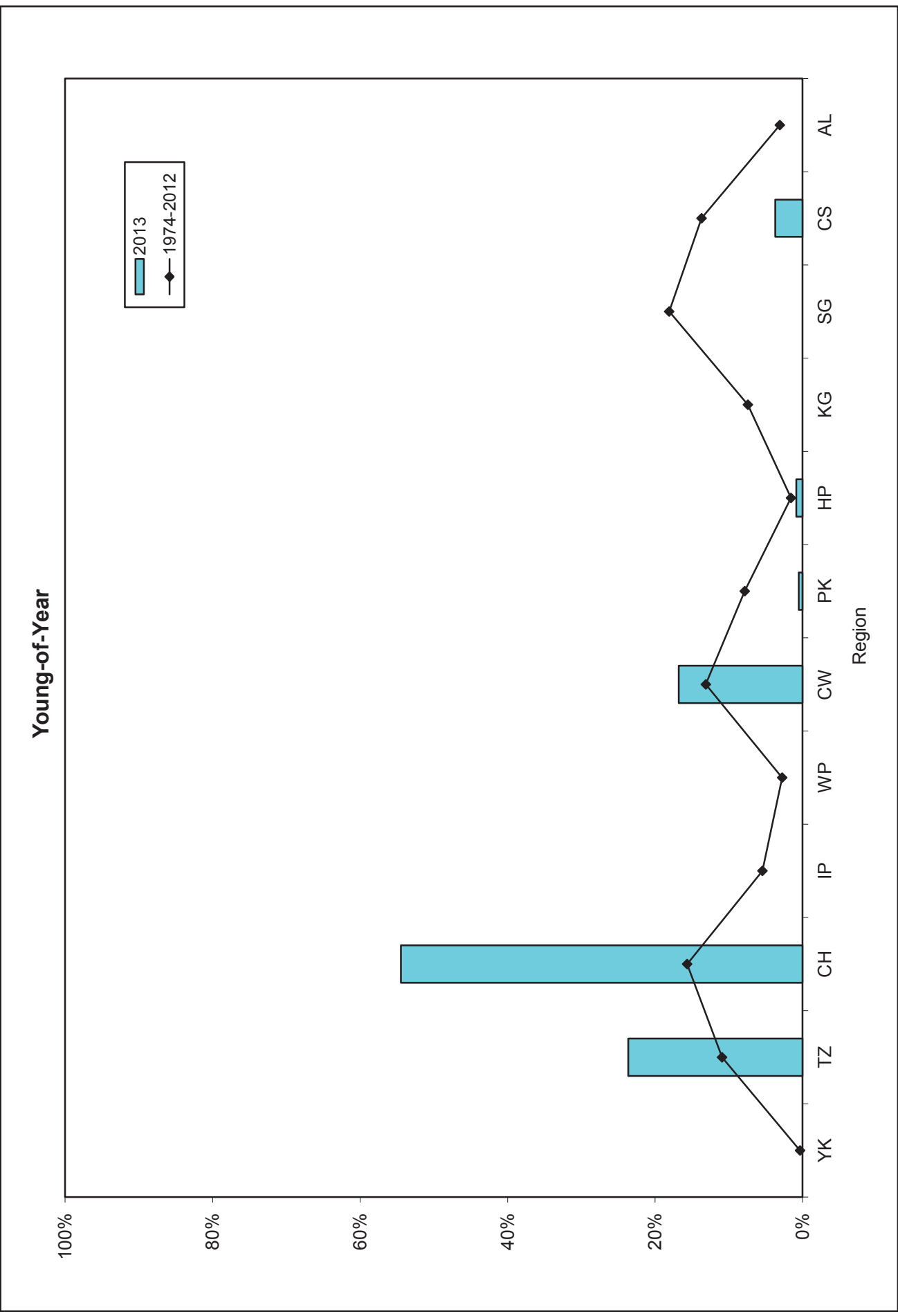


Figure 4-50. Geographic distribution indices for alewife collected during Beach Seine surveys of the Hudson River estuary, 1974-2013.

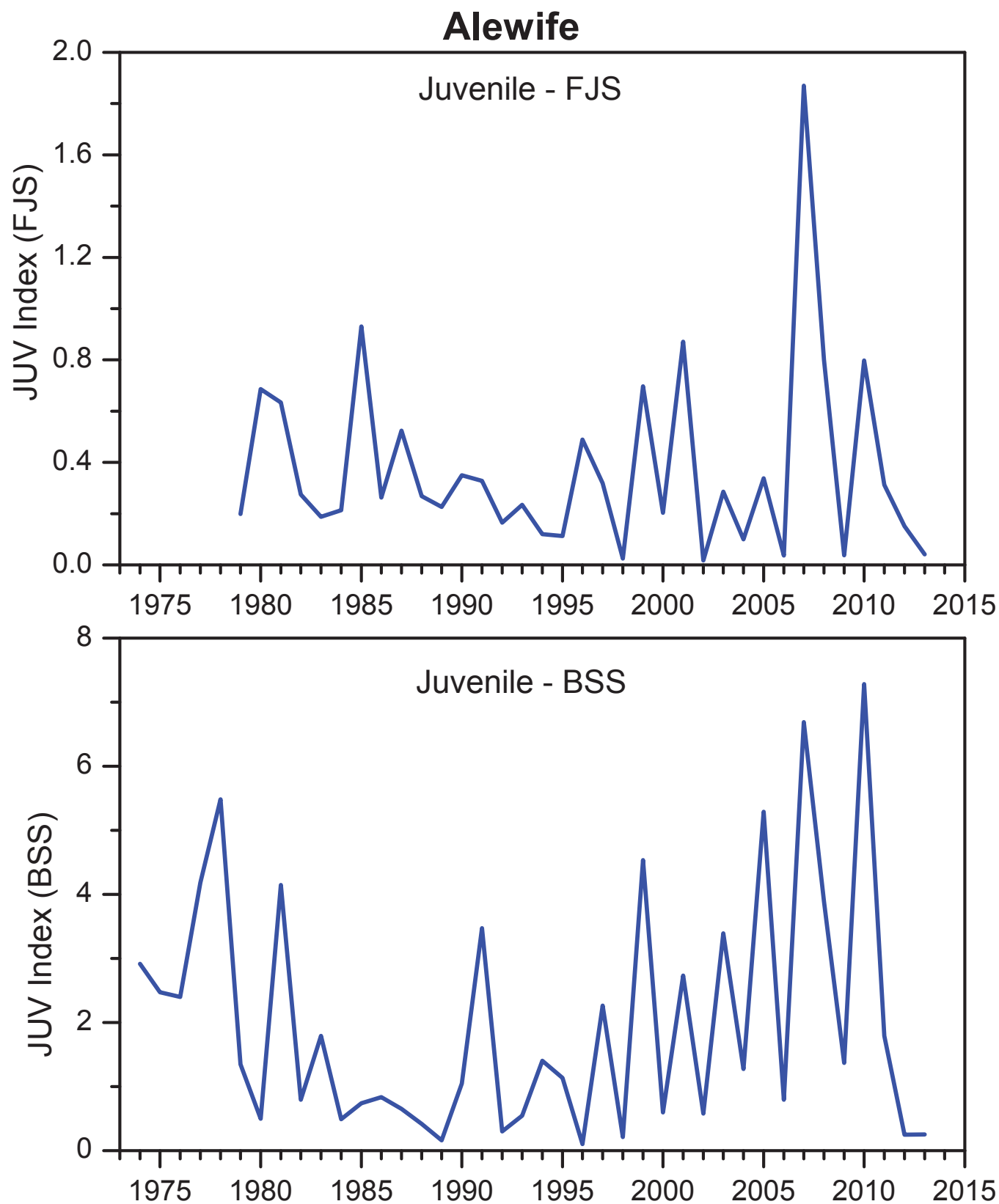


Figure 4-51. Alewife indices of annual abundance based on Fall Juvenile Survey, 1979-2013, and Beach Seine Survey, 1974-2013.

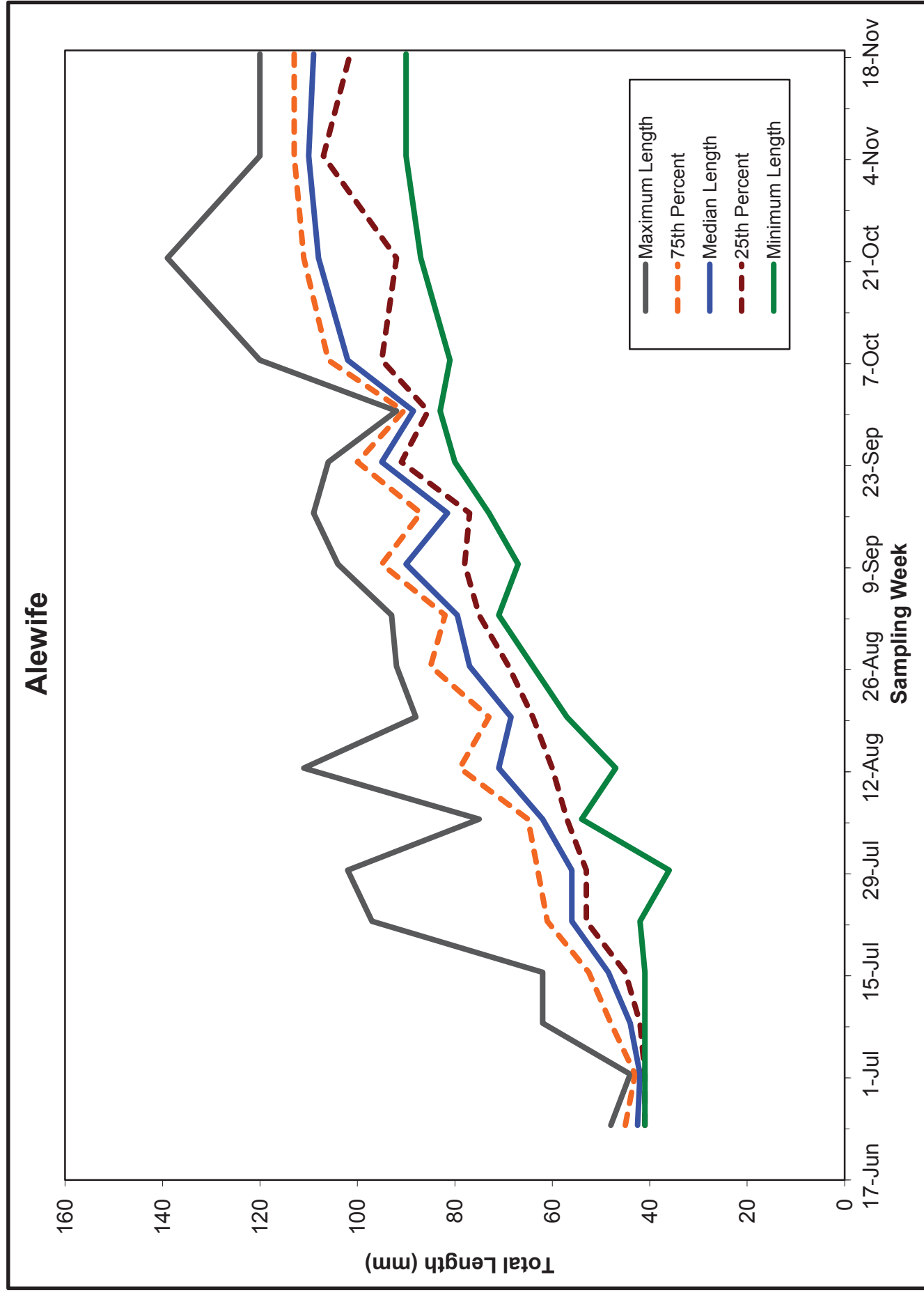


Figure 4-52. Weekly length statistics for young-of-year alewife in the Hudson River estuary, 2013.

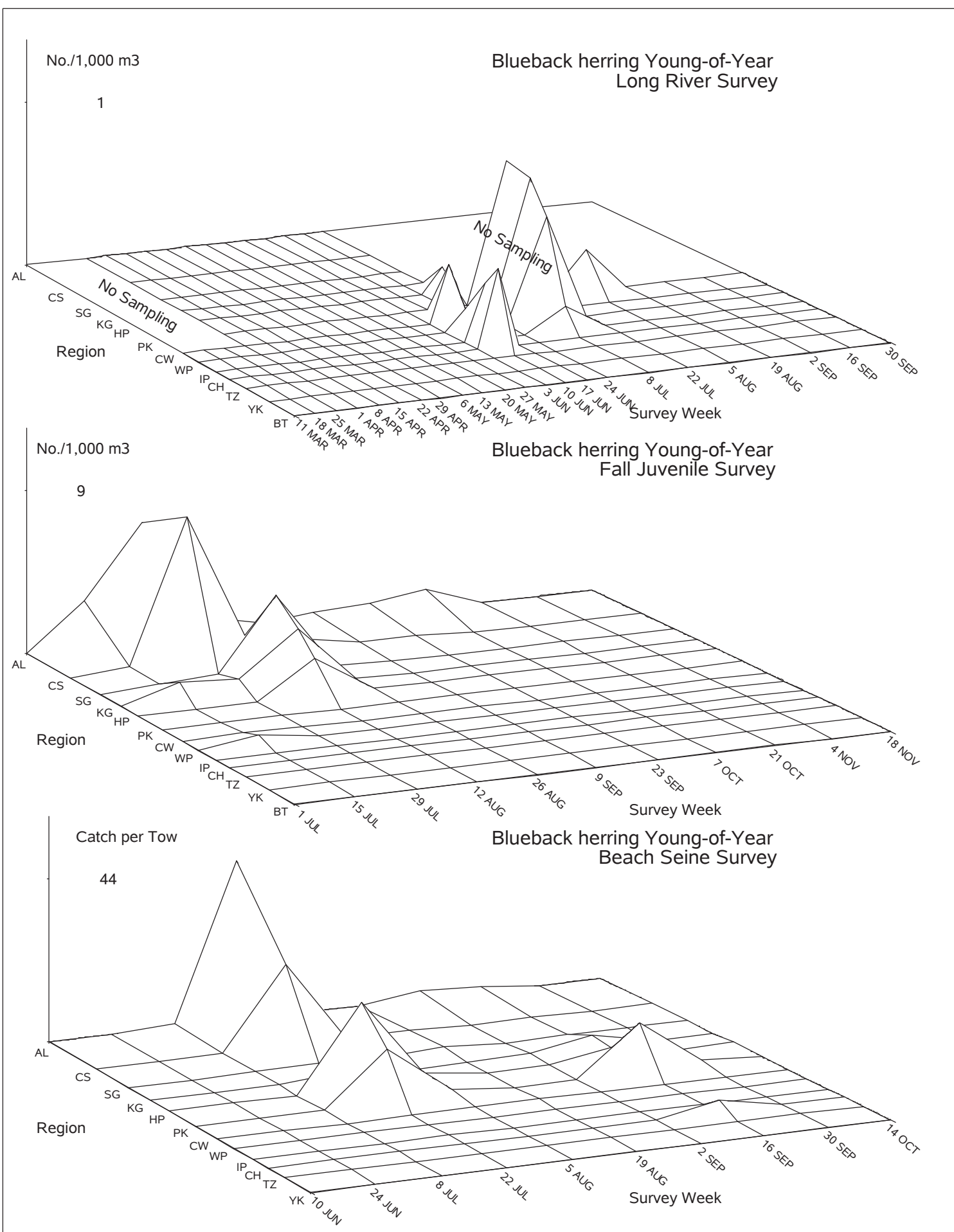


Figure 4-53. Spatiotemporal distribution of young-of-year blueback herring in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

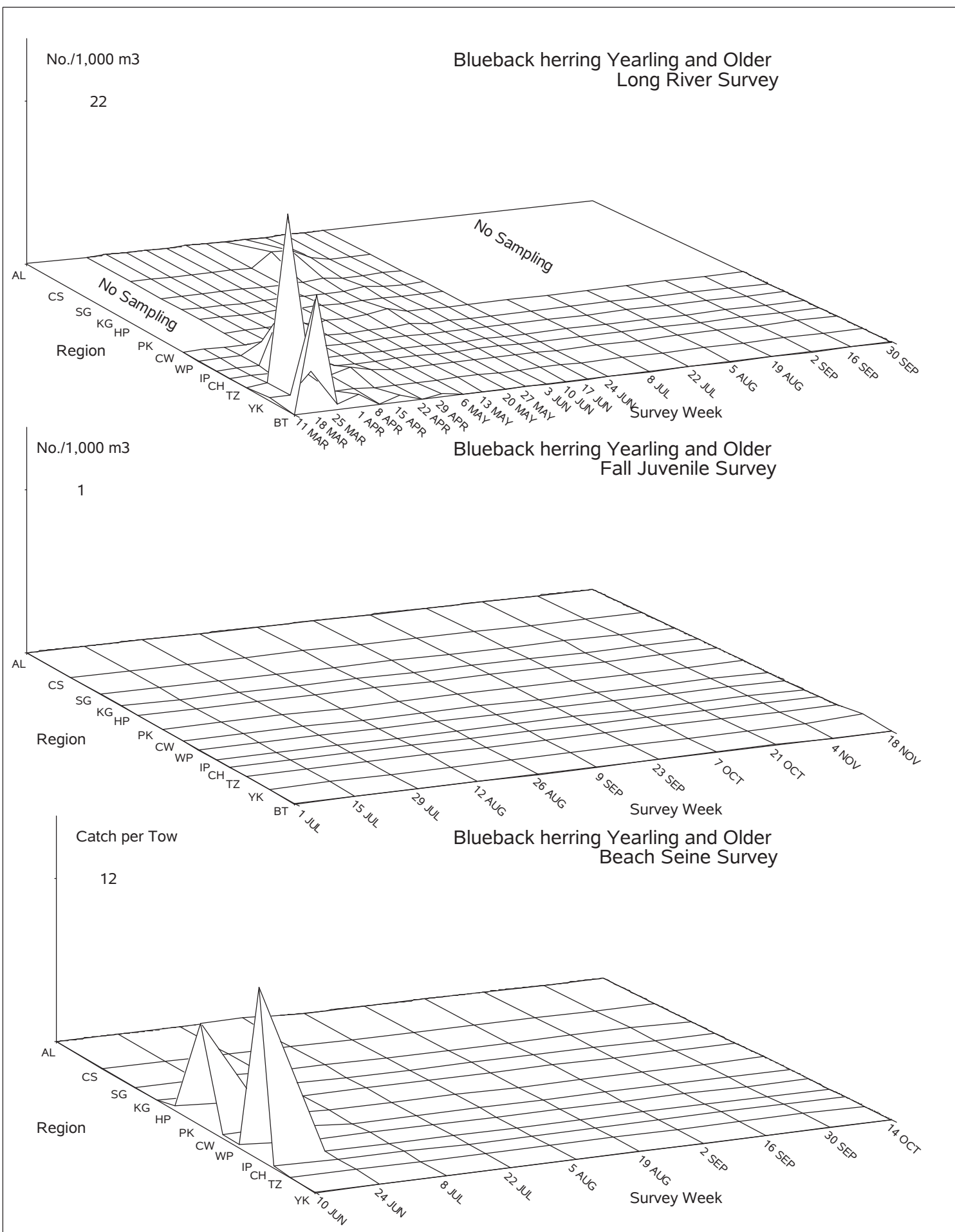


Figure 4-54. Spatiotemporal distribution of yearling and older blueback herring in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

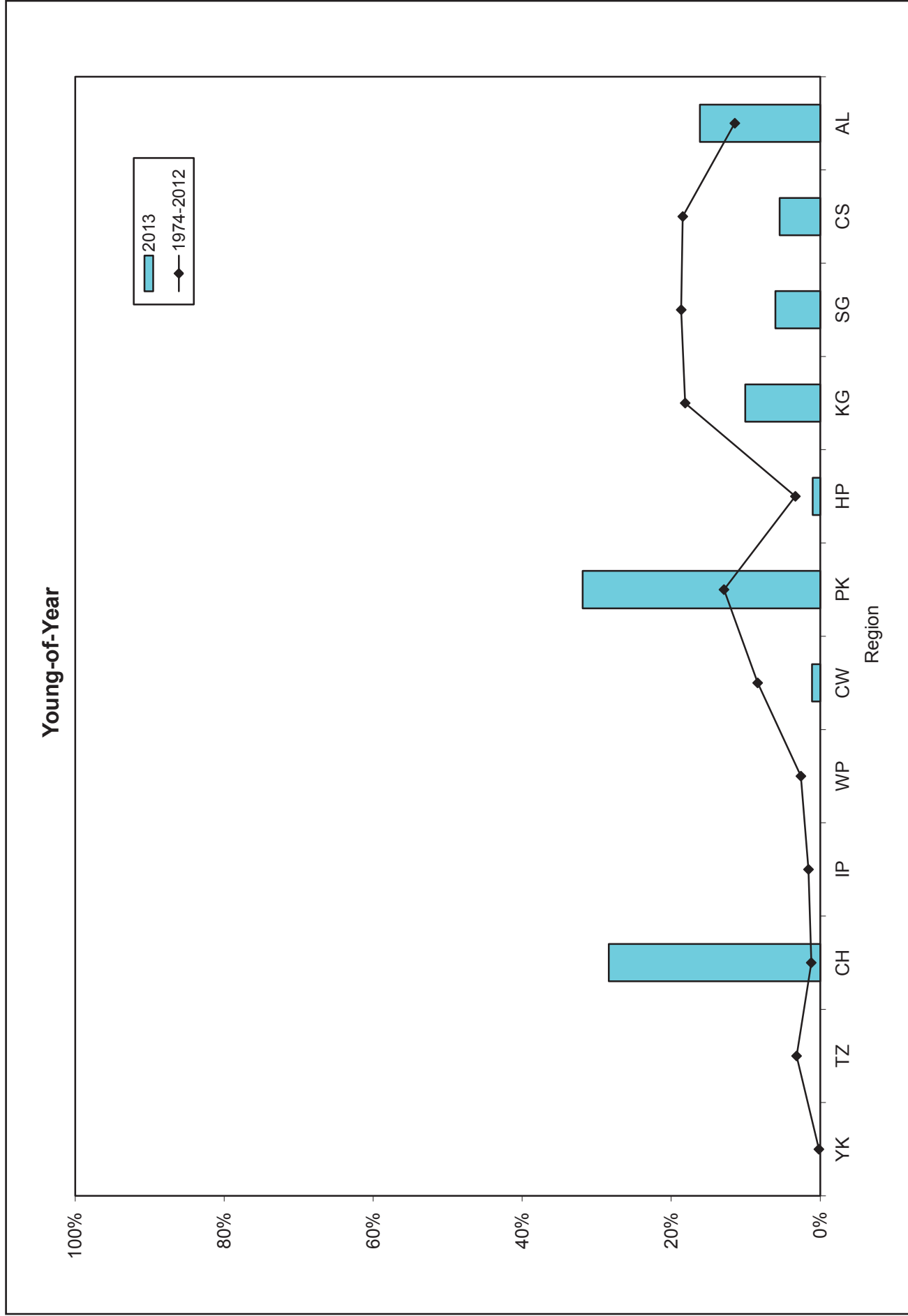


Figure 4-55. Geographic distribution indices for blueback herring collected during Beach Seine surveys of the Hudson River estuary, 1974-2013.

Blueback herring

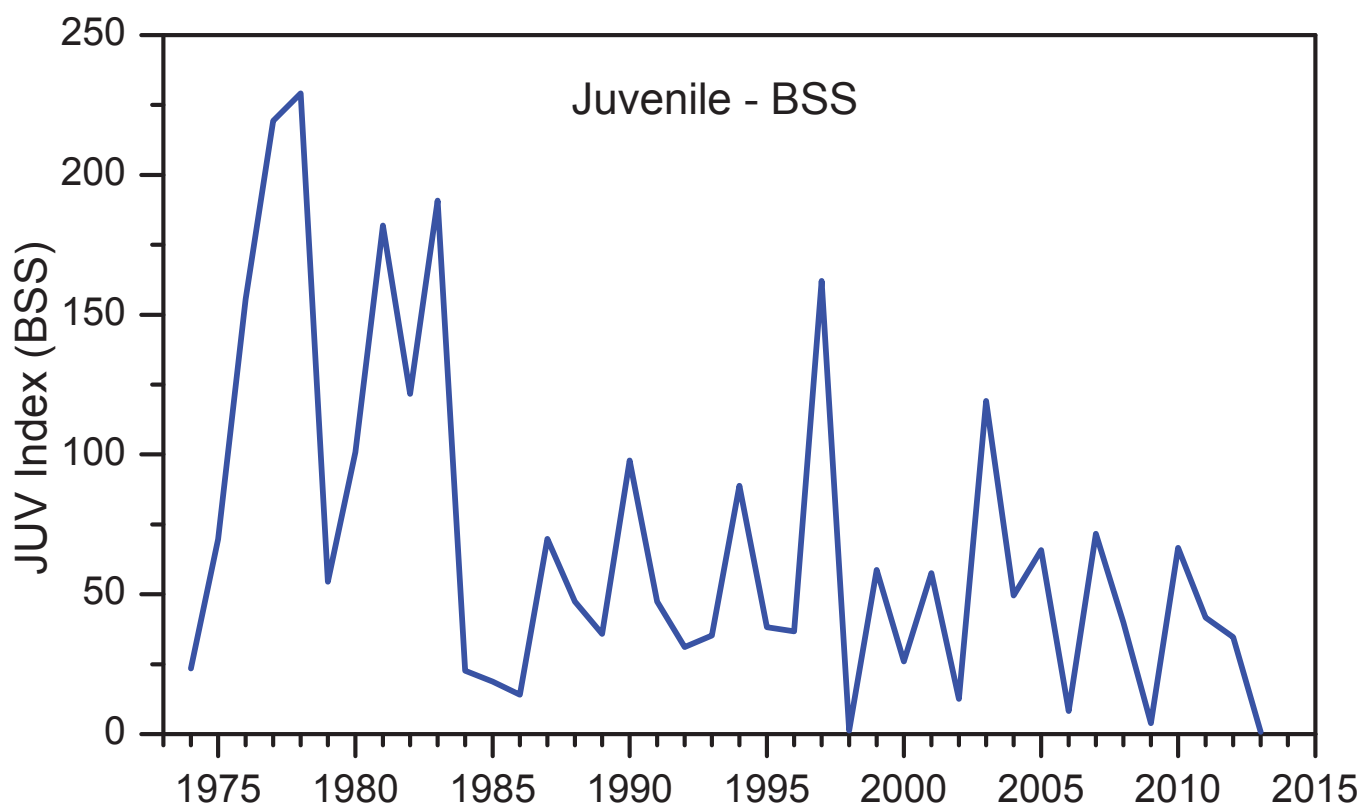
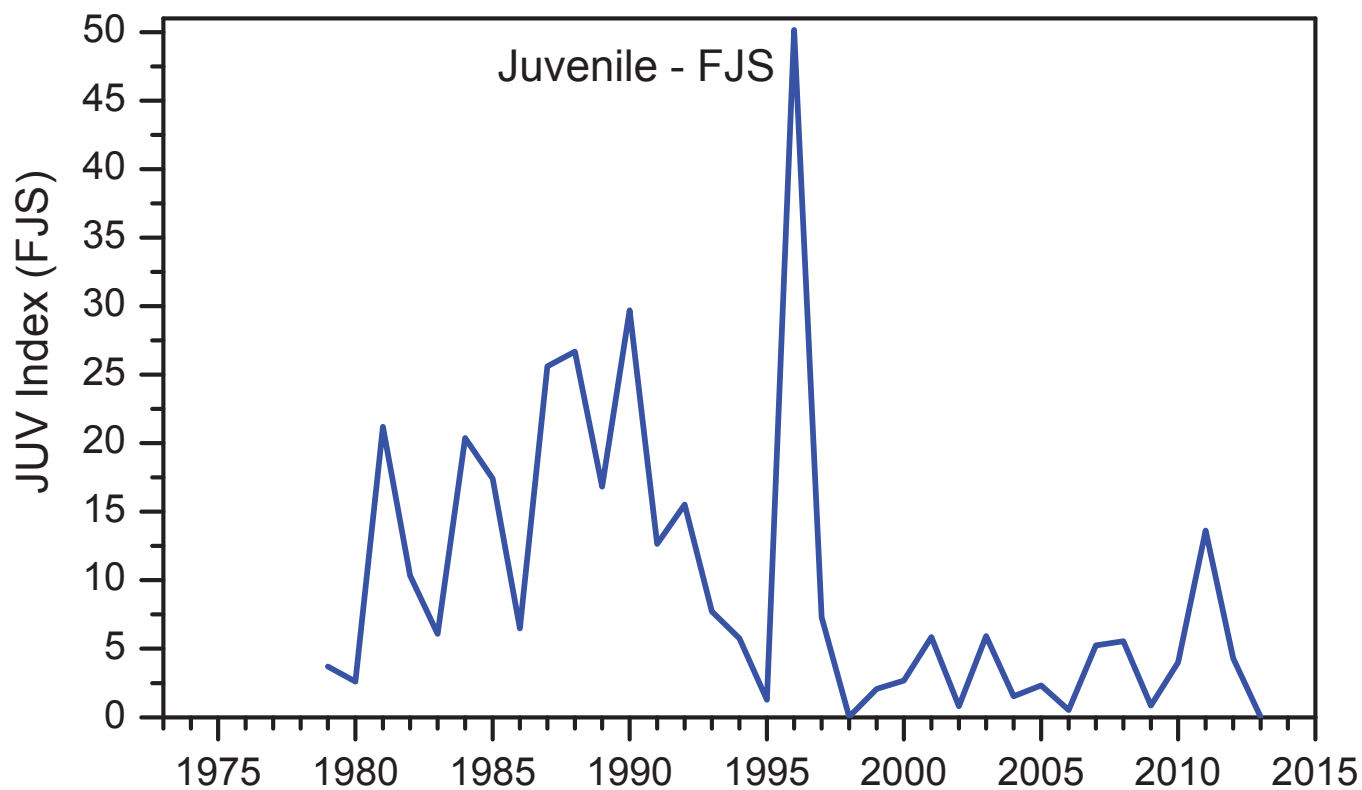


Figure 4-56. Blueback herring indices of annual abundance based on Fall Juvenile Survey, 1979-2013, and Beach Seine Survey, 1974-2013.

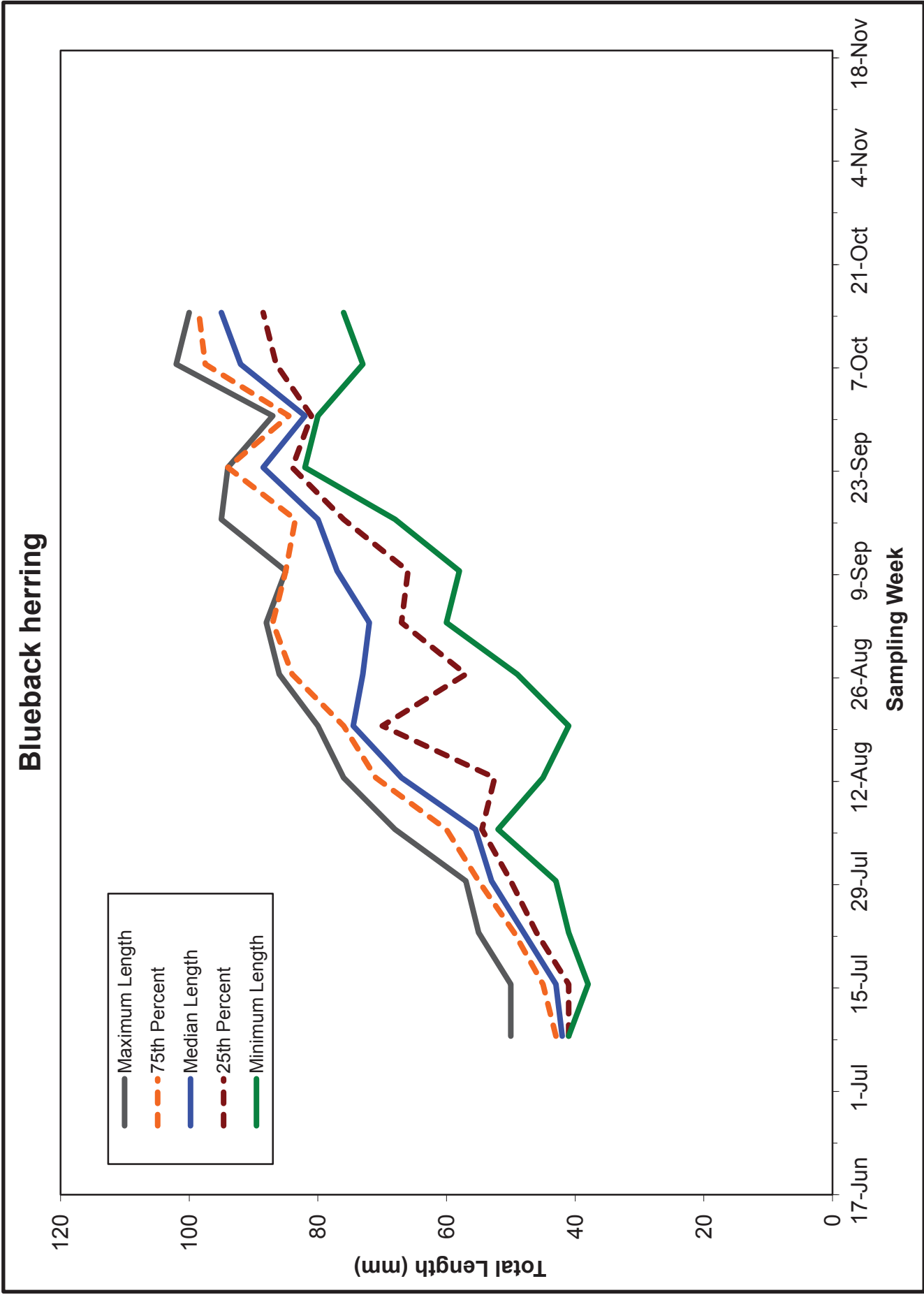


Figure 4-57. Weekly length statistics for young-of-year blueback herring in the Hudson River estuary, 2013.

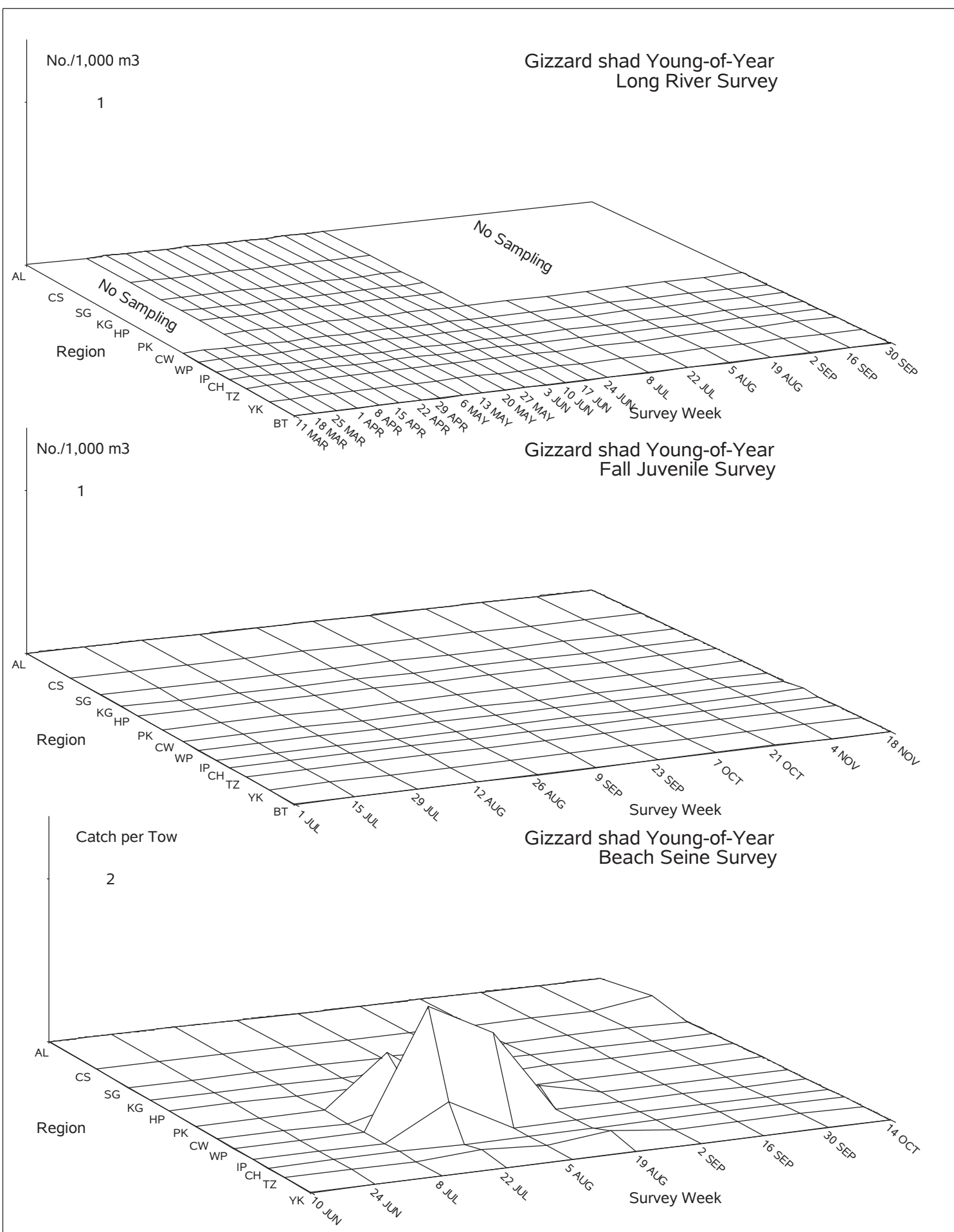


Figure 4-58. Spatiotemporal distribution of young-of-year gizzard shad in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

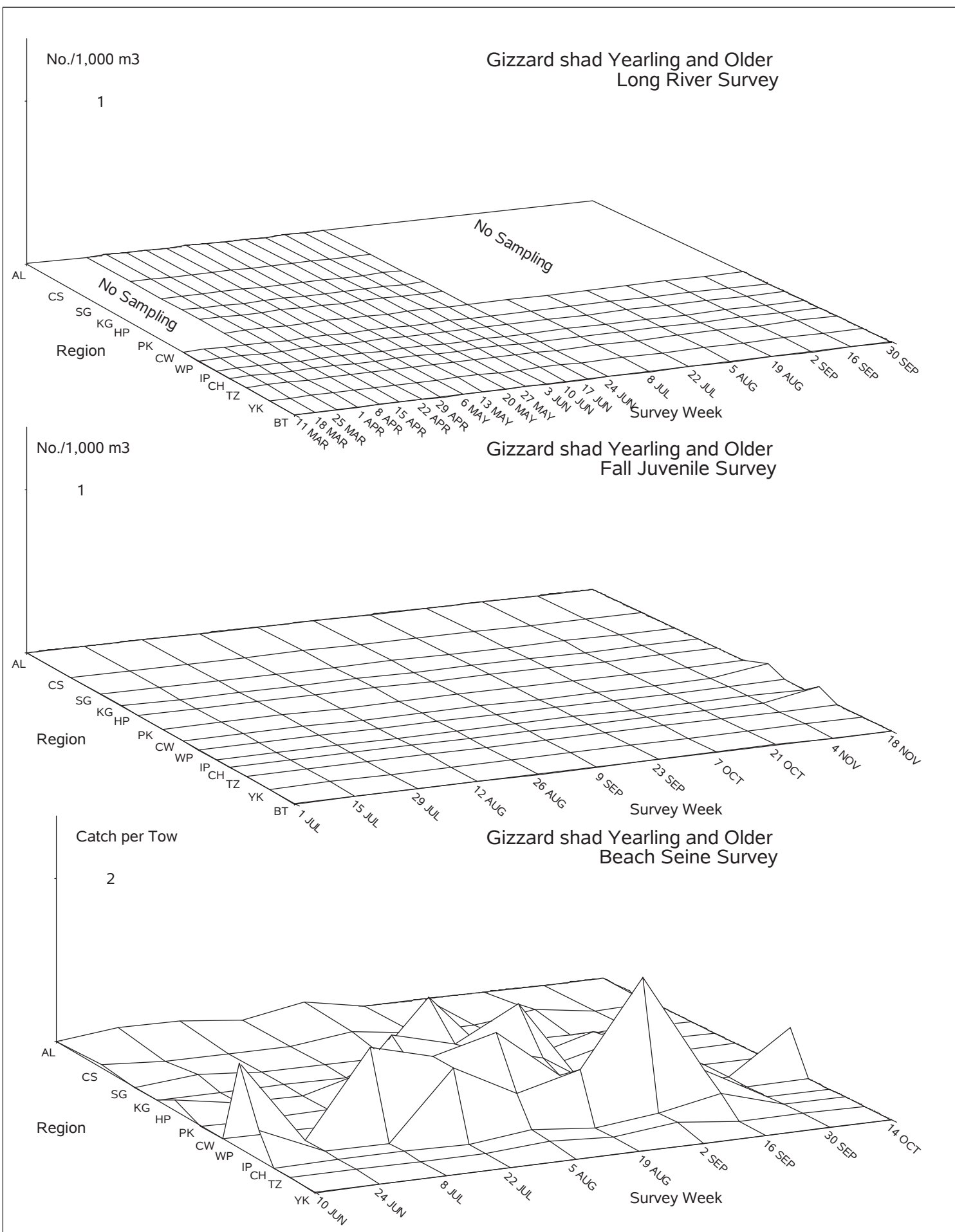


Figure 4-59. Spatiotemporal distribution of yearling and older gizzard shad in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

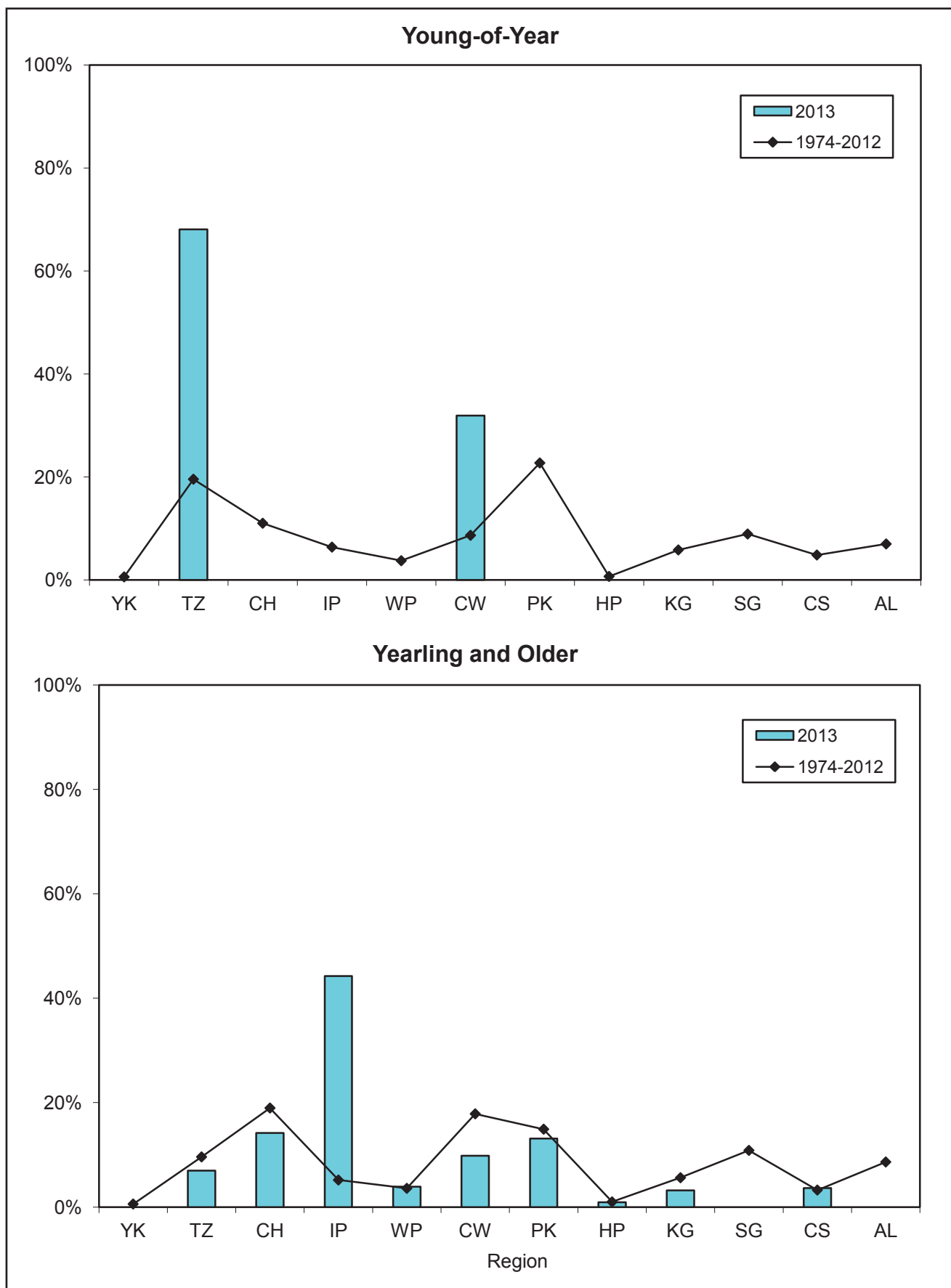


Figure 4-60. Geographic distribution indices for gizzard shad collected during Beach Seine surveys of the Hudson River estuary, 1974-2013.

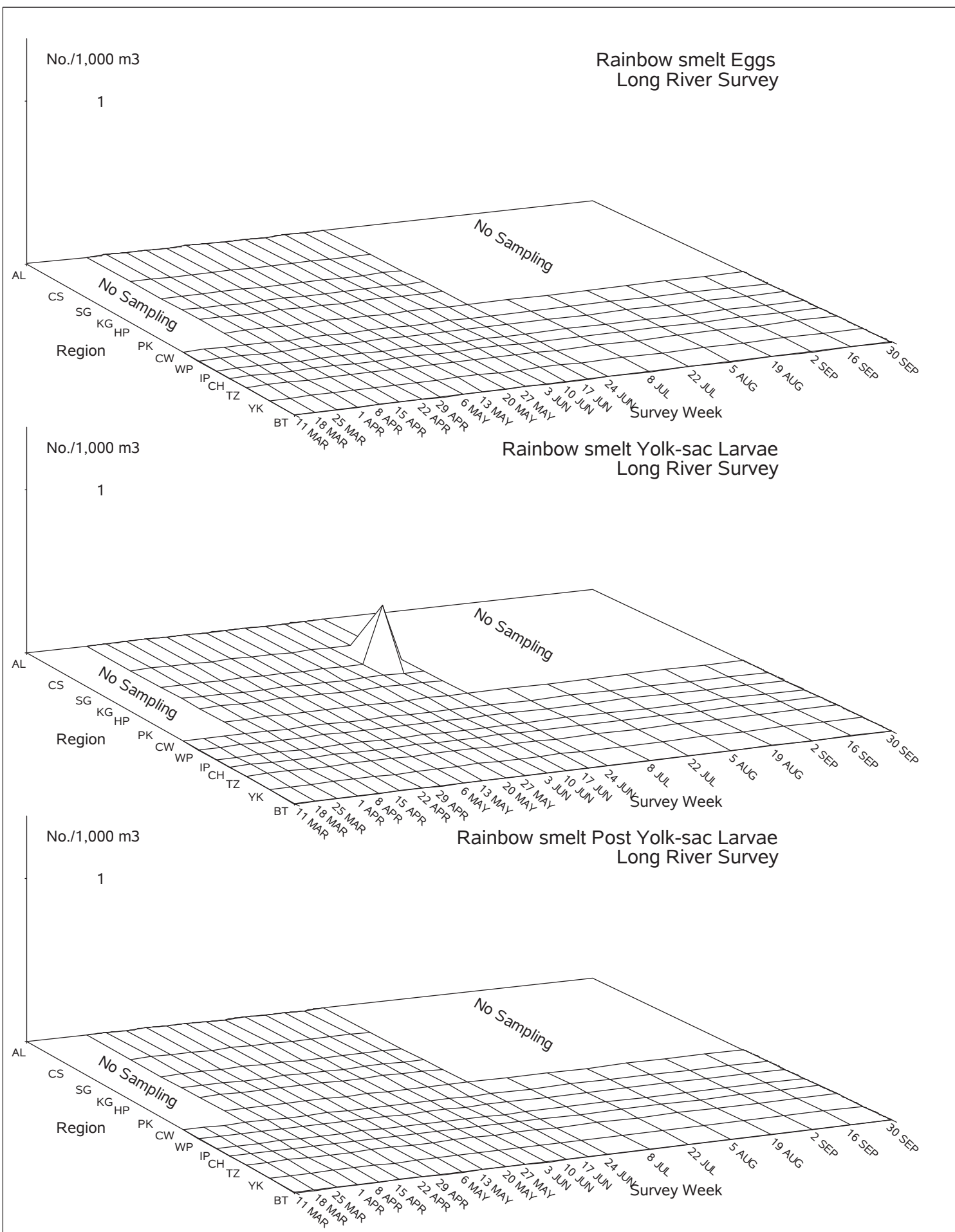


Figure 4-61. Spatiotemporal distribution of eggs, yolk-sac, and post yolk-sac larval rainbow smelt in the Hudson River estuary based on the 2013 Long River Survey.

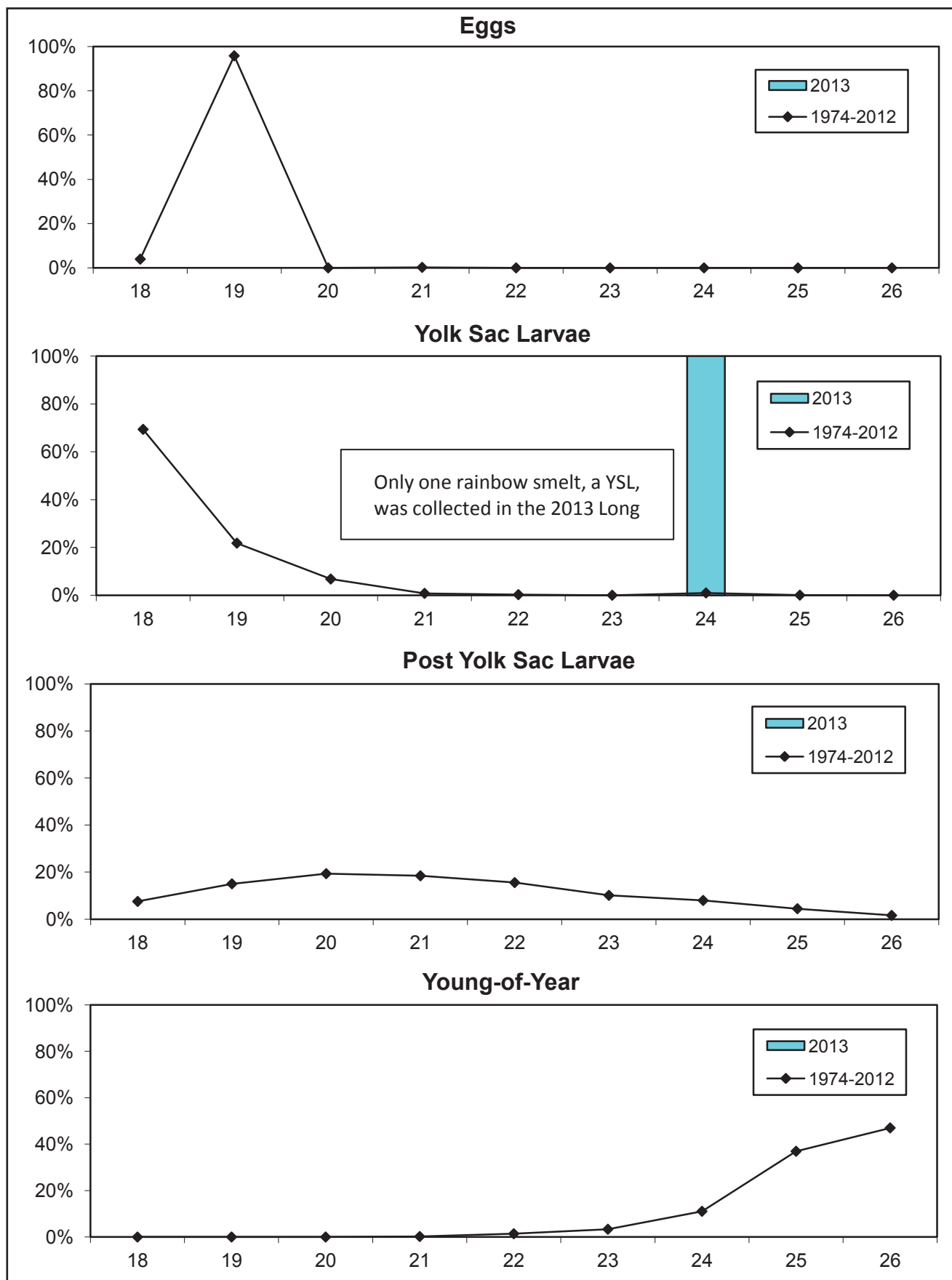


Figure 4-62. Temporal distribution indices for rainbow smelt collected during Long River surveys of the Hudson River estuary, 1974-2013.

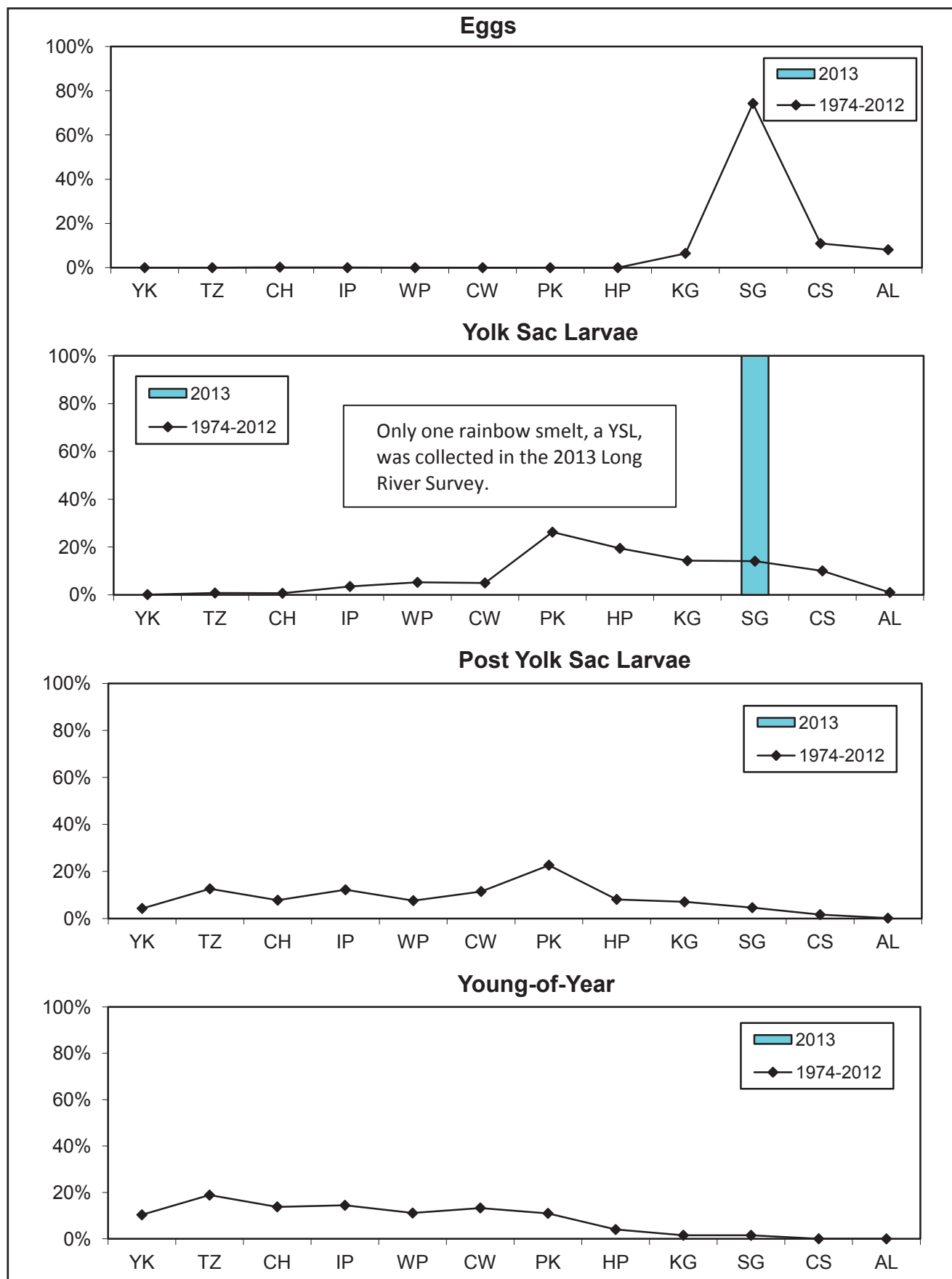


Figure 4-63. Geographic distribution indices for rainbow smelt collected during Long River surveys of the Hudson River estuary, 1974-2013.

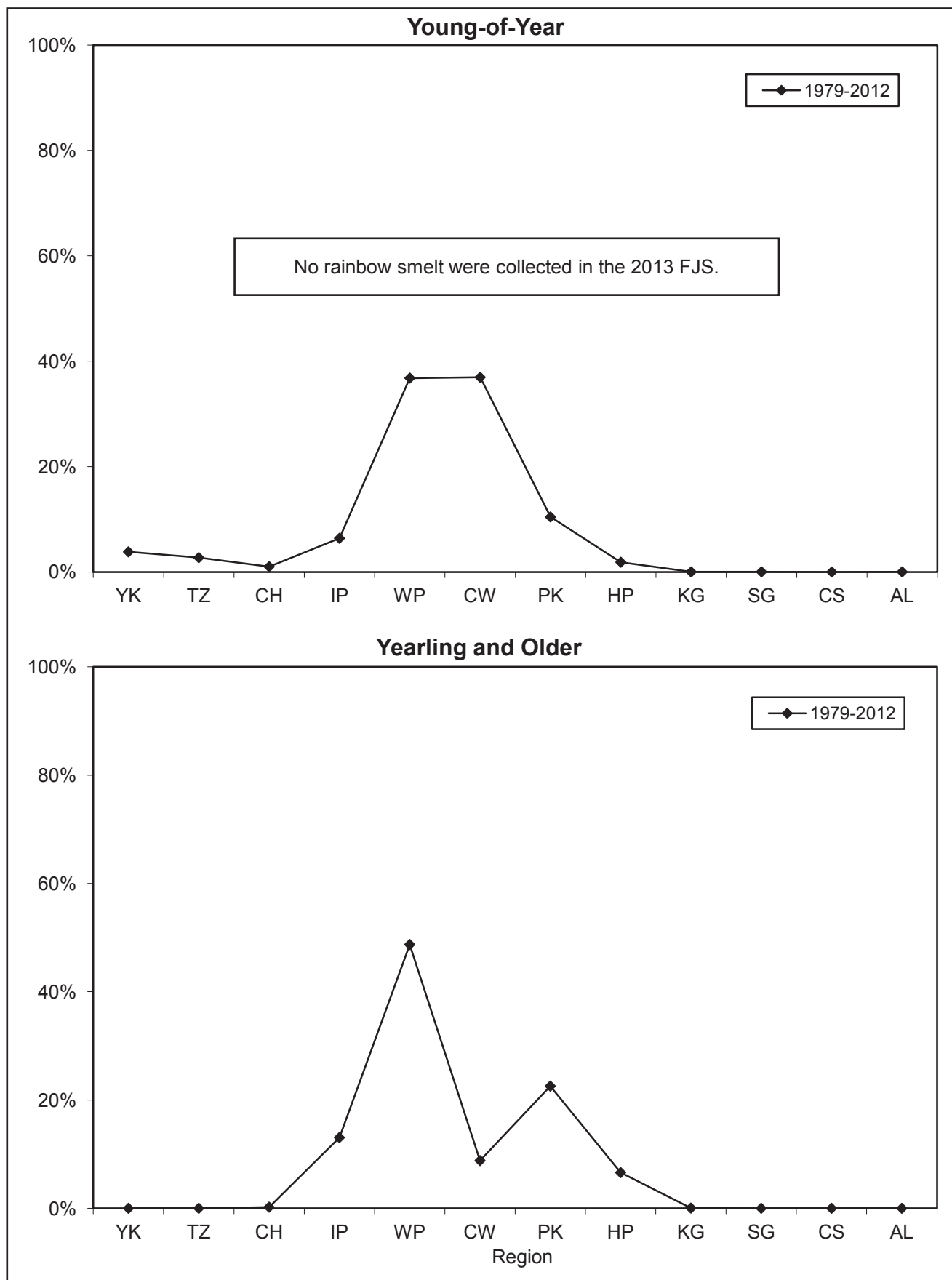


Figure 4-64. Geographic distribution indices for rainbow smelt collected during Fall Juvenile surveys of the Hudson River estuary, 1979-2013.

Rainbow smelt

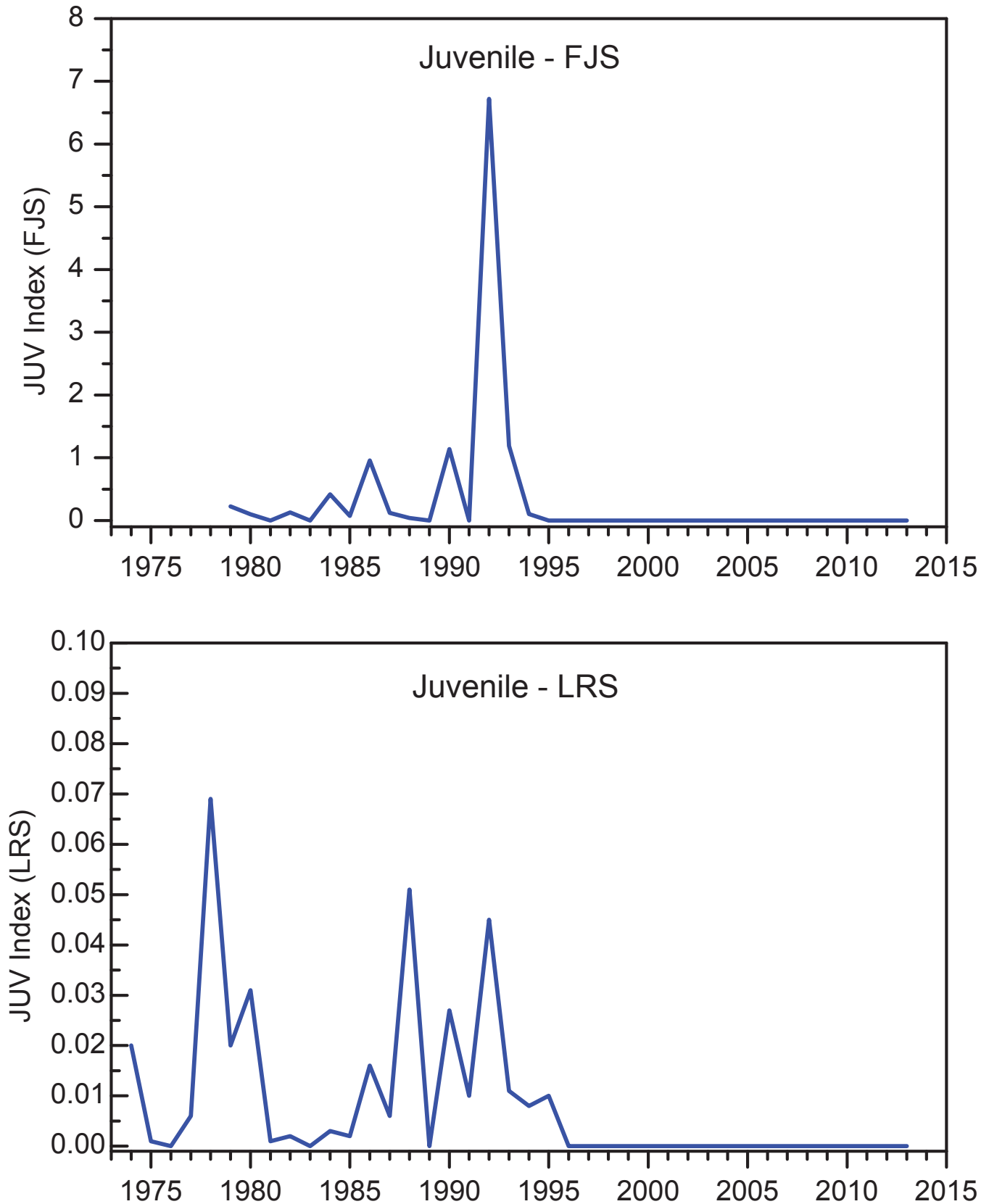


Figure 4-65. Rainbow smelt indices of annual abundance based on Fall Juvenile Survey, 1979-2013, and Long River Survey, 1974-2013.

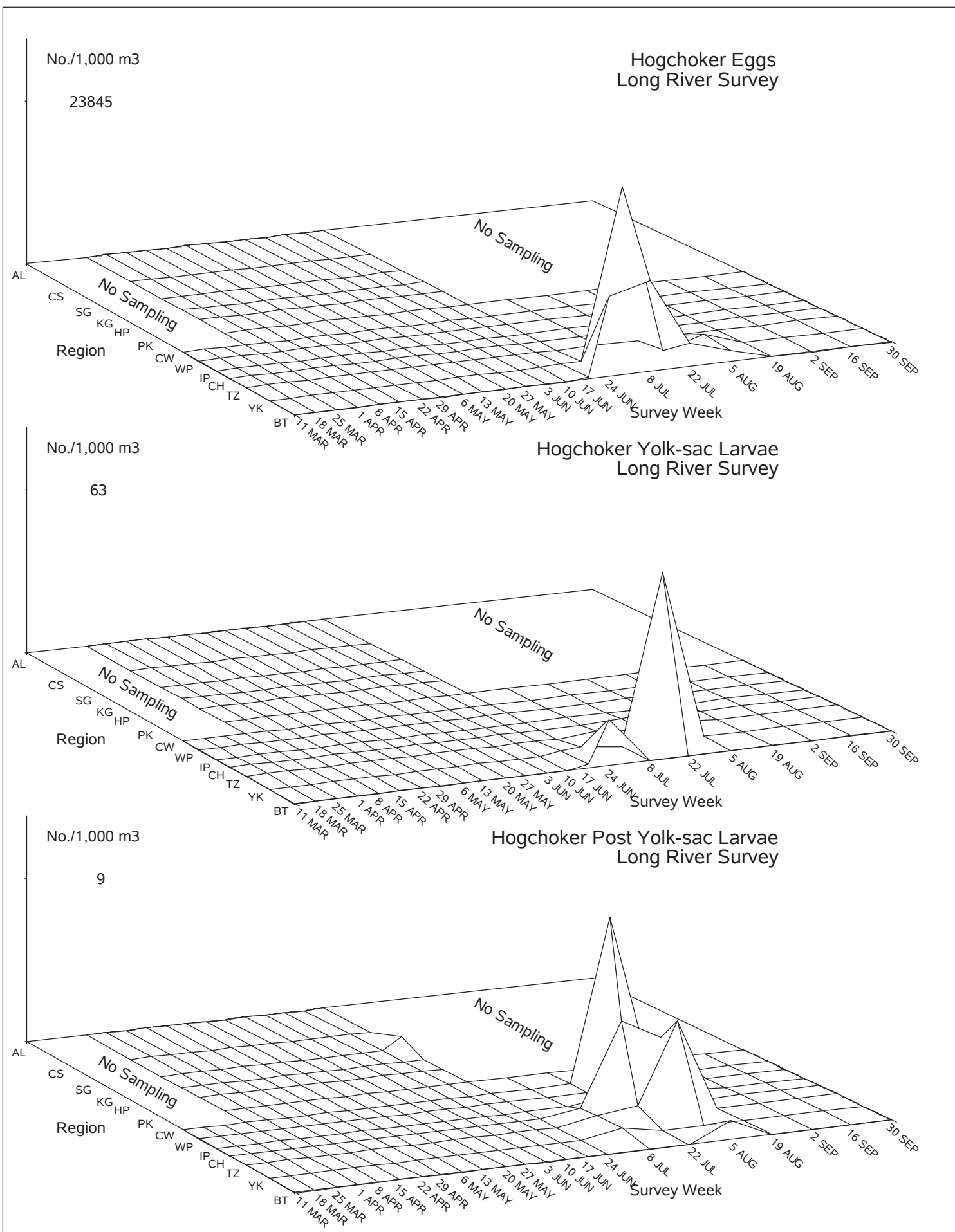


Figure 4-66. Spatiotemporal distribution of eggs, yolk-sac, and post yolk-sac larval hogchoker in the Hudson River estuary based on the 2013 Long River Survey.

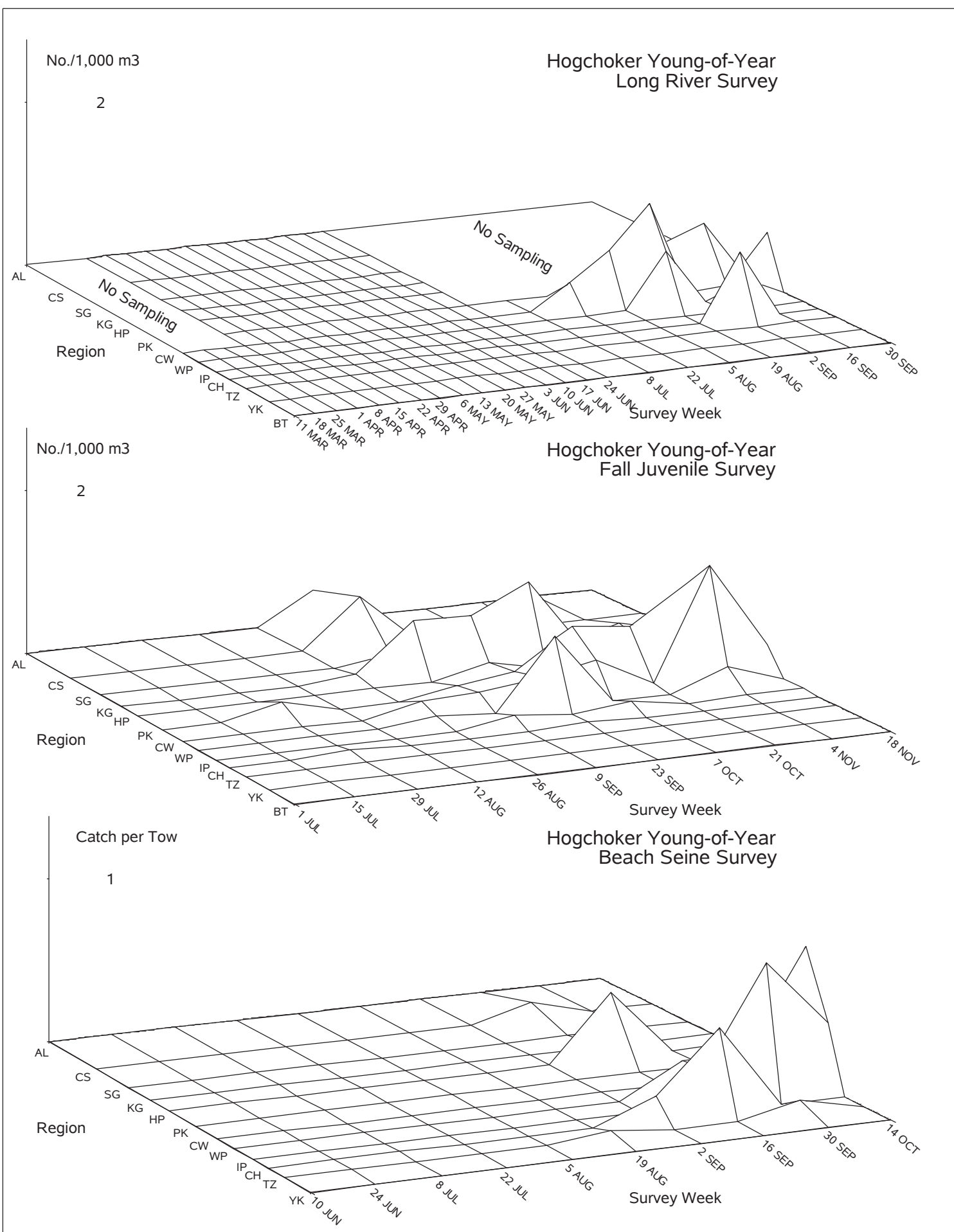


Figure 4-67. Spatiotemporal distribution of young-of-year hogchoker in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

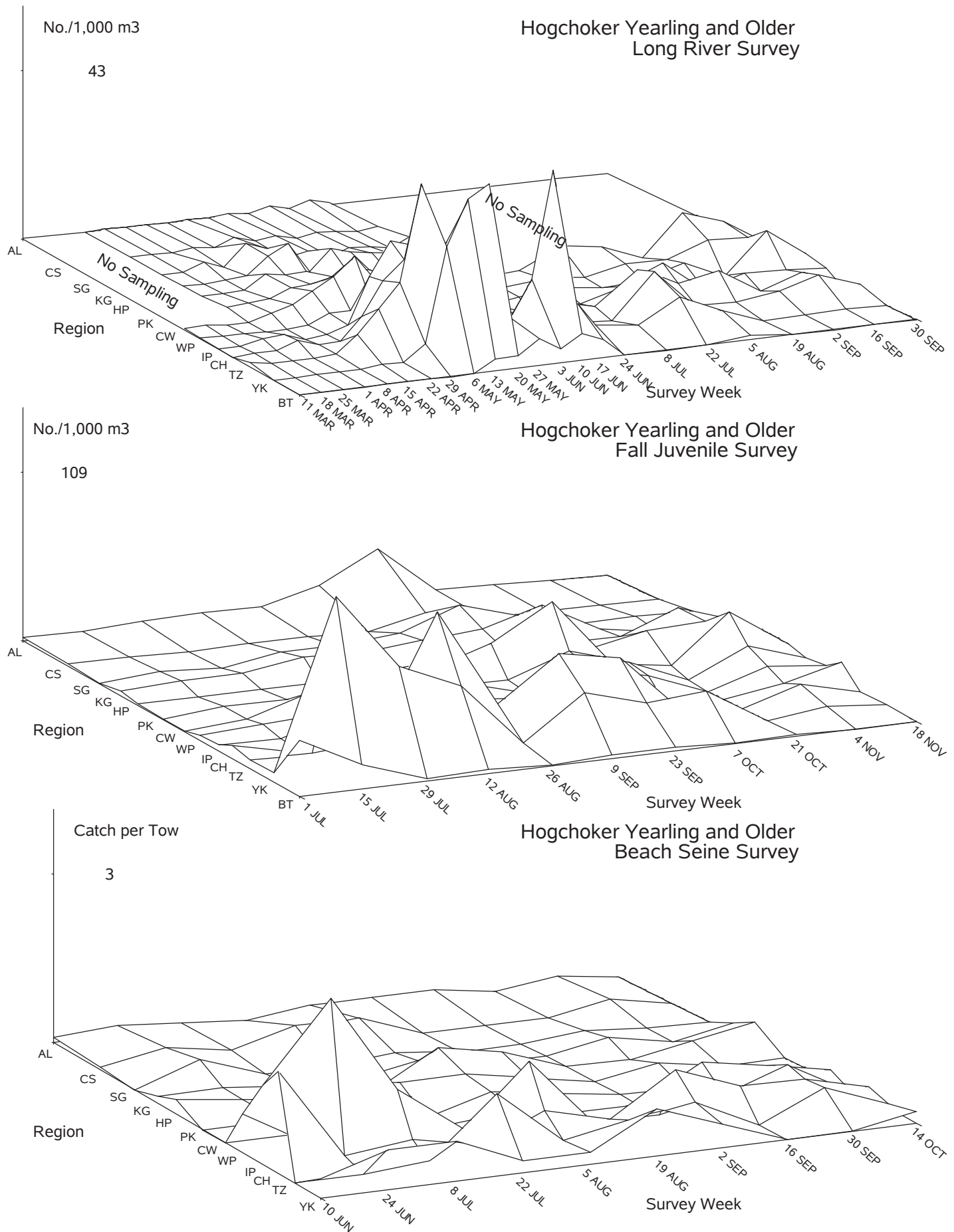


Figure 4-68. Spatiotemporal distribution of yearling and older hogchoker in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

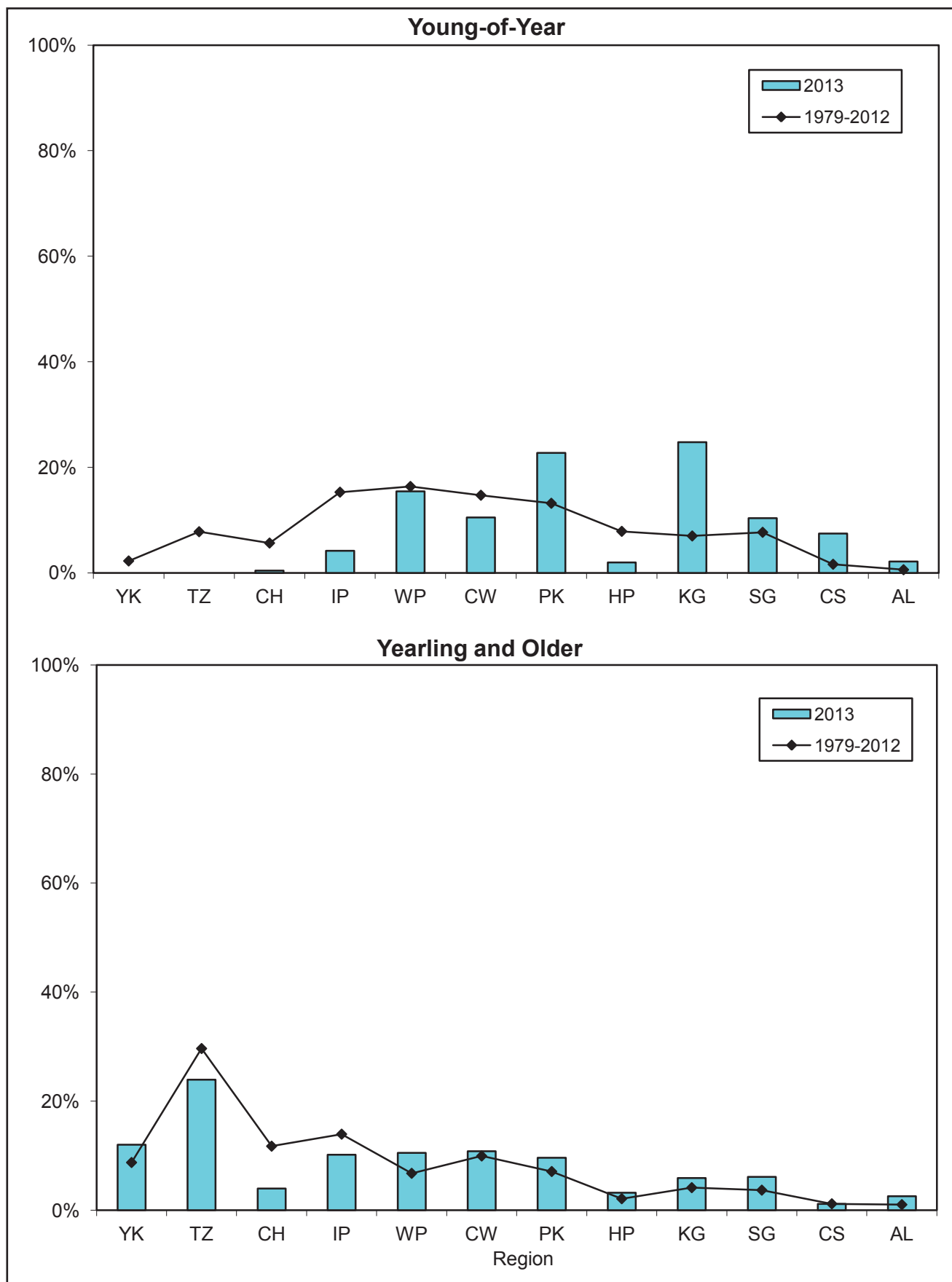


Figure 4-69. Geographic distribution indices for hogchoker collected during Fall Juvenile surveys of the Hudson River estuary, 1979-2013.

Hogchoker

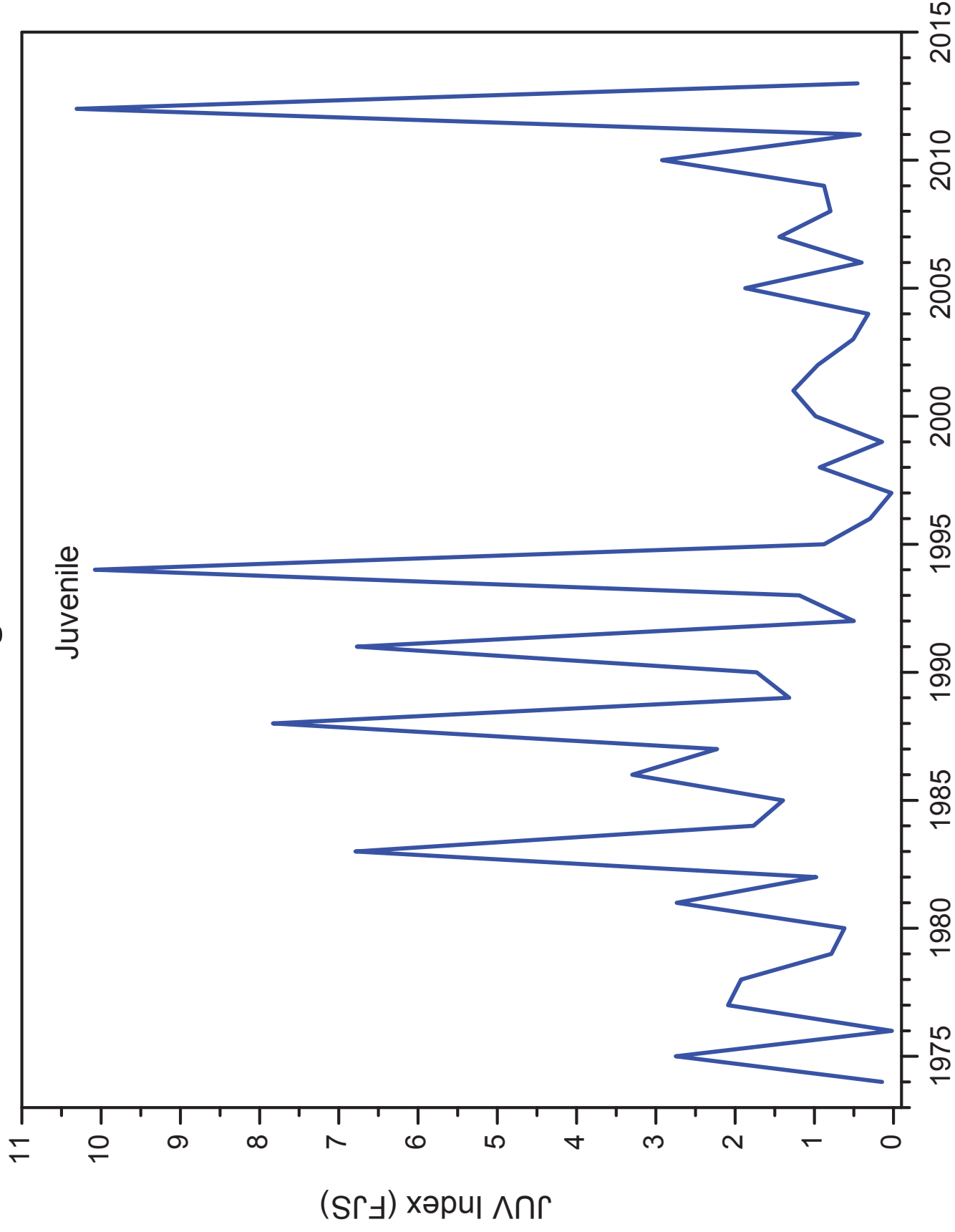


Figure 4-70. Hogchoker indices of annual abundance based on Fall Juvenile Survey, 1974-2013.

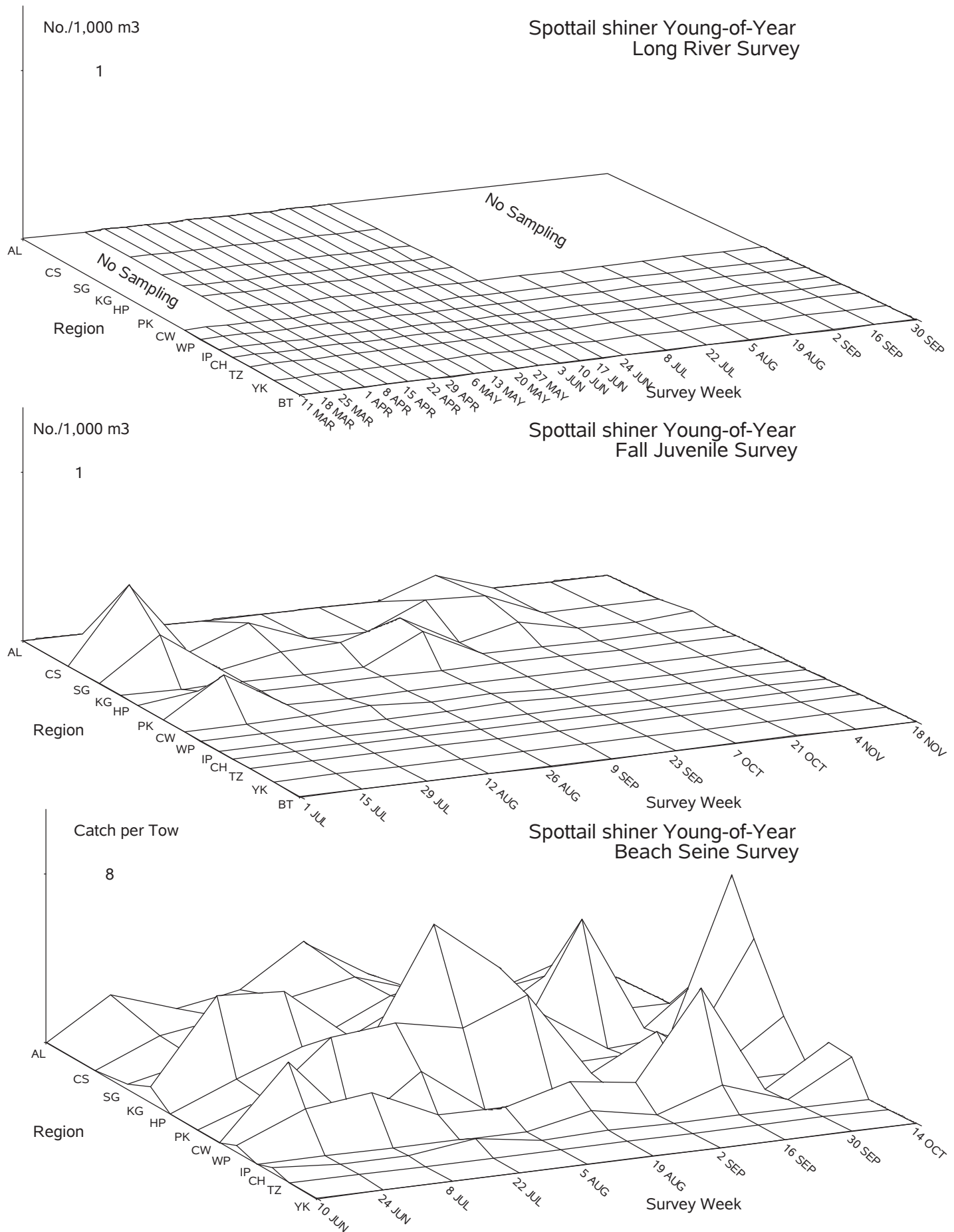


Figure 4-71. Spatiotemporal distribution of young-of-year spottail shiner in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

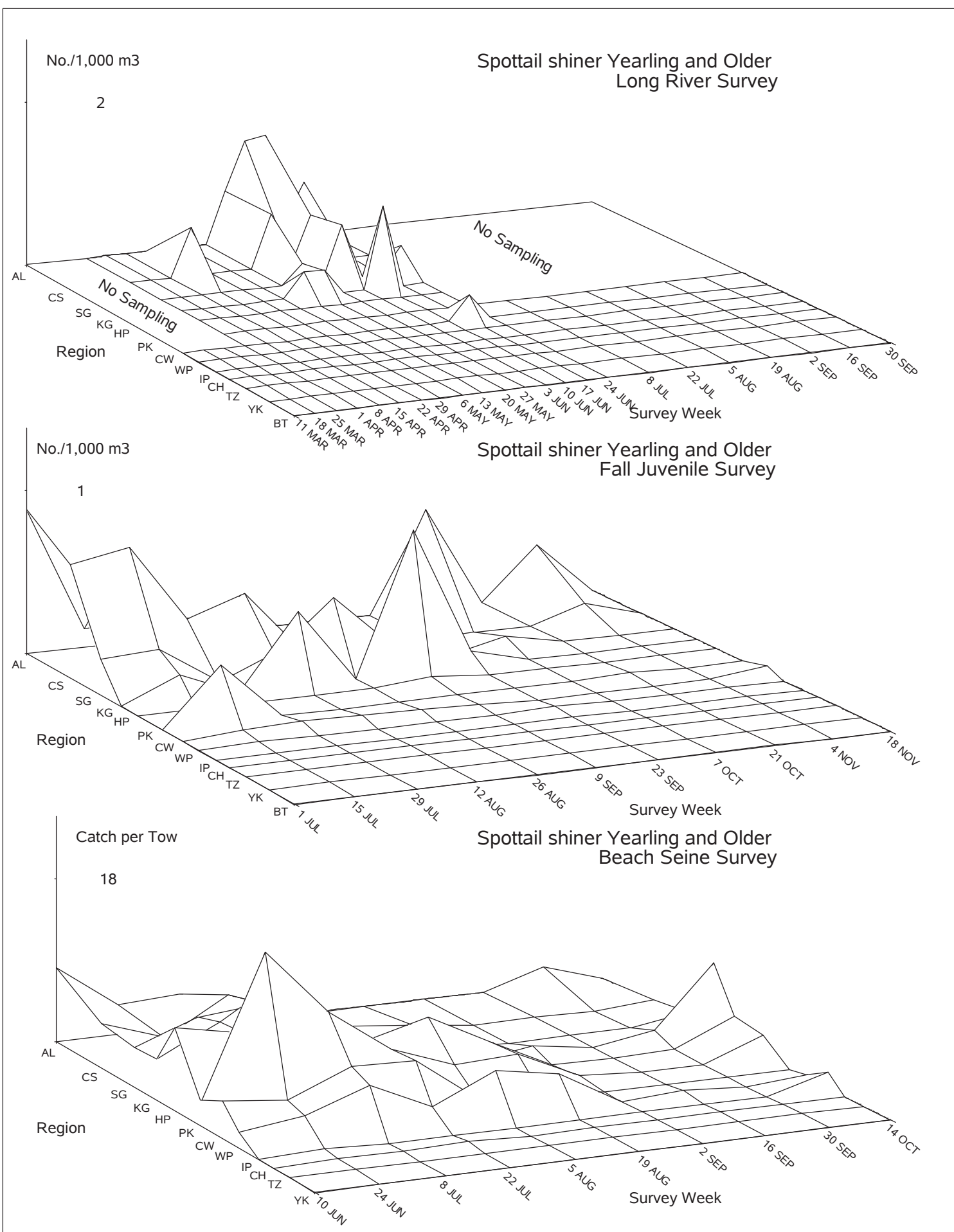


Figure 4-72. Spatiotemporal distribution of yearling and older spottail shiner in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

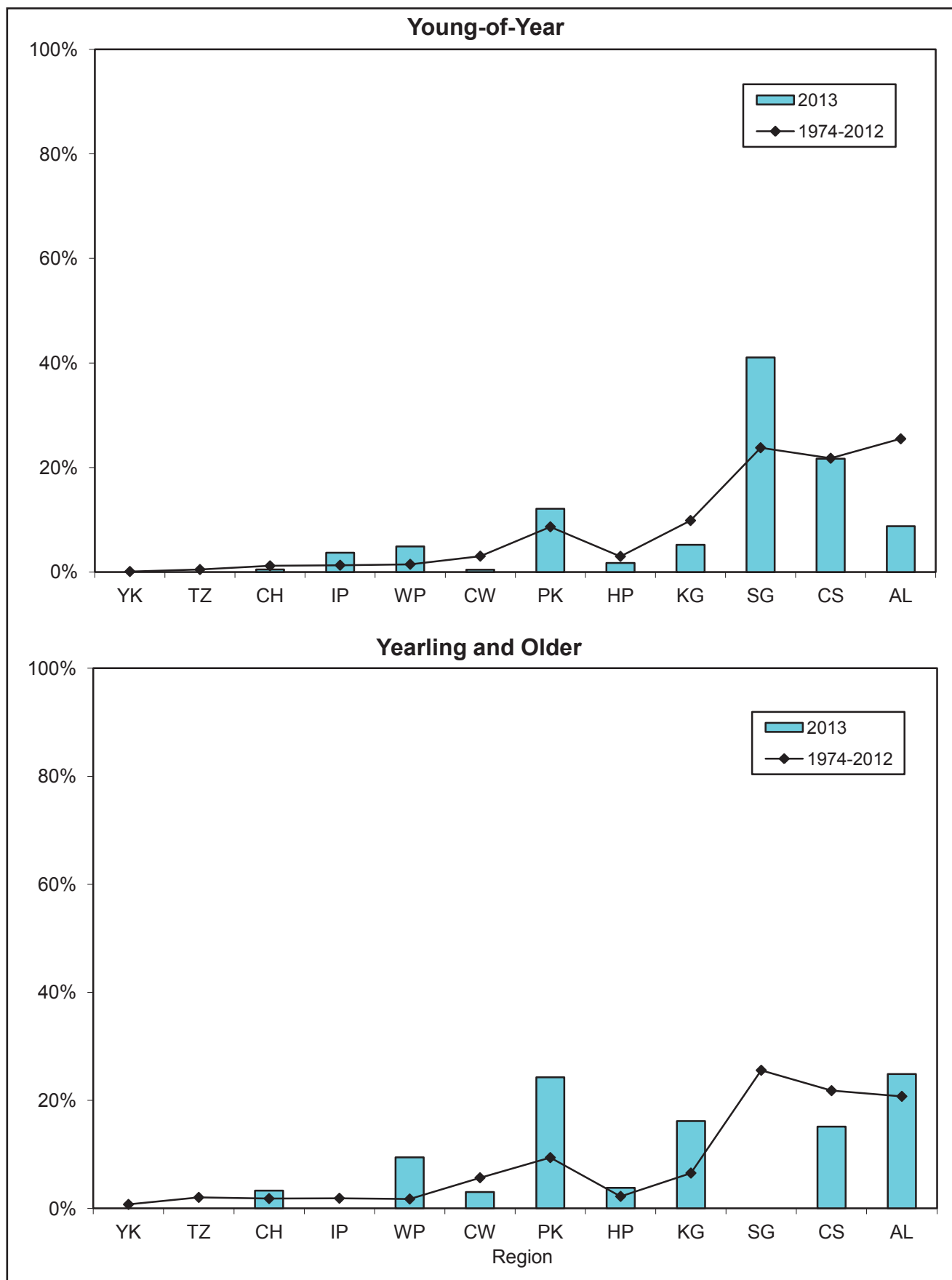


Figure 4-73. Geographic distribution indices for spottail shiner collected during Beach Seine surveys of the Hudson River estuary, 1974-2013.

Spottail shiner

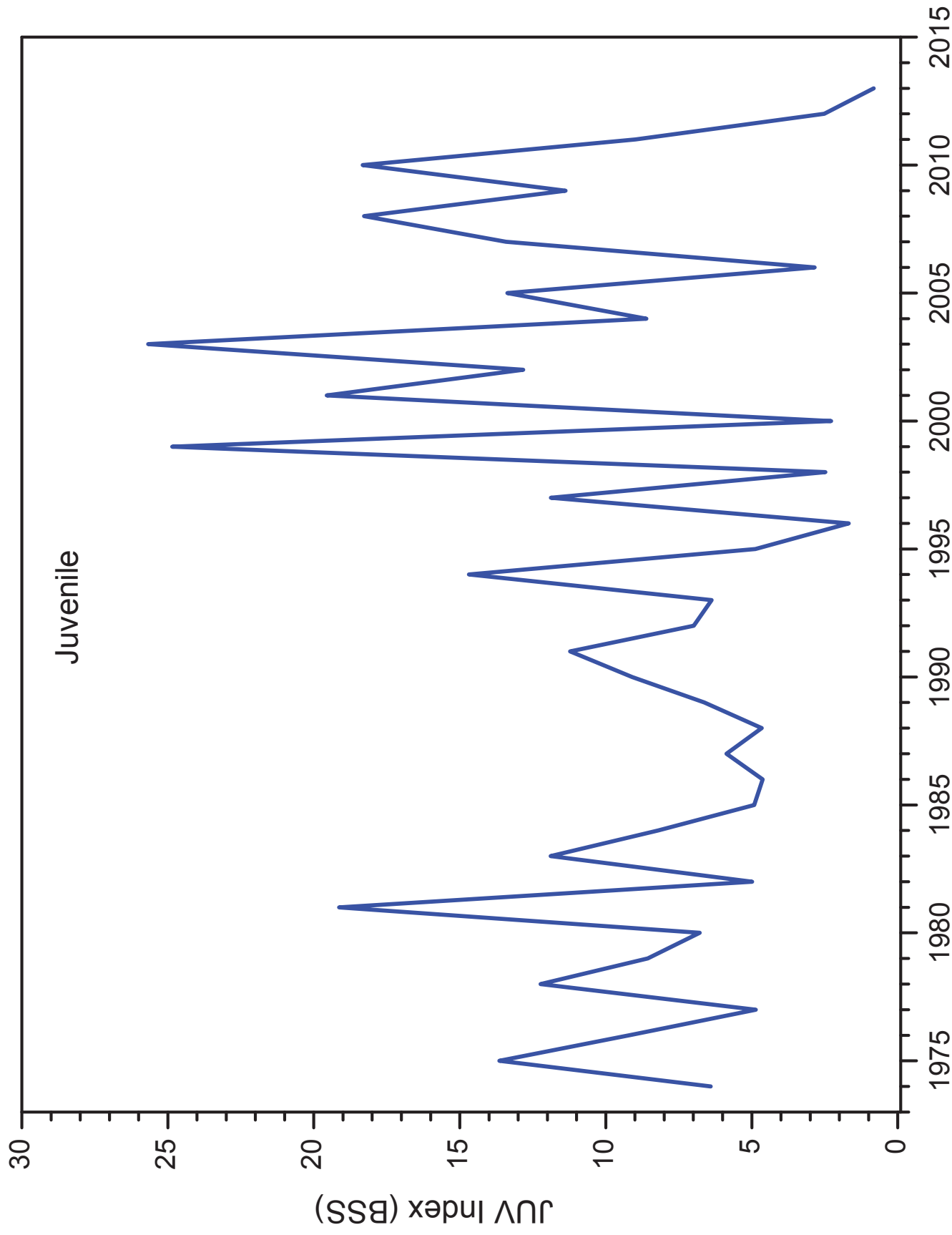


Figure 4-74. Spottail shiner indices of annual abundance based on Beach Seine Survey, 1974-2013.

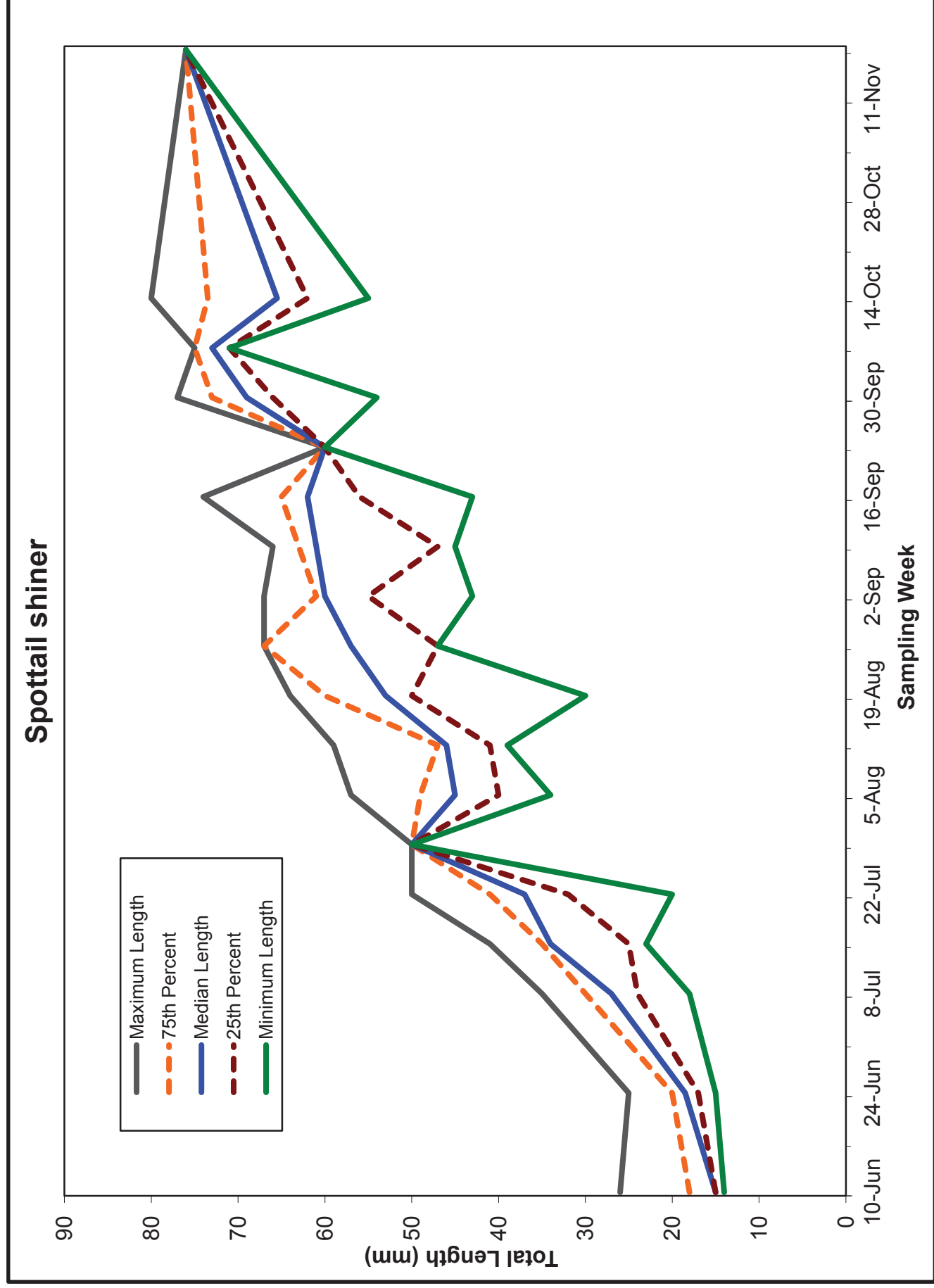


Figure 4-75. Weekly length statistics for young-of-year spottail shiner in the Hudson River estuary, 2013.

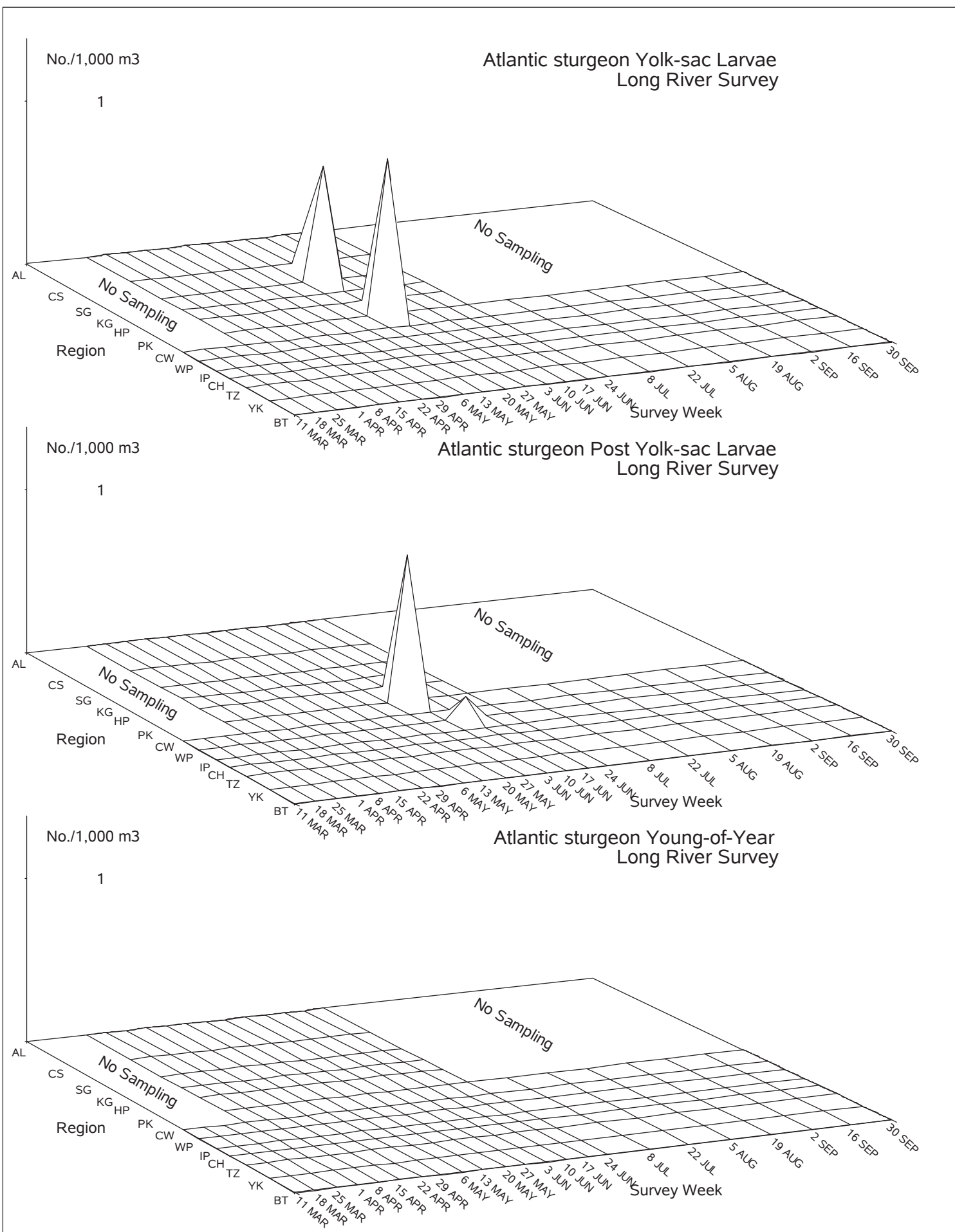


Figure 4-76. Spatiotemporal distribution of yolk-sac, post yolk-sac larval, and young-of-year Atlantic sturgeon in the Hudson River estuary based on the 2013 Long River Survey.

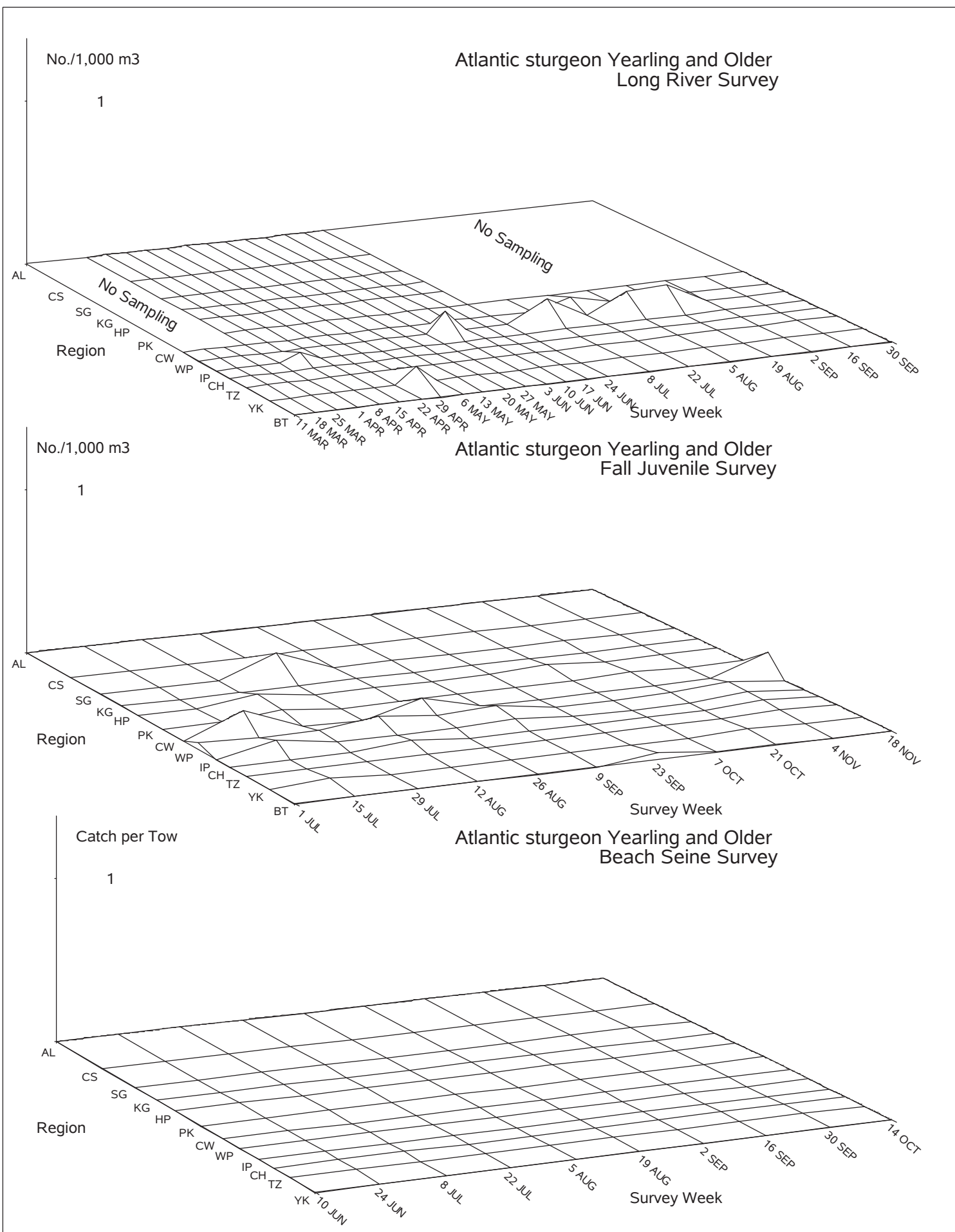


Figure 4-77. Spatiotemporal distribution of yearling and older Atlantic sturgeon in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

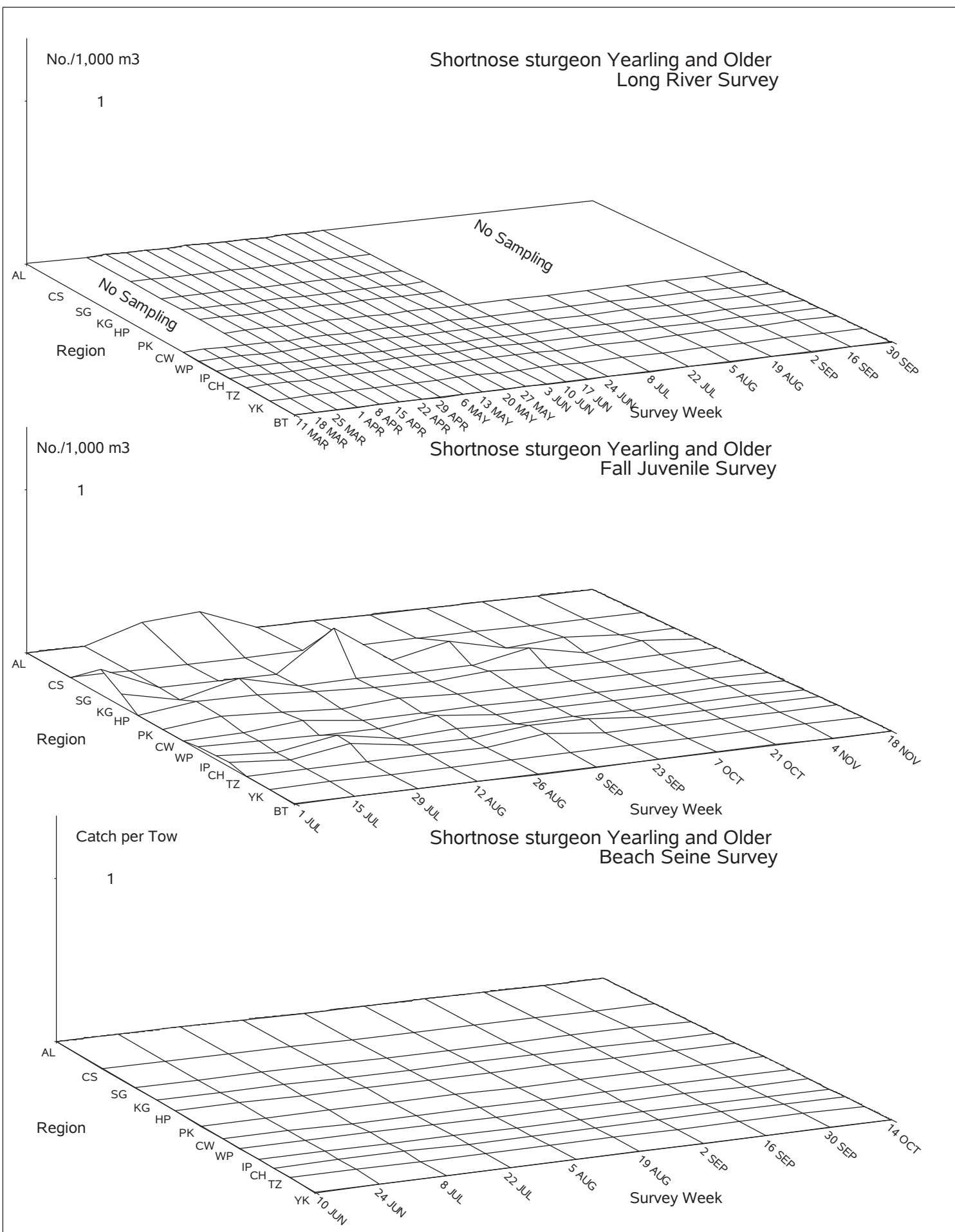


Figure 4-78. Spatiotemporal distribution of yearling and older shortnose sturgeon in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

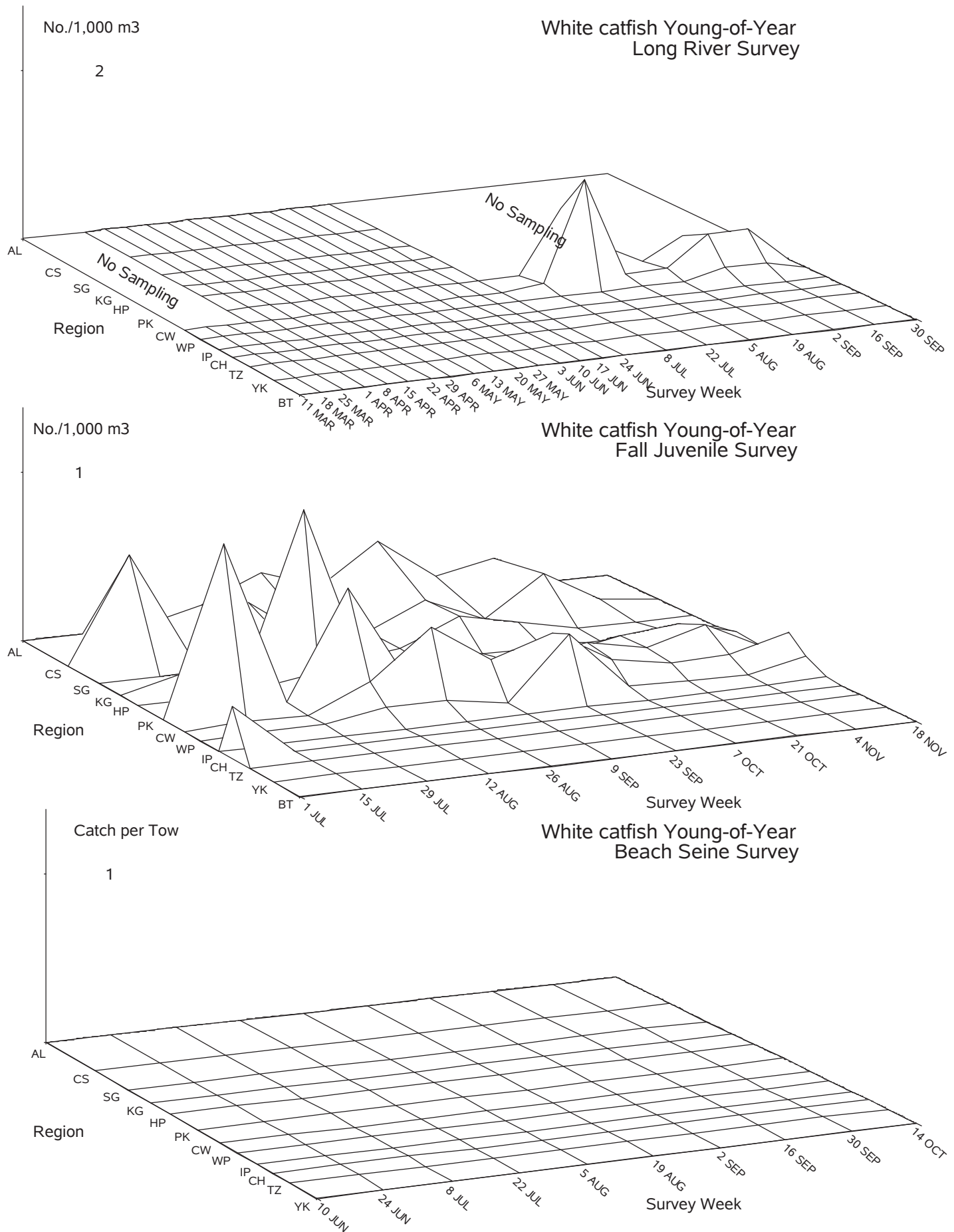


Figure 4-79. Spatiotemporal distribution of young-of-year white catfish in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

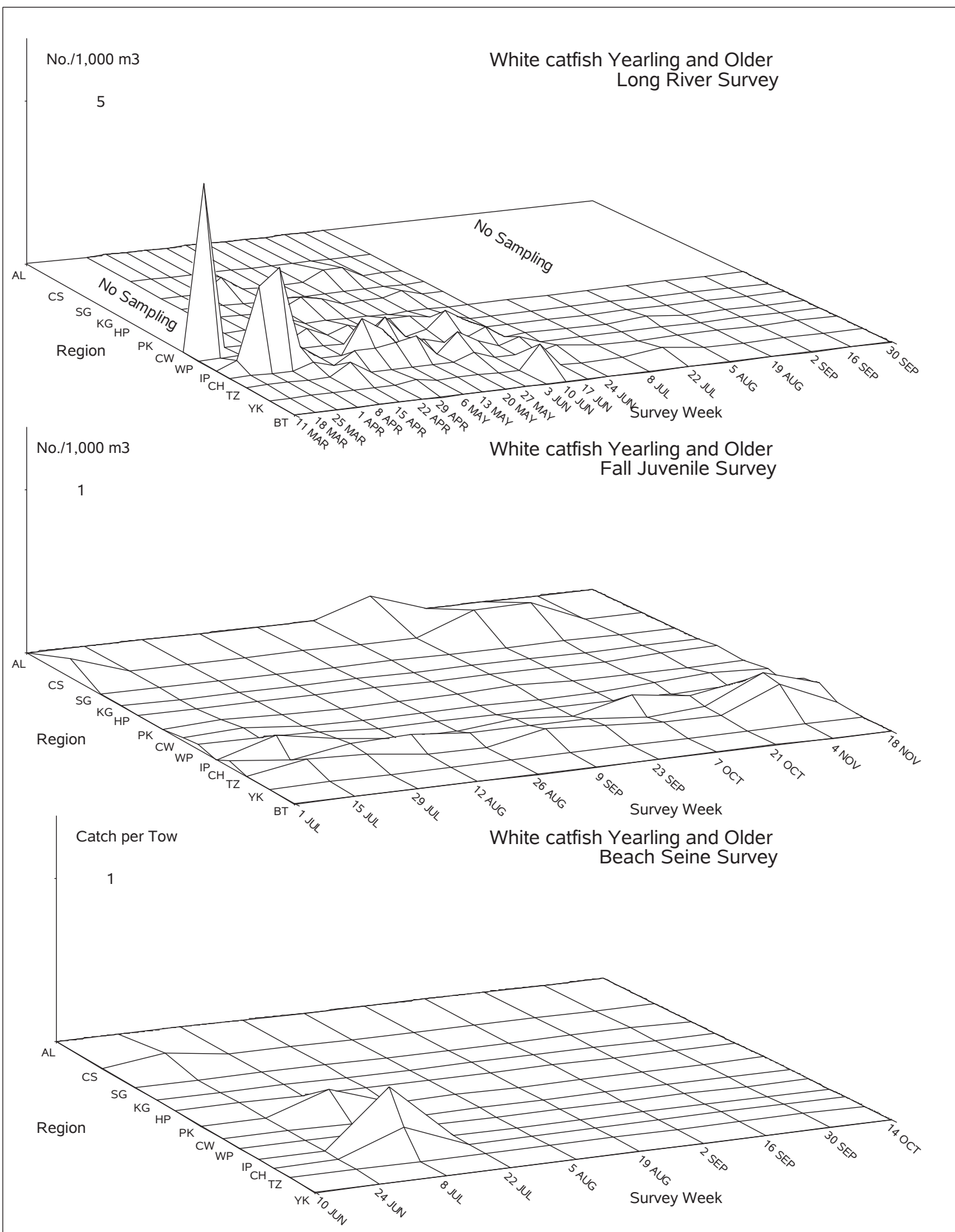


Figure 4-80. Spatiotemporal distribution of yearling and older white catfish in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

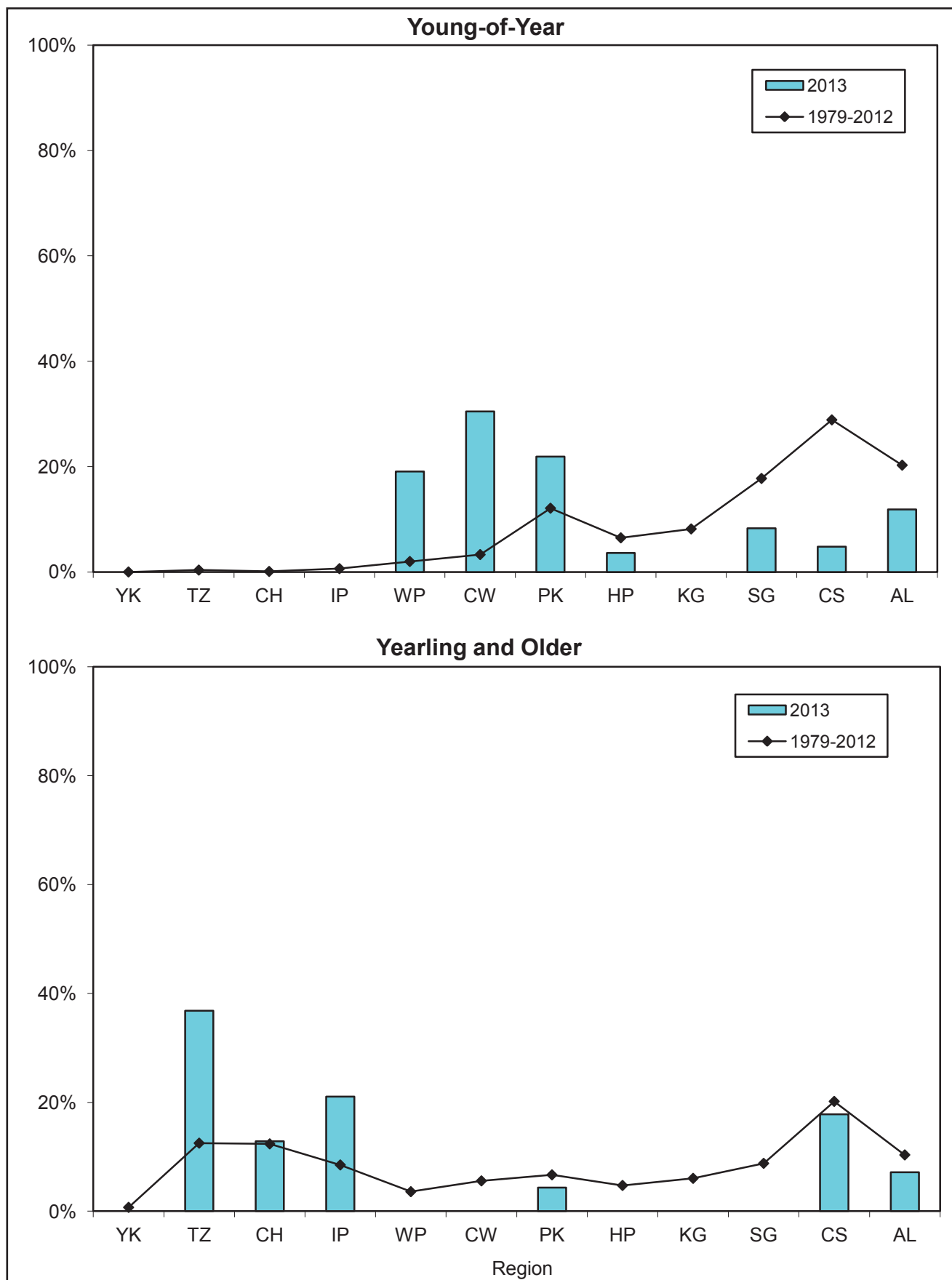


Figure 4-81. Geographic distribution indices for white catfish collected during Fall Juvenile surveys of the Hudson River estuary, 1979-2013.

White catfish

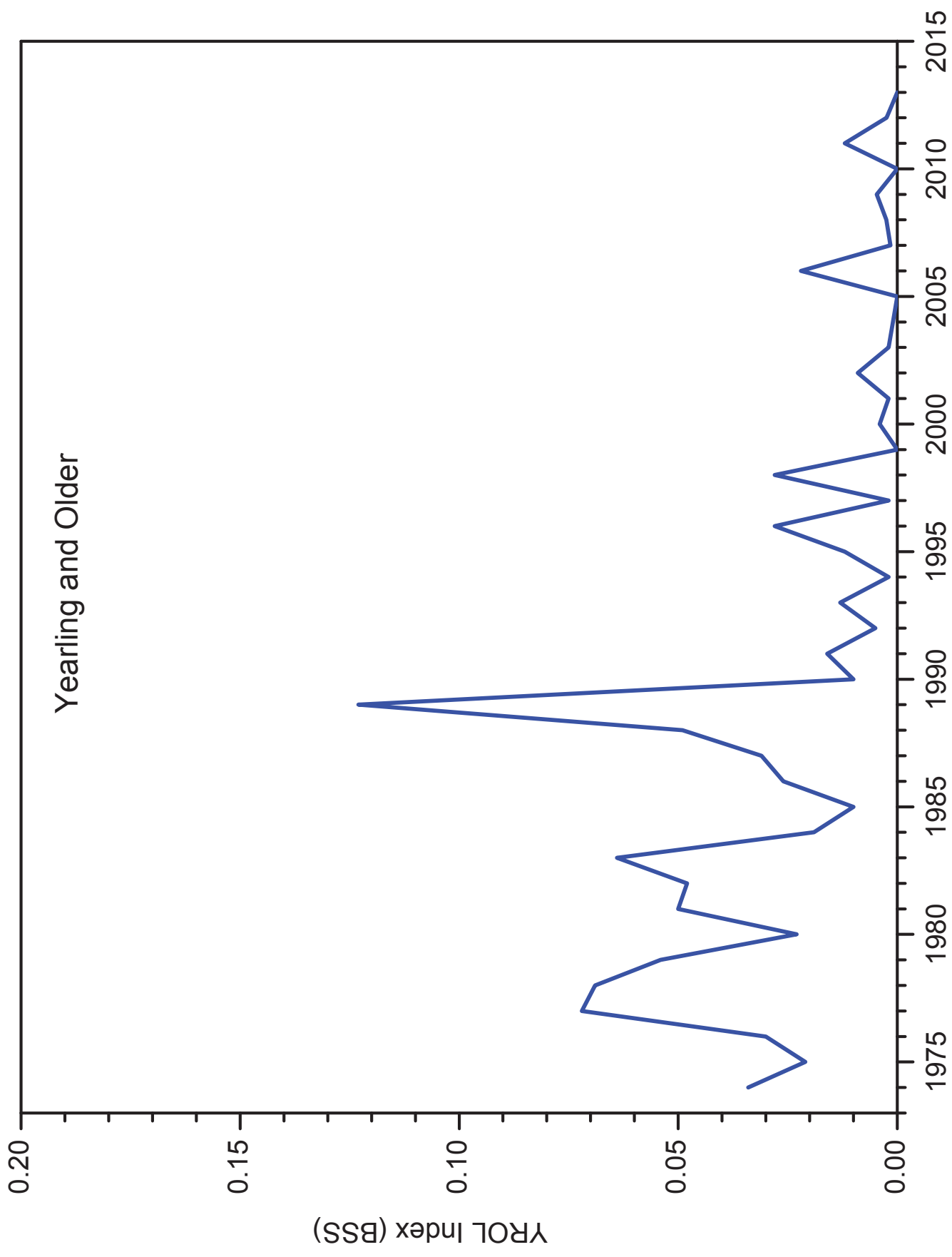


Figure 4-82. White catfish indices of annual abundance based on Beach Seine Survey, 1974-2013.

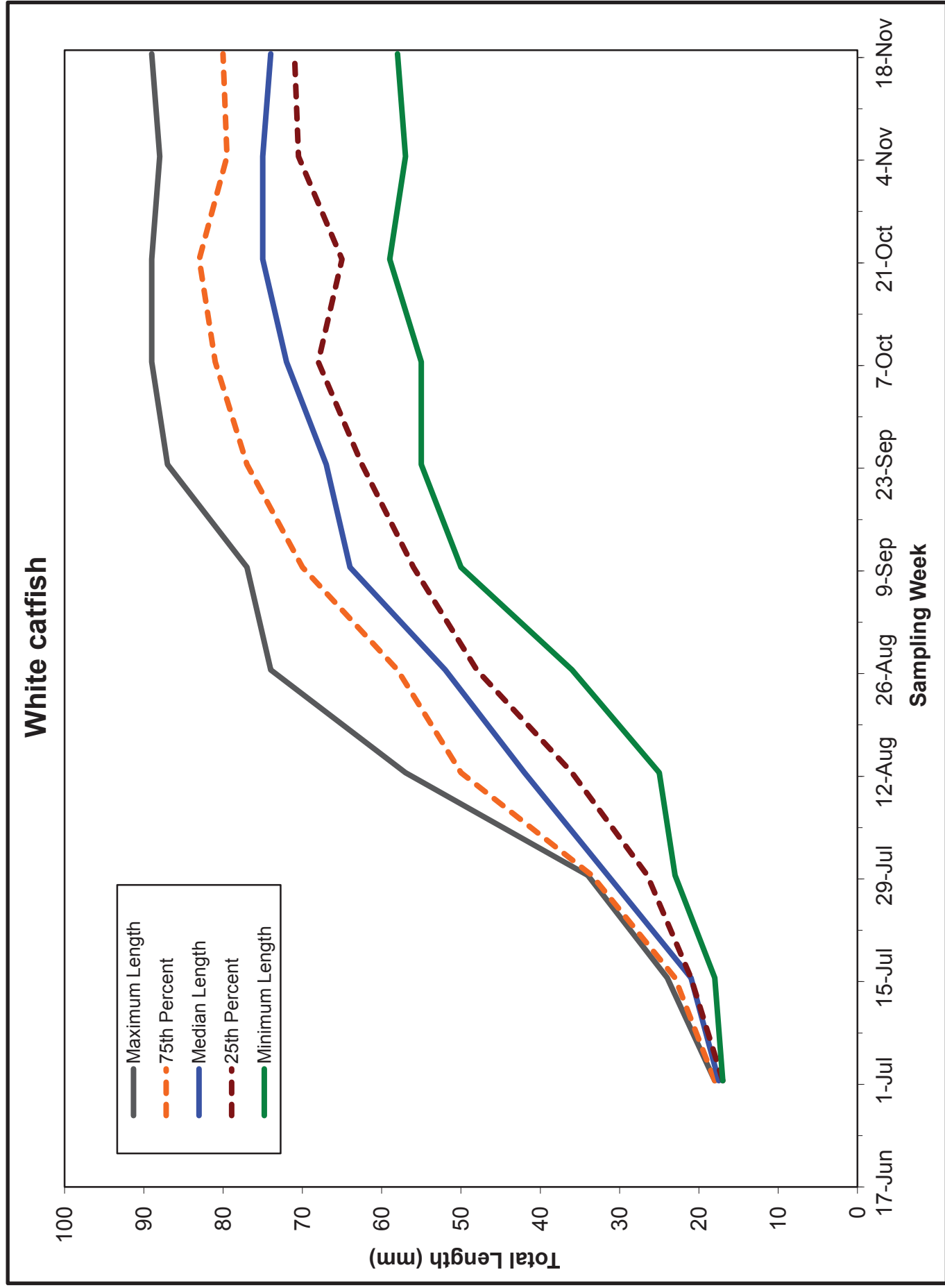


Figure 4-83. Weekly length statistics for young-of-year white catfish in the Hudson River estuary, 2013.

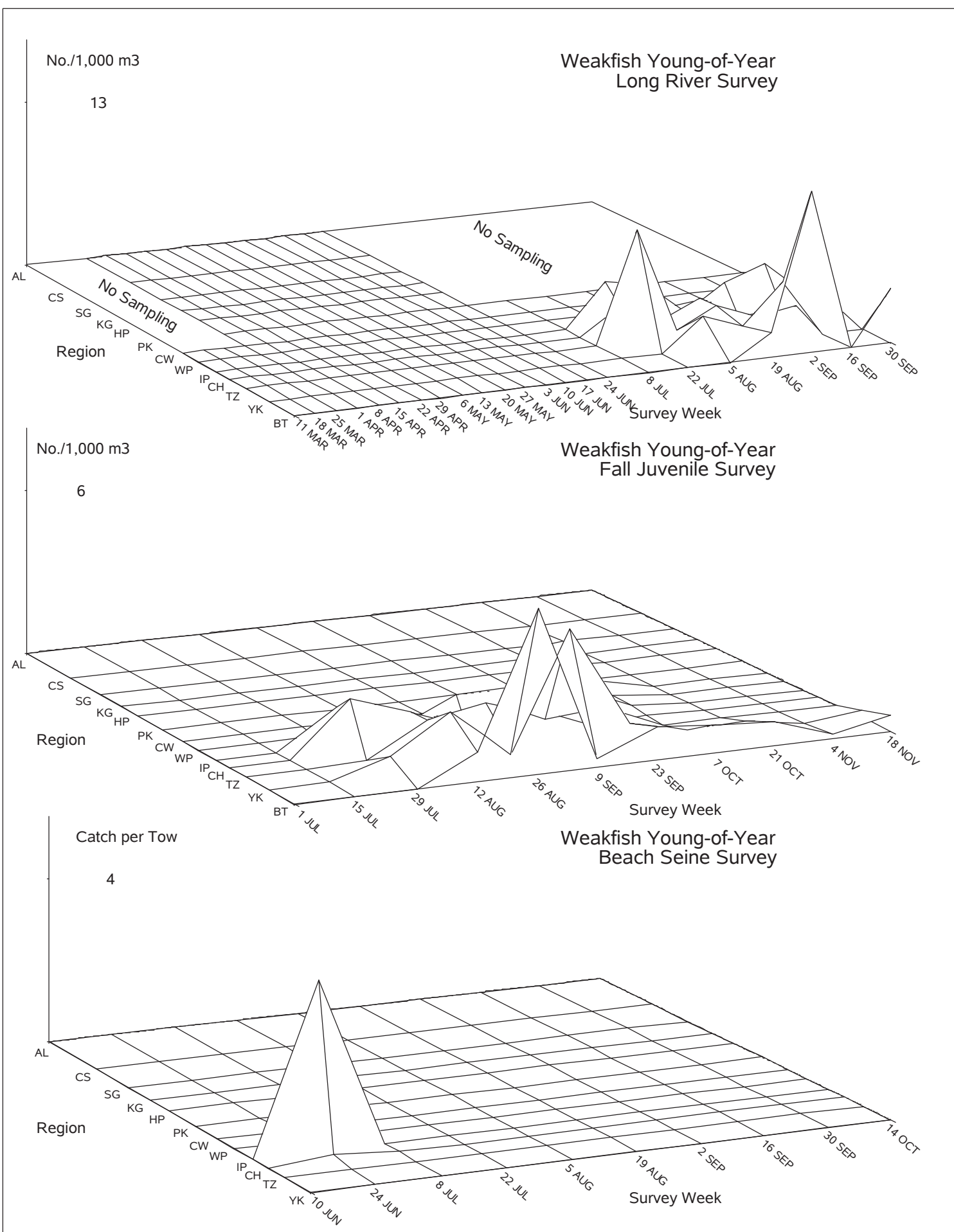


Figure 4-84. Spatiotemporal distribution of young-of-year weakfish in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

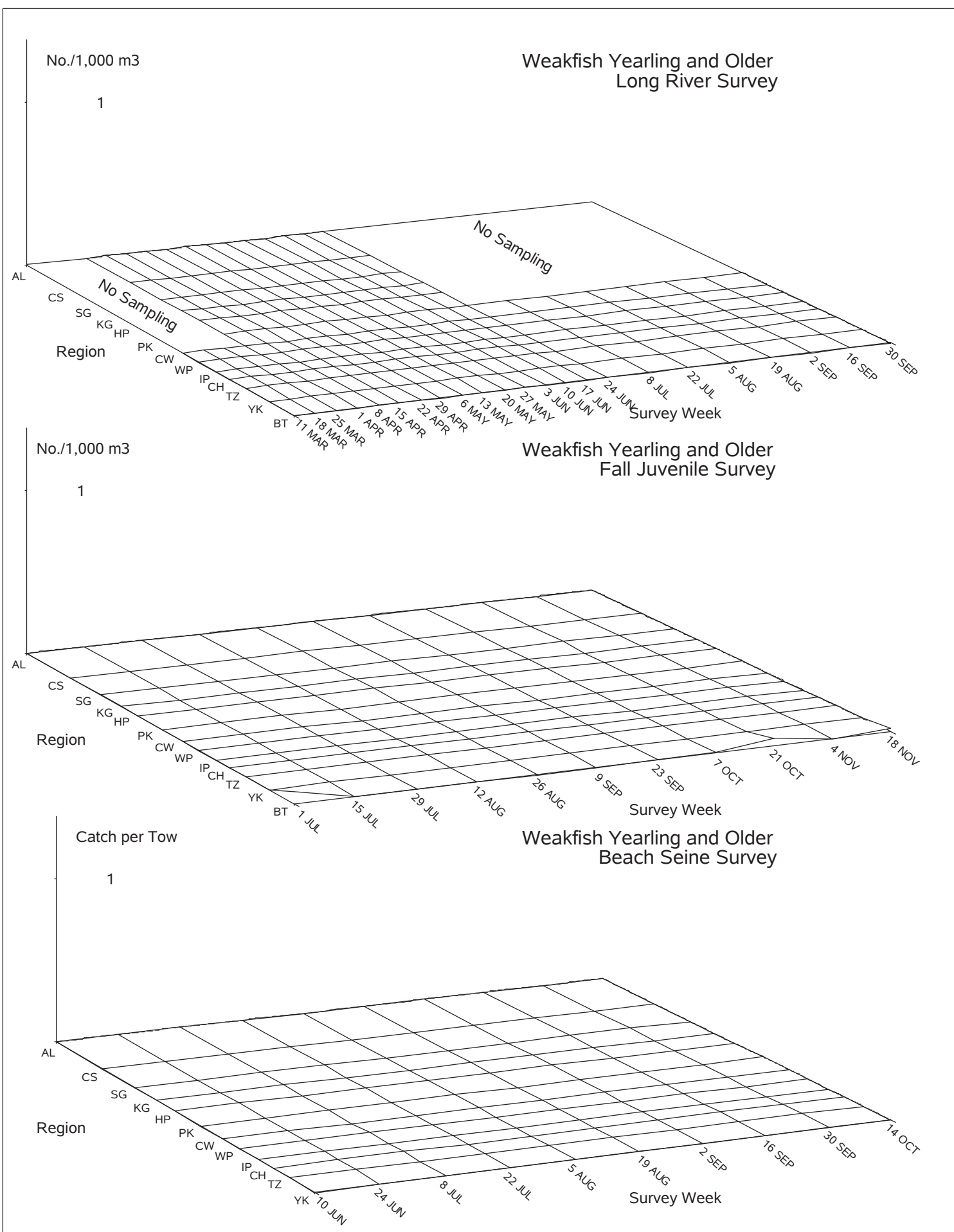


Figure 4-85. Spatiotemporal distribution of yearling and older weakfish in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

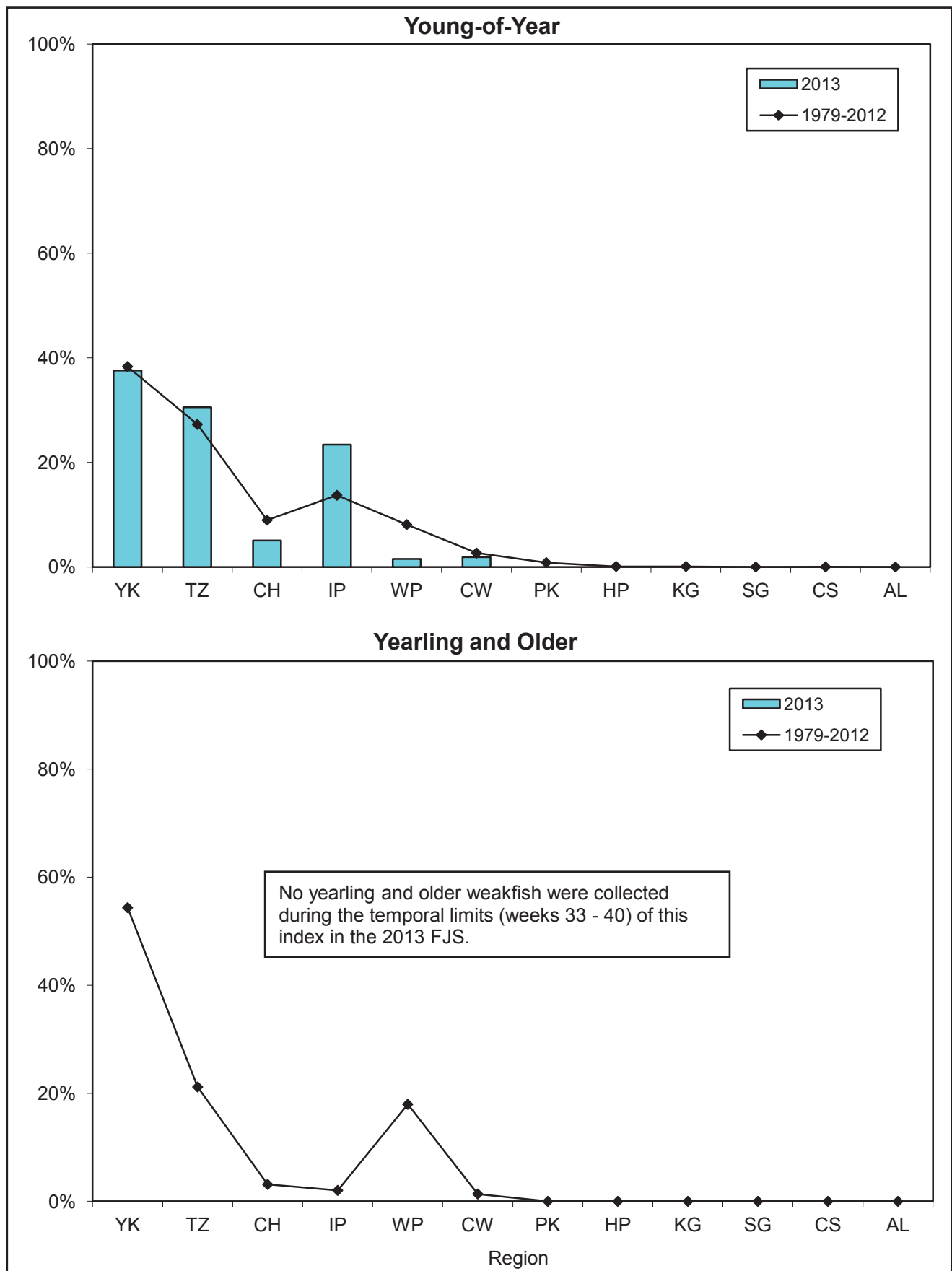


Figure 4-86. Geographic distribution indices for weakfish collected during Fall Juvenile surveys of the Hudson River estuary, 1979-2013.

Weakfish

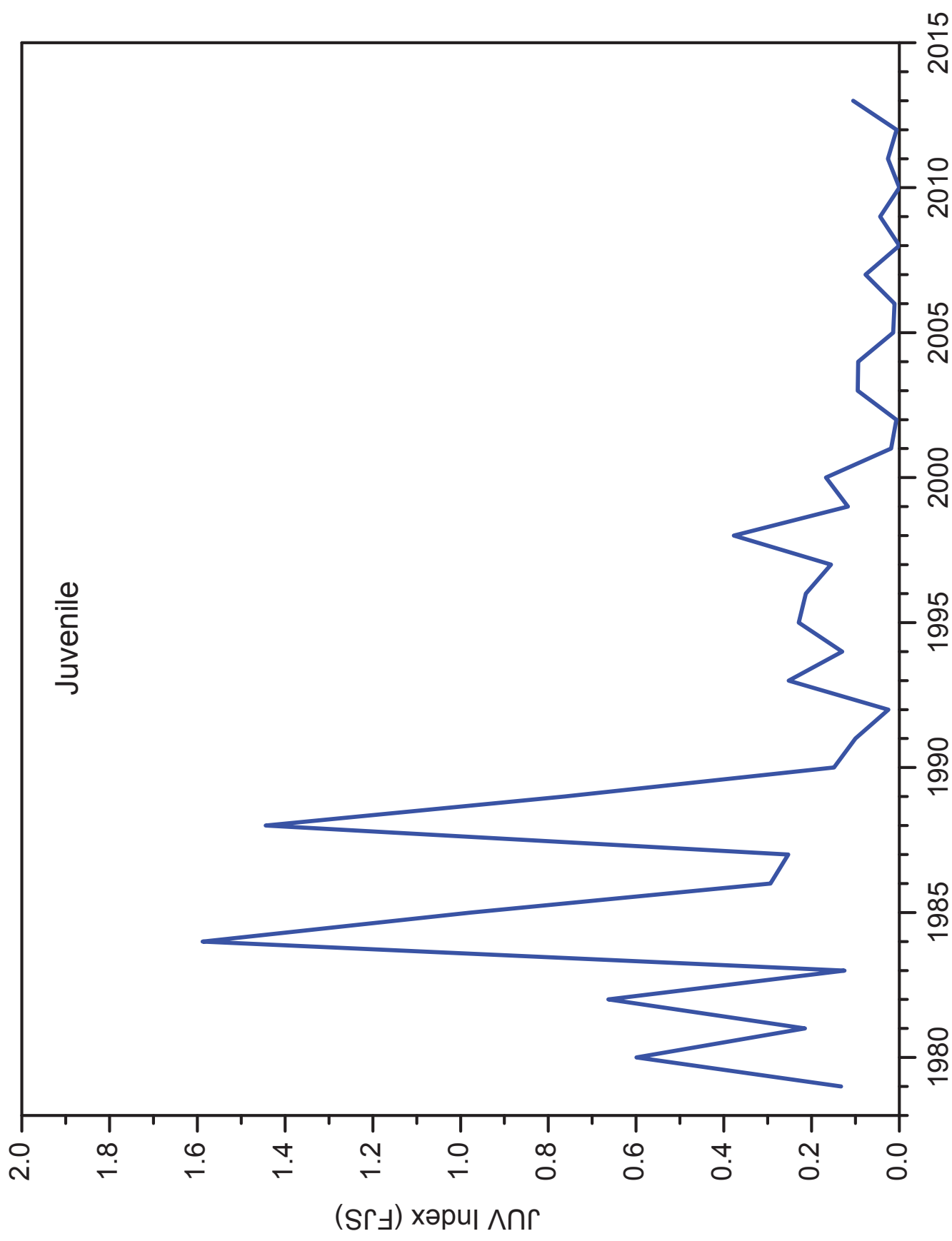


Figure 4-87. Weakfish indices of annual abundance based on Fall Juvenile Survey, 1979-2013.

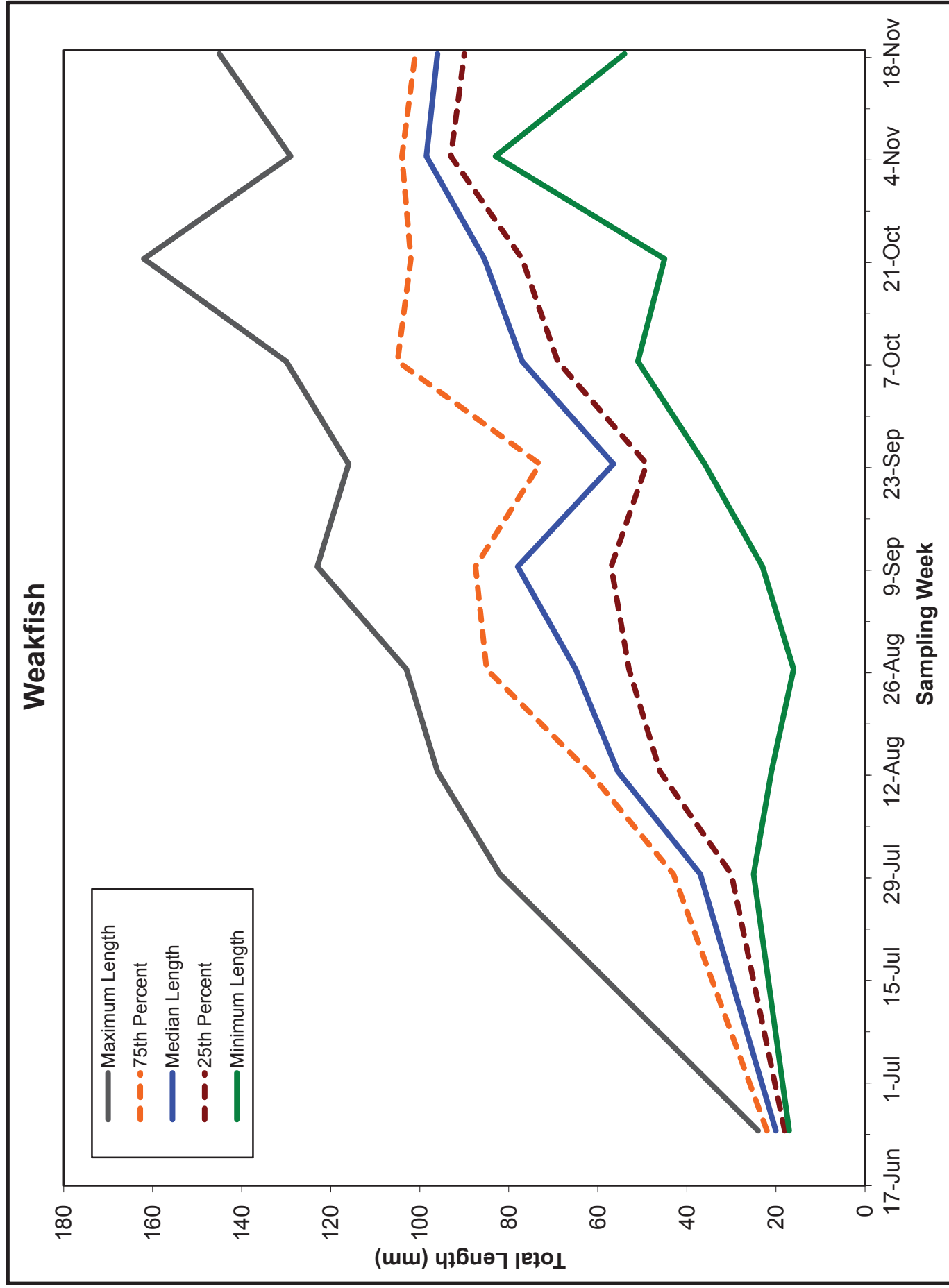


Figure 4-88. Weekly length statistics for young-of-year weakfish in the Hudson River estuary, 2013.

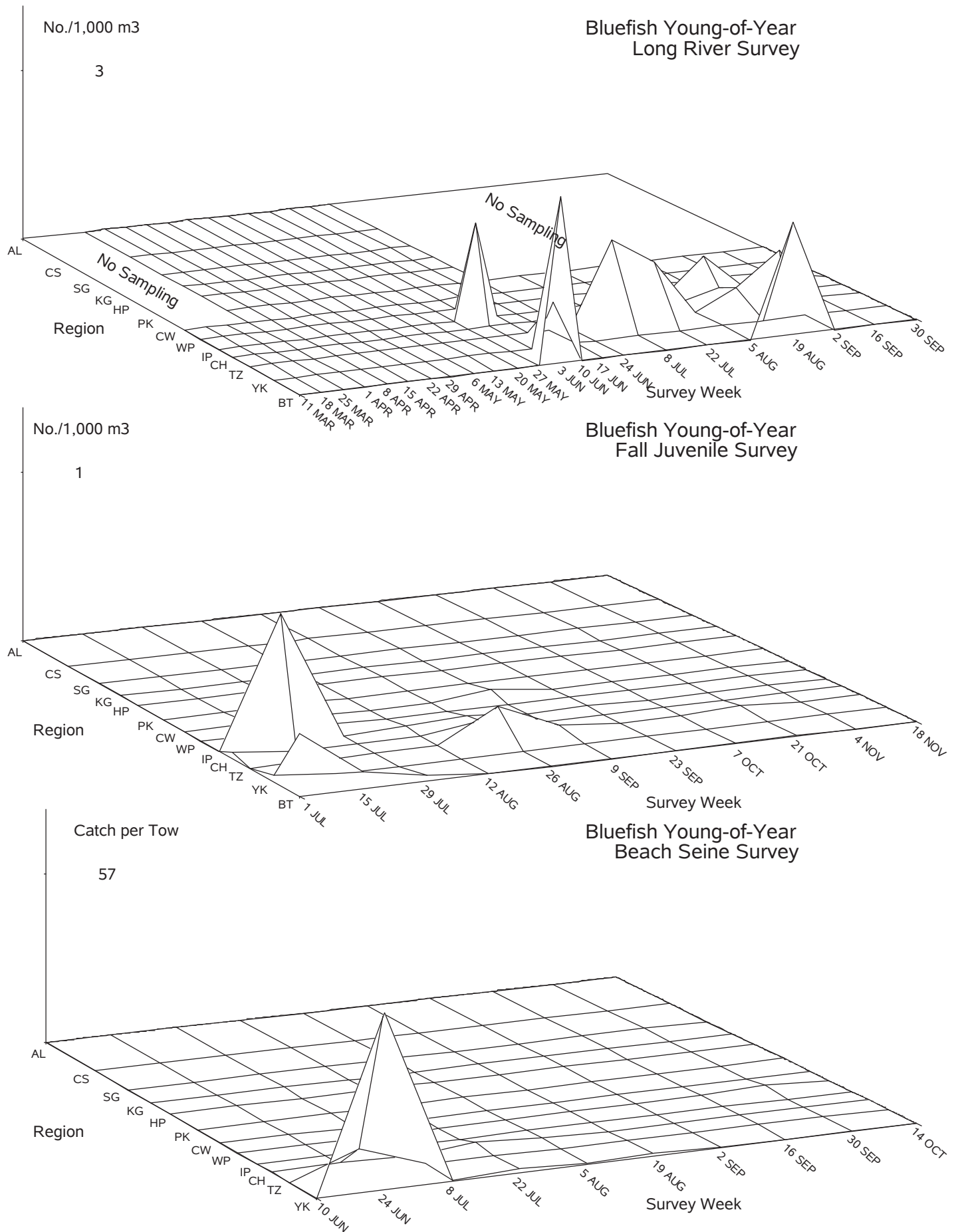


Figure 4-89. Spatiotemporal distribution of young-of-year bluefish in the Hudson River estuary based on the 2013 Long River, Fall Juvenile, and Beach Seine surveys.

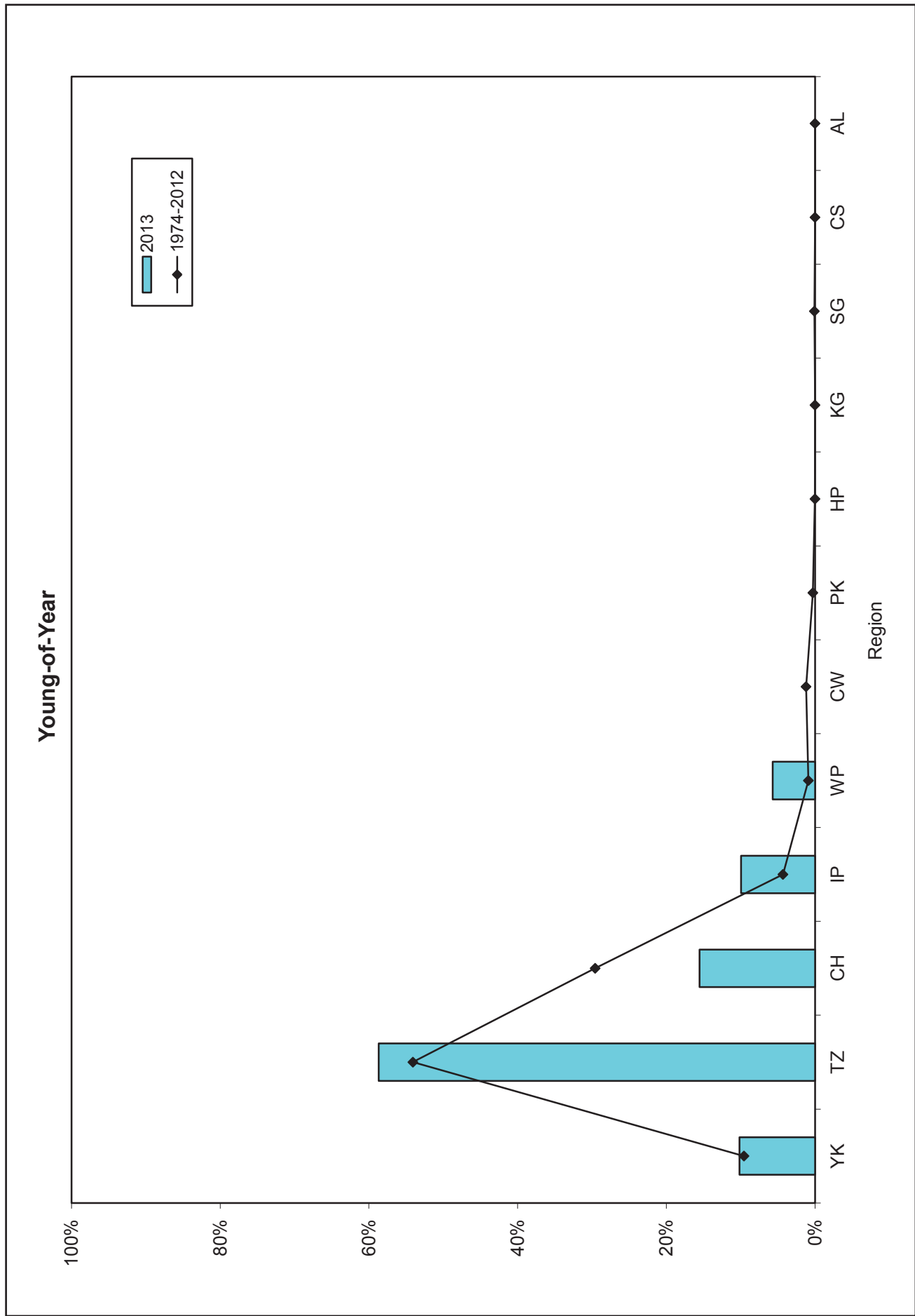


Figure 4-90. Geographic distribution indices for bluefish collected during Beach Seine surveys of the Hudson River estuary, 1974-2013.

Bluefish

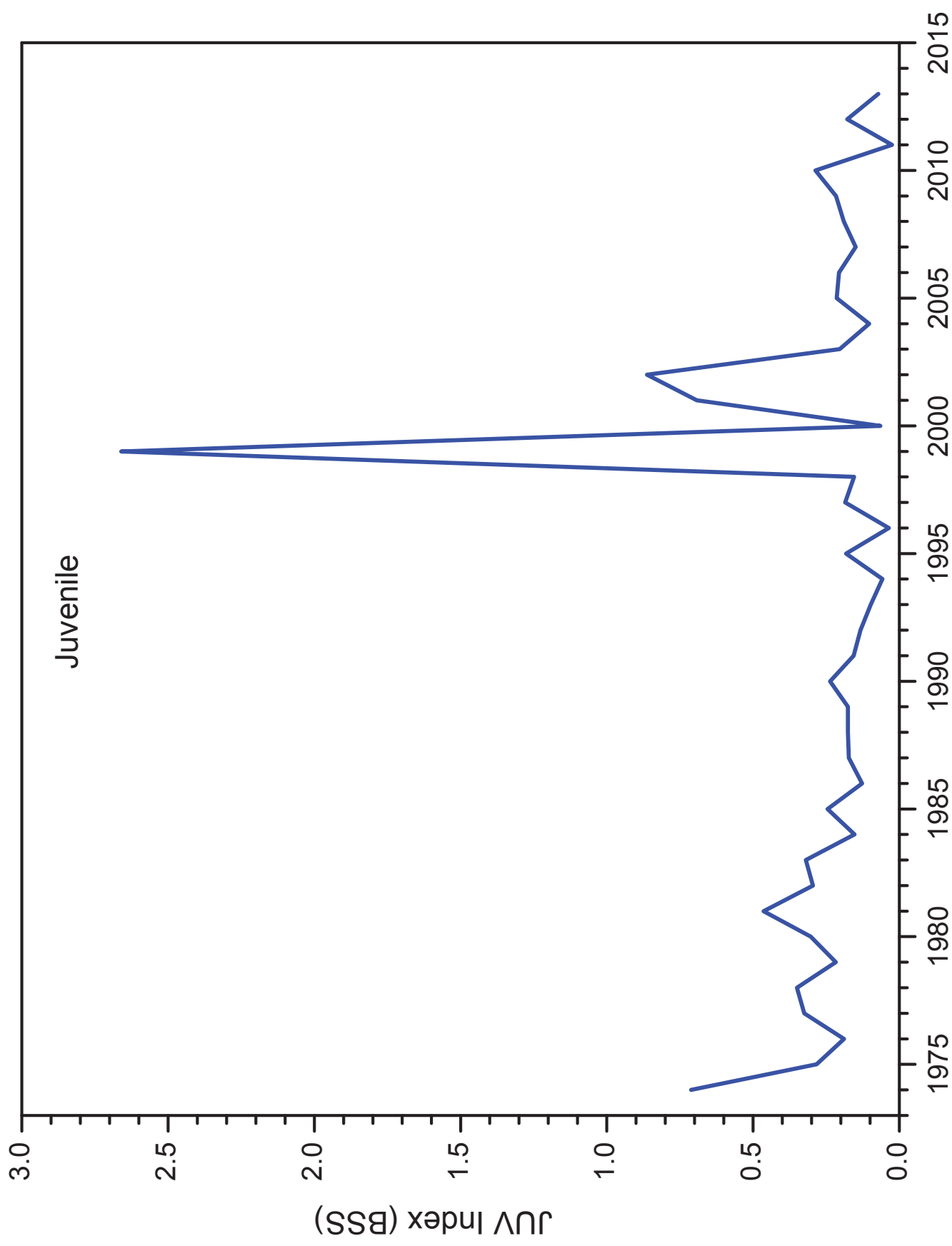


Figure 4-91. Bluefish indices of annual abundance based on Beach Seine Survey, 1974-2013.

Table 4-1 Species Composition of Fish Collected During Hudson River Studies from 1974 to 2013

Common Name	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	
Anadromous																											
Alewife	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
American shad	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Atlantic sturgeon	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Atlantic tomcod	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Blueback herring	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Hickory shad	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Rainbow smelt	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Sea lamprey	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Striped bass	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Total	8	9	7	7	8	9	8	8	7	8	8	7	8	7	8	7	8	7	7	7	7	8	7	8	9	8	
Catadromous																											
American eel	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Total	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Estuarine																											
Atlantic silverside	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Banded killifish	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Fat sleeper	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Fourspine stickleback	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Hogchoker	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Inland silverside	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Lined seahorse	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Mummichog	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Northern pipefish	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Shortnose sturgeon	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Threespine stickleback	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
White catfish	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
White mullet	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
White perch	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Total	12	11	12	12	11	12	12	11	12	12	12	12	13	11	12	12	13	13	11	12	10	12	11	12	11	13	
Freshwater																											
Black bullhead	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Black crappie	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Blacknose dace	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Bluegill	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Bluntnose minnow	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Bridle shiner	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Brook silverside	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Brook stickleback	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Brook trout	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 4-1 (Continued)

Common Name	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Brown bullhead	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Brown trout			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Carp			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Central mudminnow		X	X	X	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Chain pickerel																										
Channel catfish																										
Comely shiner																										
Common shiner		X	X	X	X	X	X	X																		
Creek chub		X	X	X	X	X	X	X																		
Cutlips minnow		X	X	X	X	X	X	X																		
Eastern mudminnow		X																								
Emerald shiner		X	X	X	X	X	X	X																		
Fatfish		X	X	X	X	X	X	X																		
Fathead minnow		X	X	X	X	X	X	X																		
Freshwater drum																										
Gizzard shad		X	X	X	X	X	X	X																		
Golden shiner		X	X	X	X	X	X	X																		
Goldfish		X	X	X	X	X	X	X																		
Grass carp																										
Grass pickerel	X				X																					
Green sunfish		X	X	X	X	X	X	X																		
Largemouth bass		X	X	X	X	X	X	X																		
Logperch																										
Longear sunfish																										
Longnose dace		X	X	X	X																					
Margined madtom																										
Mimic shiner	X																									
Northern hog sucker	X		X	X	X		X	X																		
Northern pike	X	X	X	X	X	X	X	X																		
Pugnose shiner																										
Pumpkinseed	X	X	X	X	X	X	X	X																		
Rainbow trout																										
Redbreast sunfish	X	X	X	X	X	X	X	X																		
Redfin pickerel	X	X	X	X	X	X	X	X																		
Rock bass	X	X	X	X	X	X	X	X																		
Rosyface shiner	X																									
Rudd																										
Satinfin shiner	X	X	X	X	X	X	X	X																		
Shield darter																										
Silvery minnow	X	X	X	X	X	X	X	X																		
Slimy sculpin																										
Smallmouth bass	X	X	X	X	X	X	X	X																		
Spotfin shiner	X	X	X	X	X	X	X	X																		
Spottail shiner	X	X	X	X	X	X	X	X																		
Swallowtail shiner																										
Tessellated darter	X	X	X	X	X	X	X	X																		
Tiger muskellunge																										
Trout perch	X	X	X	X	X	X	X	X																		
Walleye																										
White bass																										

Table 4-1 (Continued)

Common Name	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	
White crappie	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
White sucker	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Yellow bullhead	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Yellow perch	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Total	37	36	40	42	38	36	38	30	23	23	27	26	24	28	30	28	26	30	30	31	29	30	35	30	35	33	
Marine																											
American sand lance																											
Ammodytes sp.	X	X	X	X	X	X	X	X			X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	
Atlantic cod														X	X												
Atlantic croaker																											
Atlantic cutlassfish																											
Atlantic herring																											
Atlantic mackerel																											
Atlantic menhaden	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Atlantic needlefish	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Atlantic searail																											
Bay anchovy	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Black drum																											
Black seabass																											
Blackcheek																											
longuefish																											
Bluefish	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Butterfish	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Cobia																											
Conger eel						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Crevalle jack						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Cunner	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Cusk																											
Feather blenny						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Fourbeard rockling																											
Fourspot flounder	X						X	X				X	X		X	X	X	X	X	X	X	X	X	X	X	X	
Goosefish																											
Gray snapper														X	X	X	X	X	X	X	X	X	X	X	X	X	
Grubby																											
Gulf Stream flounder																											
Harvestfish																											
Hightail goby																											
Inshore lizardfish	X					X	X	X			X	X			X	X	X	X	X	X	X	X	X	X	X	X	
Longhorn sculpin	X	X				X	X	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Lookdown	X	X		X																							
Moonfish																											
Naked goby	X																										
Northern kingfish	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Northern puffer		X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 4-1 (Continued)

Common Name	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Orangespotted filefish													X													
Oyster toadfish																						X	X		X	X
Permit																			X	X					X	
Pigfish																										
Pinfish																						X				
Pollack				X																						
Radiated shanny																										X
Red hake	X		X			X	X	X			X	X			X	X	X	X		X	X				X	X
Rock gunnel			X									X	X		X	X	X	X		X	X				X	X
Rough silverside		X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		X	X				X	X
Scup	X																					X				
Seaboard goby		X	X				X								X			X		X					X	X
Sea raven							X																			
Sheepshead minnow																										
Silver anchovy																										
Silver hake	X	X										X	X		X	X	X		X	X					X	X
Silver perch	X					X					X	X			X	X									X	X
Skilletfish																										
Smallmouth flounder						X	X		X		X	X			X	X	X		X	X					X	X
Spanish mackerel												X	X		X	X	X		X	X						
Speckled worm eel														X	X	X										
Spot	X	X	X	X	X		X	X	X			X	X		X	X	X		X	X					X	X
Spotfin butterflyfish																										
Spotfin mojarra																										
Spotted goatfish																										
Spotted hake							X			X	X	X	X		X	X	X		X	X					X	X
Striped anchovy						X			X		X	X			X	X									X	X
Striped burrfish																										
Striped cuskeel							X																		X	X
Striped killifish																										
Striped mullet				X		X	X	X	X		X	X	X	X	X	X		X	X	X						
Striped searobin				X		X	X	X	X		X	X	X	X	X	X		X	X	X					X	X
Summer flounder				X		X	X	X	X		X	X	X	X	X	X		X	X	X					X	X
Tautog				X		X	X	X	X		X	X	X	X	X	X		X	X	X					X	X
Weakfish				X		X	X	X	X		X	X	X	X	X	X		X	X	X					X	X
Windowpane				X		X	X	X	X		X	X	X	X	X	X		X	X	X					X	X
Winter flounder				X		X	X	X	X		X	X	X	X	X	X		X	X	X					X	X
Witch flounder				X		X	X	X	X		X	X	X	X	X	X		X	X	X					X	X
Yellowtail flounder	X																								X	X
Total	24	24	24	20	16	74	84	92	68	20	28	35	35	29	41	34	35	38	42	37	37	39	39	40	45	49
All Categories	82	81	84	82	74	84	92	74	68	64	76	81	81	76	92	82	83	89	92	86	85	89	93	91	101	104
Total																										

Table 4-1 (Continued)

Common Name	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Anadromous														
Alewife	X	X	X	X	X	X	X	X	X	X	X	X	X	X
American shad	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Atlantic sturgeon	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Atlantic tomcod	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Blueback herring	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hickory shad						X								
Rainbow smelt	X	X	X			X	X	X	X	X				X
Sea lamprey						X	X	X	X	X	X	X	X	X
Striped bass	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Total	7	7	7	6	6	7	8	8	8	7	6	8	7	8
Catadromous														
American eel	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Total	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Estuarine														
Atlantic silverside	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Banded killifish	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fat sleeper														
Fourspine stickleback	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hogchoker	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Inland silverside	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lined seahorse	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Mummichog	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Northern pipefish	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Shortnose sturgeon	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Threespine stickleback	X	X	X	X	X	X	X	X	X	X	X	X	X	X
White catfish	X	X	X	X	X	X	X	X	X	X	X	X	X	X
White mullet	X	X	X	X	X	X	X	X	X	X	X	X	X	X
White perch	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Total	11	12	13	12	10	11	12	12	12	11	12	11	12	11
Freshwater														
Black bullhead				X										
Black crappie	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Blacknose dace														
Bluegill	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Bluntnose minnow	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Bride shiner														
Brook silverside														
Brook stickleback														
Brook trout														
Brown bullhead	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Brown trout														
Carp	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Central mudminnow														
Chain pickerel	X				X				X	X	X			

Table 4-1 (Continued)

Common Name	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>
Channel catfish	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Comely shiner														
Common shiner		X							X		X		X	X
Creek chub				X										
Cutlips minnow								X						
Eastern mudminnow														
Emerald shiner	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fallfish	X			X	X	X	X	X	X	X	X	X	X	X
Fathead minnow	X		X	X	X	X	X	X	X	X	X	X	X	X
Freshwater drum	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Gizzard shad	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Golden shiner	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Goldfish	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Grass carp						X								
Grass pickerel														
Green sunfish			X	X										
Largemouth bass	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Logperch		X	X	X										
Longear sunfish							X	X						
Longnose dace														
Margined madtom														
Mimic shiner											X			
Northern hog sucker	X		X	X	X			X	X				X	X
Northern pike	X	X				X					X			
Pugnose shiner														
Pumpkinseed	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Rainbow trout									X					
Redbreast sunfish	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Redfin pickerel	X	X	X	X	X				X	X	X			
Rock bass	X	X	X	X	X	X	X	X	X	X	X	X		
Rosyface shiner														
Rudd					X			X	X	X	X	X	X	X
Satinfin shiner		X	X	X	X	X	X	X	X	X	X	X	X	X
Shield darter														
Silvery minnow	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Slimy sculpin														
Smallmouth bass	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Spotfin shiner	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Spottail shiner	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Swallowtail shiner	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Tessellated darter	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Tiger muskellunge														
Trout perch														
Walleye	X	X	X	X	X	X	X	X	X	X	X	X	X	X
White bass														
White crappie		X	X	X	X	X	X	X	X	X	X	X	X	X
White sucker														
Yellow bullhead														
Yellow perch	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Total	29	27	28	35	35	29	28	28	34	34	31	33	27	30

Table 4-1 (Continued)

Common Name	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Marine														
American sand lance	X	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Ammodytes</i> sp.														
Atlantic cod	X		X	X	X	X	X	X	X	X	X	X	X	X
Atlantic croaker		X	X	X	X	X	X	X	X	X	X	X	X	X
Atlantic cutlassfish	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Atlantic herring	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Atlantic mackerel	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Atlantic menhaden	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Atlantic needlefish	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Atlantic seasnail														
Bay anchovy	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Black drum														
Black seabass								X						X
Blackcheek tonguefish														
Bluefish	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Butterfish	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cobia														
Conger eel	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Crevalle jack	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cunner	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cusk	X							X						
Feather blenny	X		X					X	X	X	X	X	X	X
Fourbeard rockling	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fourspot flounder														
Goosefish														X
Gray snapper		X			X	X		X	X	X	X	X	X	X
Grubby	X	X	X	X	X	X								
Gulf Stream flounder					X									
Harvestfish			X						X					
Hightail goby														
Inshore lizardfish	X	X	X			X		X	X	X	X	X	X	X
Longhorn sculpin														
Lookdown	X			X		X		X	X	X	X	X	X	X
Moonfish	X	X	X	X	X	X		X	X	X	X	X	X	X
Naked goby	X	X	X	X	X	X		X	X	X	X	X	X	X
Northern kingfish	X	X	X	X	X	X		X	X	X	X	X	X	X
Northern puffer	X	X	X	X	X	X		X	X	X	X	X	X	X
Northern searobin	X	X	X	X	X	X		X	X	X	X	X	X	X
Northern stargazer	X	X	X	X	X	X		X	X	X	X	X	X	X
Orangespotted filefish														
Oyster toadfish	X	X	X	X	X	X		X	X	X	X	X	X	X
Permit	X	X					X							
Pigfish												X		
Pinfish					X							X		
Pollack														
Radiated shanny														
Red hake	X	X		X	X	X		X	X	X	X			

Table 4-1 (Continued)

Common Name	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>
Rock gunnel	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Rough silverside	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Scup	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Seaboard goby	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sea raven														
Sheepshead minnow														
Silver anchovy										X				
Silver hake	X	X	X		X	X	X	X	X	X	X	X	X	X
Silver perch	X		X		X		X	X	X	X	X	X	X	X
Skilletfish														
Smallmouth flounder	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Spanish mackerel				X										
Speckled worm eel	X		X									X		
Spot	X	X	X	X		X	X	X	X	X	X	X	X	X
Spotfin butterflyfish										X				
Spotfin mojarra														
Spotted goatfish														
Spotted hake	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Striped anchovy	X		X	X	X	X	X	X	X	X	X	X	X	X
Striped burrfish						X	X	X	X	X	X	X	X	X
Striped cuskeel	X	X		X	X	X	X	X	X	X	X	X	X	X
Striped killifish														
Striped mullet	X		X			X	X	X	X	X	X	X	X	X
Striped searobin	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Summer flounder	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Tautog	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Weakfish	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Windowpane	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Winter flounder	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Witch flounder														
Yellowtail flounder	X	X	X		X	X	X	X	X	X	X	X	X	X
Total	46	43	44	39	40	42	40	40	43	45	38	46	43	49
All Categories	94	90	93	93	92	90	89	89	98	98	88	99	90	99
Total														

Table 4-2 Species Composition of Fish Collected in Each of the Hudson River Surveys During 2013

<u>Common Name</u>	<u>BSS</u>	<u>FSS</u>	<u>LRS</u>
<u>Anadromous</u>			
Alewife	X	X	X
American shad	X	X	X
Atlantic sturgeon		X	X
Atlantic tomcod		X	X
Blueback herring	X	X	X
Hickory shad	X		
Rainbow smelt			X
Striped bass	X	X	X
Total	5	6	7
<u>Catadromous</u>			
American eel	X	X	X
Total	1	1	1
<u>Estuarine</u>			
Atlantic silverside	X	X	X
Banded killifish	X		X
Hogchoker	X	X	X
Inland silverside	X		X
Lined sea horse			X
Mummichog	X		X
Northern pipefish	X	X	X
Shortnose sturgeon		X	X
White catfish	X	X	X
White perch	X	X	X
Total	9	7	11
<u>Freshwater</u>			
Black crappie	X		X
Bluegill	X		X
Brook silverside	X		
Brown bullhead	X	X	X
Carp	X	X	X
Channel catfish	X	X	X
Emerald shiner	X		
Fall fish	X		X
Fathead minnow	X		
Freshwater drum	X	X	X
Gizzard shad	X	X	X
Golden shiner	X		
Goldfish	X		
Largemouth bass	X		X
Logperch	X		X
(Continued)			

Table 4-2 (Continued)

<u>Common name</u>	<u>BSS</u>	<u>FSS</u>	<u>LRS</u>
<u>Freshwater (continued)</u>			
Northern hog sucker	X		
Northern pike	X		
Pumpkinseed	X	X	
Redbreast sunfish	X		
Redfin pickerel	X		
Satinfin shiner	X		
Silvery minnow	X		
Smallmouth bass	X		X
Spotfin shiner	X		
Spottail shiner	X	X	X
Tesselated darter	X	X	X
Walleye	X		X
White sucker	X		X
Yellow perch	X		X
Total	30	8	16
<u>Marine</u>			
American sand lance			X
Atlantic cod			X
Atlantic croaker	X	X	X
Atlantic herring			X
Atlantic mackerel		X	X
Atlantic menhaden	X	X	X
Atlantic needlefish	X	X	X
Bay anchovy	X	X	X
Black sea bass			X
Bluefish	X	X	X
Butterfish	X	X	X
Conger eel			X
Creville jack		X	
Cunner			X
Feather blenny			X
Fourbeard rockling			X
Fourspot flounder			X
Goosefish			X
Grubby			X
Inshore lizardfish	X		
Longhorn sculpin			X
Naked goby	X	X	X
Northern kingfish	X	X	
Northern searobin		X	X
Northern stargazer		X	
Oyster toadfish		X	X
Pinfish	X		
Pollack			X
Rock gunnel		X	X
Rough silverside			X
Seaboard goby			X
(Continued)			

Table 4-2 (Continued)

<u>Common name</u>	<u>BSS</u>	<u>FSS</u>	<u>LRS</u>
<u>Marine (continued)</u>			
Silver hake		X	
Silver perch		X	
Skilletfish			X
Smallmouth flounder		X	X
Spot	X	X	X
Spotted hake		X	X
Striped anchovy	X	X	X
Striped cuskeel		X	X
Striped mullet	X		
Striped searobin		X	X
Summer flounder	X	X	X
Tautog			X
Weakfish	X	X	X
Windowpane		X	X
Winter flounder	X	X	X
Witch flounder			X
Yellowtail flounder			X
Total	16	27	41
<u>Undetermined</u>			
Acipenseridae		X	X
Alosa spp.	X	X	X
Centrarchidae	X	X	X
Cyprinidae	X		
Gadidae			X
Gobiidae			X
Menidia spp.			X
Morone unidentified			X
Pleuronectidae			X
Searobin			X
Unidentified lamprey			X
Unidentifiable			X
Total	3	3	12

Table 4-3 Collections Of Atlantic Sturgeon During The 2013 Hudson River Surveys

<u>Date</u>	<u>Survey</u>	<u>Region</u>	<u>River Mile</u>	<u>Gear</u>	<u>Number Collected</u>	<u>Total Length (mm)</u>
11-Apr	LRS	Indian Point	43	1-m Epibenthic Sled	1	544
30-Apr	LRS	Yonkers	14	1-m Epibenthic Sled	1	468
30-May	LRS	Poughkeepsie	73	1-m Tucker Trawl	1	YSL
30-May	LRS	Saugerties	99	1-m Tucker Trawl	1	YSL
31-May	LRS	Poughkeepsie	68	1-m Epibenthic Sled	1	YSL
5-Jun	LRS	Poughkeepsie	74	1-m Tucker Trawl	1	PYSL
6-Jun	LRS	Battery	7	1-m Epibenthic Sled	1	538
6-Jun	LRS	West Point	54	1-m Epibenthic Sled	1	319
13-Jun	LRS	West Point	53	1-m Epibenthic Sled	1	PYSL
13-Jun	LRS	Cornwall	59	1-m Epibenthic Sled	1	295
3-Jul	FJS	West Point	54	3-m Beam Trawl	1	407
3-Jul	FJS	West Point	55	3-m Beam Trawl	3	360,478,481
10-Jul	LRS	West Point	48	1-m Epibenthic Sled	1	405
17-Jul	FJS	Yonkers	19	3-m Beam Trawl	1	755
17-Jul	FJS	Indian Point	40	3-m Beam Trawl	2	491,753
17-Jul	FJS	Indian Point	41	3-m Beam Trawl	2	484,546
18-Jul	FJS	West Point	51	3-m Beam Trawl	1	510
18-Jul	FJS	West Point	54	3-m Beam Trawl	1	401
18-Jul	FJS	West Point	55	3-m Beam Trawl	1	365
18-Jul	FJS	Cornwall	56	3-m Beam Trawl	3	131,504,520
18-Jul	FJS	Cornwall	57	3-m Beam Trawl	1	410
26-Jul	LRS	Cornwall	57	1-m Epibenthic Sled	1	146
31-Jul	FJS	Poughkeepsie	71	3-m Beam Trawl	1	531
31-Jul	FJS	Hyde Park	77	3-m Beam Trawl	1	392
31-Jul	FJS	Hyde Park	82	3-m Beam Trawl	1	150
1-Aug	FJS	West Point	54	3-m Beam Trawl	2	380,975
1-Aug	FJS	West Point	55	3-m Beam Trawl	1	480
1-Aug	FJS	Poughkeepsie	68	3-m Beam Trawl	1	468
2-Aug	FJS	Indian Point	41	3-m Beam Trawl	1	384
8-Aug	LRS	West Point	55	1-m Epibenthic Sled	1	503
14-Aug	FJS	Saugerties	97	3-m Beam Trawl	2	358,388
15-Aug	FJS	West Point	55	3-m Beam Trawl	5	358,495,502,397,524
16-Aug	FJS	Croton-Haverstraw	37	3-m Beam Trawl	1	977
16-Aug	FJS	Indian Point	41	3-m Beam Trawl	1	502
16-Aug	FJS	West Point	48	3-m Beam Trawl	2	525,546
23-Aug	LRS	West Point	55	1-m Epibenthic Sled	1	947
30-Aug	FJS	West Point	51	3-m Beam Trawl	1	499
30-Aug	FJS	West Point	54	3-m Beam Trawl	1	185
30-Aug	FJS	West Point	55	3-m Beam Trawl	1	155
30-Aug	FJS	Cornwall	58	3-m Beam Trawl	2	381,374

Table 4-3 (Continued)

<u>Date</u>	<u>Survey</u>	<u>Region</u>	<u>River Mile</u>	<u>Gear</u>	<u>Number Collected</u>	<u>Total Length (mm)</u>
31-Aug	FJS	Indian Point	39	3-m Beam Trawl	1	458
12-Sep	FJS	West Point	54	3-m Beam Trawl	1	402
12-Sep	FJS	West Point	55	3-m Beam Trawl	4	450,396,490,520
13-Sep	FJS	Indian Point	41	3-m Beam Trawl	2	425,914
26-Sep	FJS	Battery	7	3-m Beam Trawl	1	648
8-Oct	FJS	Hyde Park	80	3-m Beam Trawl	1	399
21-Oct	FJS	Yonkers	15	3-m Beam Trawl	1	576
22-Oct	FJS	West Point	54	3-m Beam Trawl	1	392
24-Oct	FJS	Poughkeepsie	76	3-m Beam Trawl	1	193
5-Nov	FJS	Tappan Zee	26	3-m Beam Trawl	1	495
5-Nov	FJS	Croton-Haverstraw	37	3-m Beam Trawl	1	369
5-Nov	FJS	Indian Point	39	3-m Beam Trawl	1	410
5-Nov	FJS	Indian Point	40	3-m Beam Trawl	2	605,517
5-Nov	FJS	West Point	48	3-m Beam Trawl	1	408
6-Nov	FJS	West Point	55	3-m Beam Trawl	4	220,252,275,517
						225,265,268,414,441,
19-Nov	FJS	Cornwall	56	3-m Beam Trawl	7	475,510

Table 4-4 Collections of Shortnose Sturgeon During the 2013 Hudson River Surveys

<u>Date</u>	<u>Survey</u>	<u>Region</u>	<u>River Mile</u>	<u>Gear</u>	<u>Number Collected</u>	<u>Total Length (mm)</u>
18-Apr	LRS	Albany	131	1-m Epibenthic Sled	1	805
1-Jul	FJS	Croton-Haverstraw	34	3-m Beam Trawl	1	775
2-Jul	FJS	Kingston	92	3-m Beam Trawl	1	813
2-Jul	FJS	Saugerties	94	3-m Beam Trawl	1	752
2-Jul	FJS	Saugerties	105	3-m Beam Trawl	1	747
3-Jul	FJS	Indian Point	42	3-m Beam Trawl	1	775
3-Jul	FJS	West Point	55	3-m Beam Trawl	2	705,710
18-Jul	FJS	West Point	55	3-m Beam Trawl	1	810
18-Jul	FJS	Cornwall	57	3-m Beam Trawl	1	880
19-Jul	FJS	Poughkeepsie	72	3-m Beam Trawl	1	1164
19-Jul	FJS	Hyde Park	77	3-m Beam Trawl	1	785
19-Jul	FJS	Hyde Park	84	3-m Beam Trawl	1	769
20-Jul	FJS	Poughkeepsie	65	3-m Beam Trawl	1	867
30-Jul	FJS	Albany	139	3-m Beam Trawl	1	933
31-Jul	FJS	Poughkeepsie	73	3-m Beam Trawl	1	746
31-Jul	FJS	Hyde Park	77	3-m Beam Trawl	1	711
31-Jul	FJS	Hyde Park	81	3-m Beam Trawl	1	674
31-Jul	FJS	Kingston	91	3-m Beam Trawl	1	1065
1-Aug	FJS	Cornwall	58	3-m Beam Trawl	1	701
2-Aug	FJS	Croton-Haverstraw	38	3-m Beam Trawl	1	713
2-Aug	FJS	Indian Point	39	3-m Beam Trawl	1	712
2-Aug	FJS	Indian Point	40	3-m Beam Trawl	3	619,708,711
13-Aug	FJS	Albany	127	3-m Beam Trawl	1	875
14-Aug	FJS	Hyde Park	84	3-m Beam Trawl	1	713
28-Aug	FJS	Saugerties	94	3-m Beam Trawl	2	700,740
28-Aug	FJS	Saugerties	96	3-m Beam Trawl	1	774
30-Aug	FJS	West Point	55	3-m Beam Trawl	3	710,739,818
30-Aug	FJS	Poughkeepsie	68	3-m Beam Trawl	1	750
31-Aug	FJS	Indian Point	40	3-m Beam Trawl	1	785
13-Sep	FJS	Tappan Zee	31	3-m Beam Trawl	1	841
13-Sep	FJS	Croton-Haverstraw	35	3-m Beam Trawl	1	901
25-Sep	FJS	Hyde Park	82	3-m Beam Trawl	1	841
25-Sep	FJS	Saugerties	94	3-m Beam Trawl	1	633
27-Sep	FJS	Croton-Haverstraw	36	3-m Beam Trawl	1	880
8-Oct	FJS	Kingston	87	3-m Beam Trawl	1	682
23-Oct	FJS	Saugerties	96	3-m Beam Trawl	1	683
6-Nov	FJS	West Point	55	3-m Beam Trawl	1	722
7-Nov	FJS	Kingston	93	3-m Beam Trawl	1	895

Table 4-5 Collections of Unidentified Sturgeon During the 2013 Hudson River Surveys

<u>Date</u>	<u>Survey</u>	<u>Region</u>	<u>River Mile</u>	<u>Gear</u>	<u>Number Collected</u>	<u>Total Length (mm)</u>
18-Jul	FJS	West Point	55	3-m Beam Trawl	1	72,68
1-Aug	FJS	West Point	55	3-m Beam Trawl	2	92,118
1-Aug	FJS	Poughkeepsie	68	3-m Beam Trawl	1	135
8-Aug	LRS	Cornwall	57	1-m Epibenthic Sled	1	130
15-Aug	FJS	West Point	55	3-m Beam Trawl	2	152,159