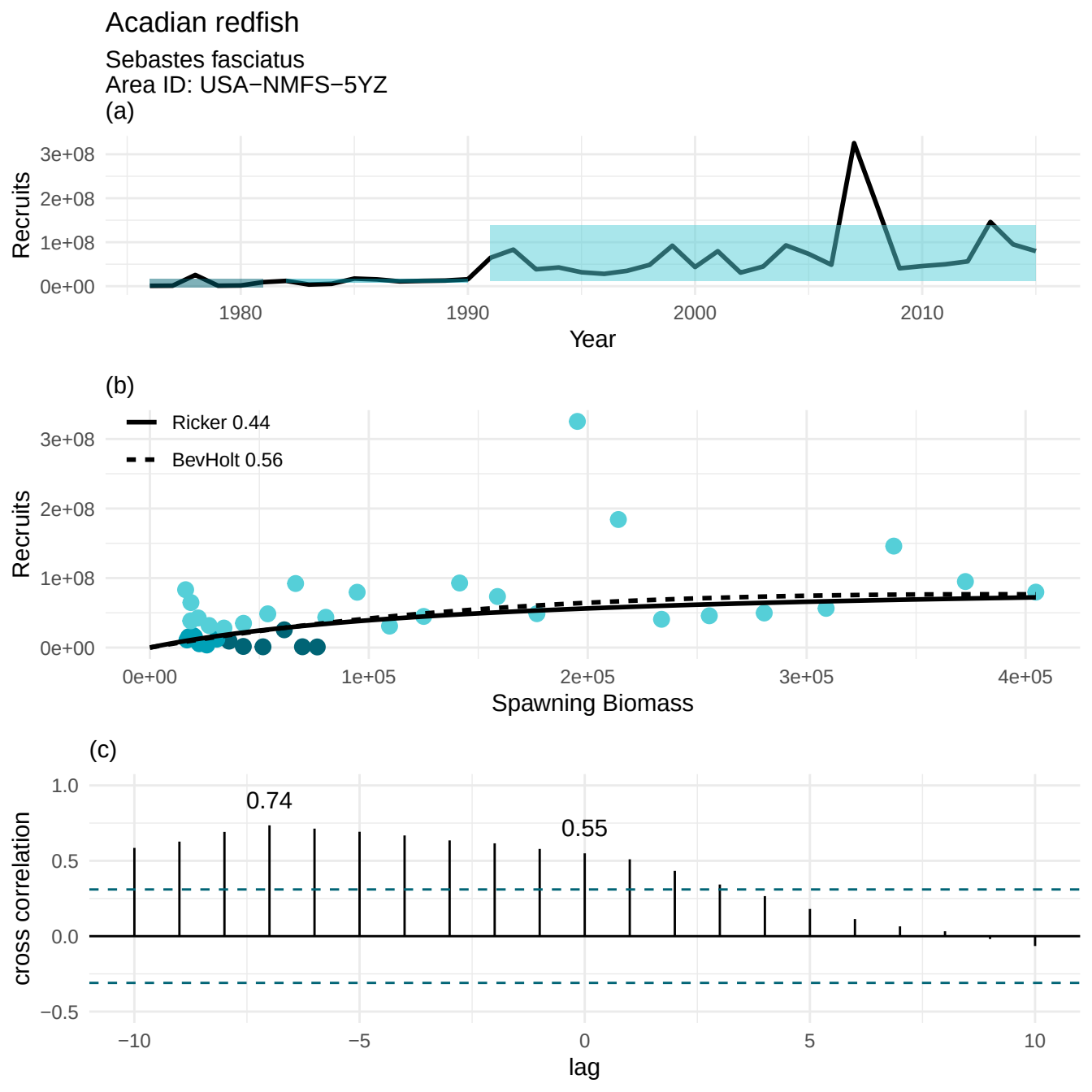
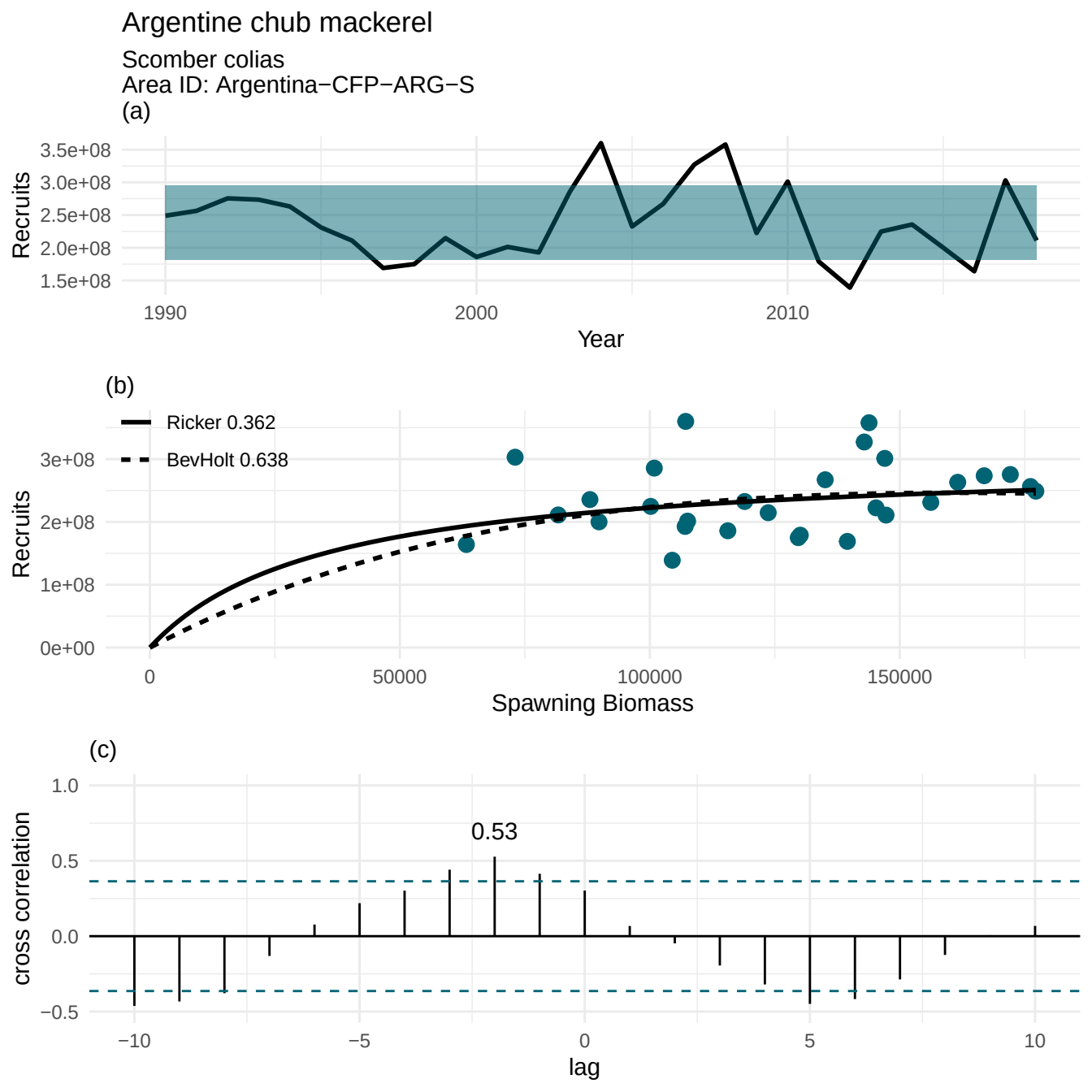
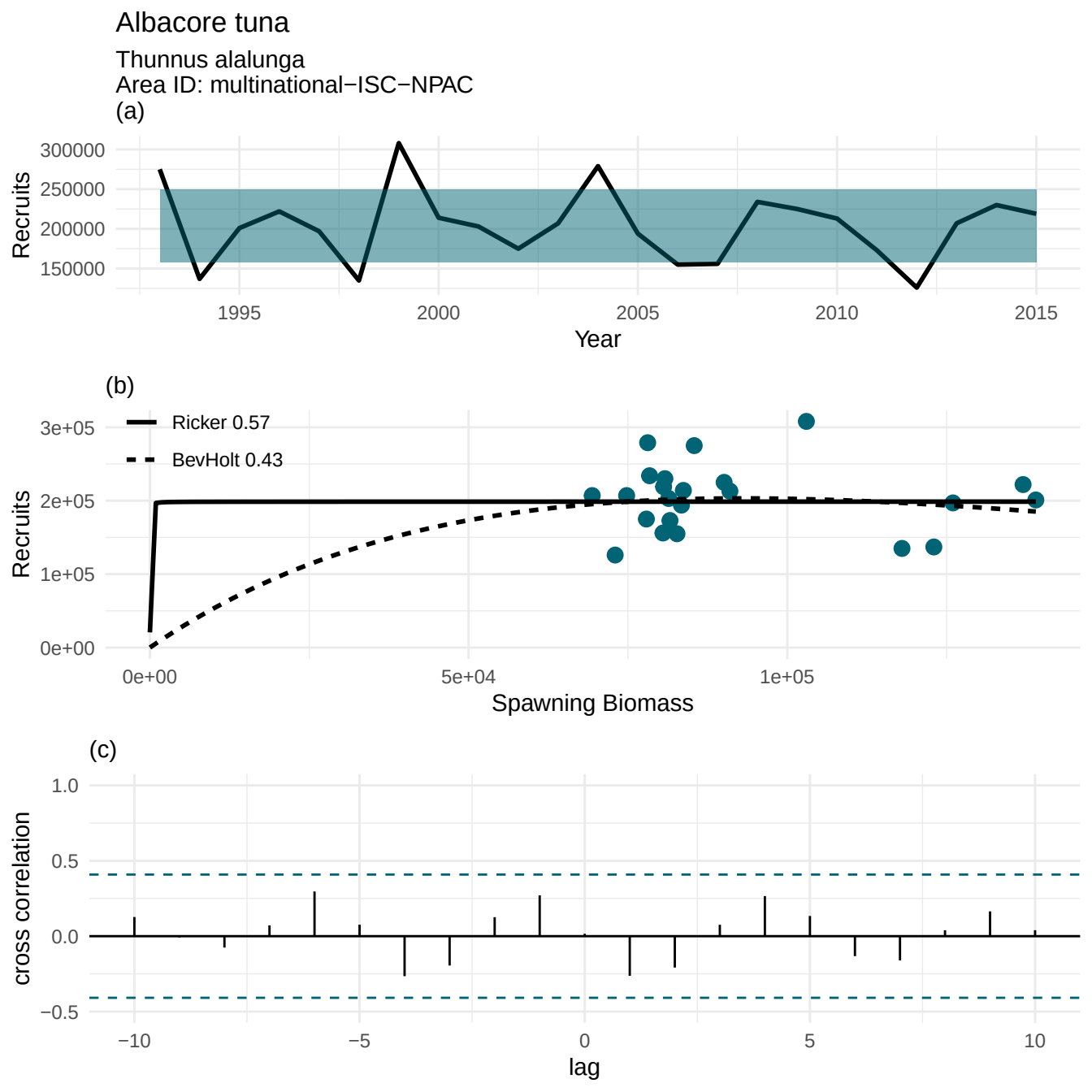
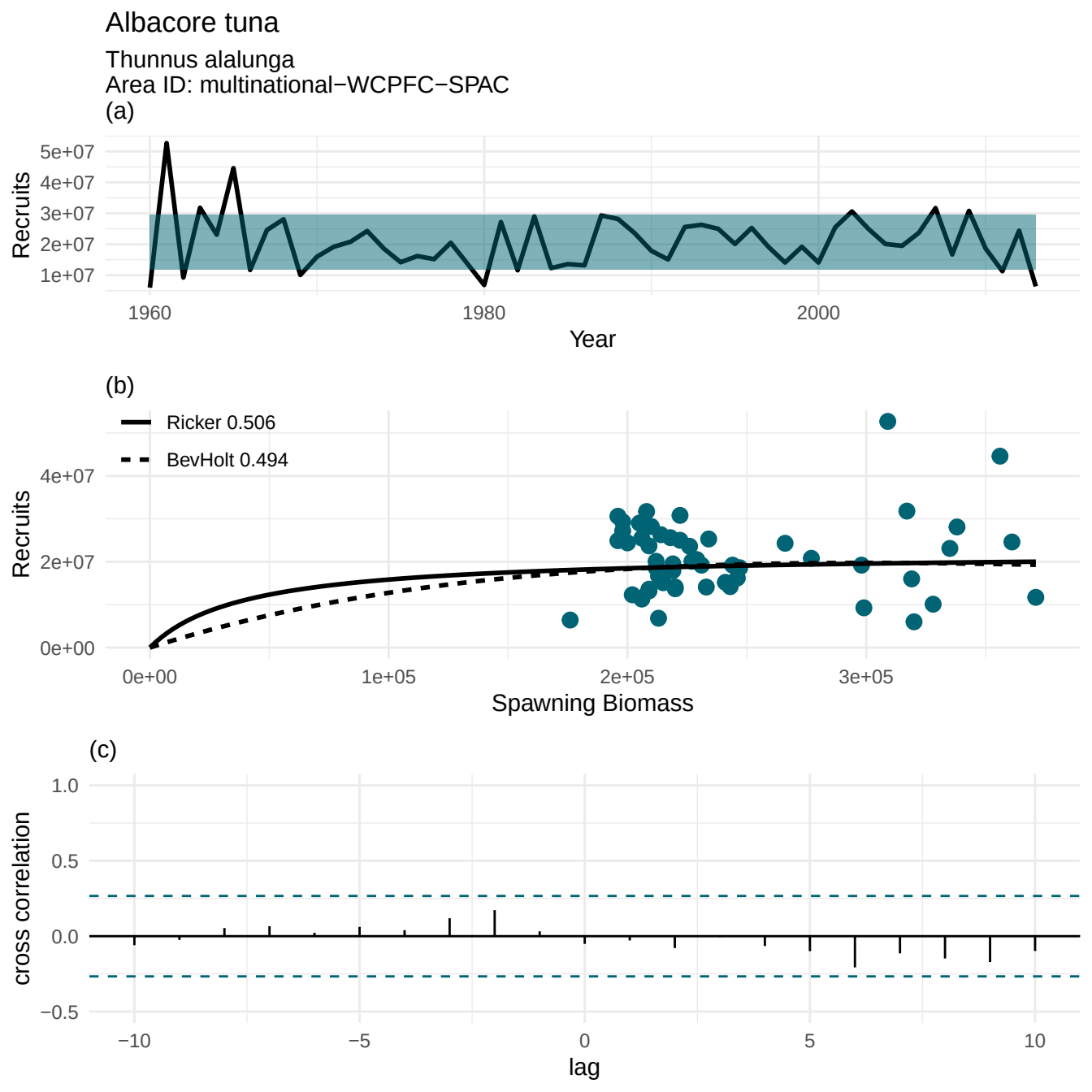
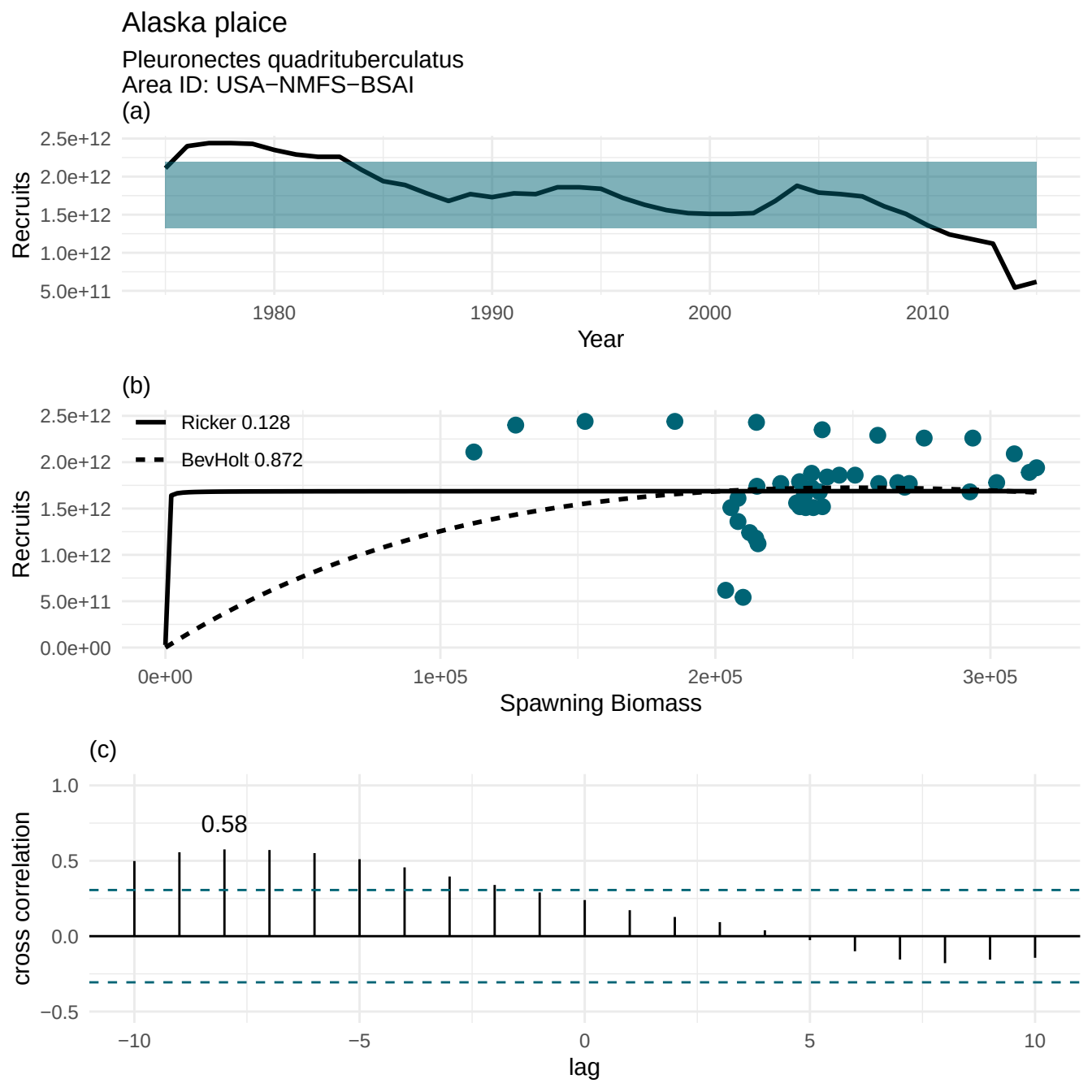
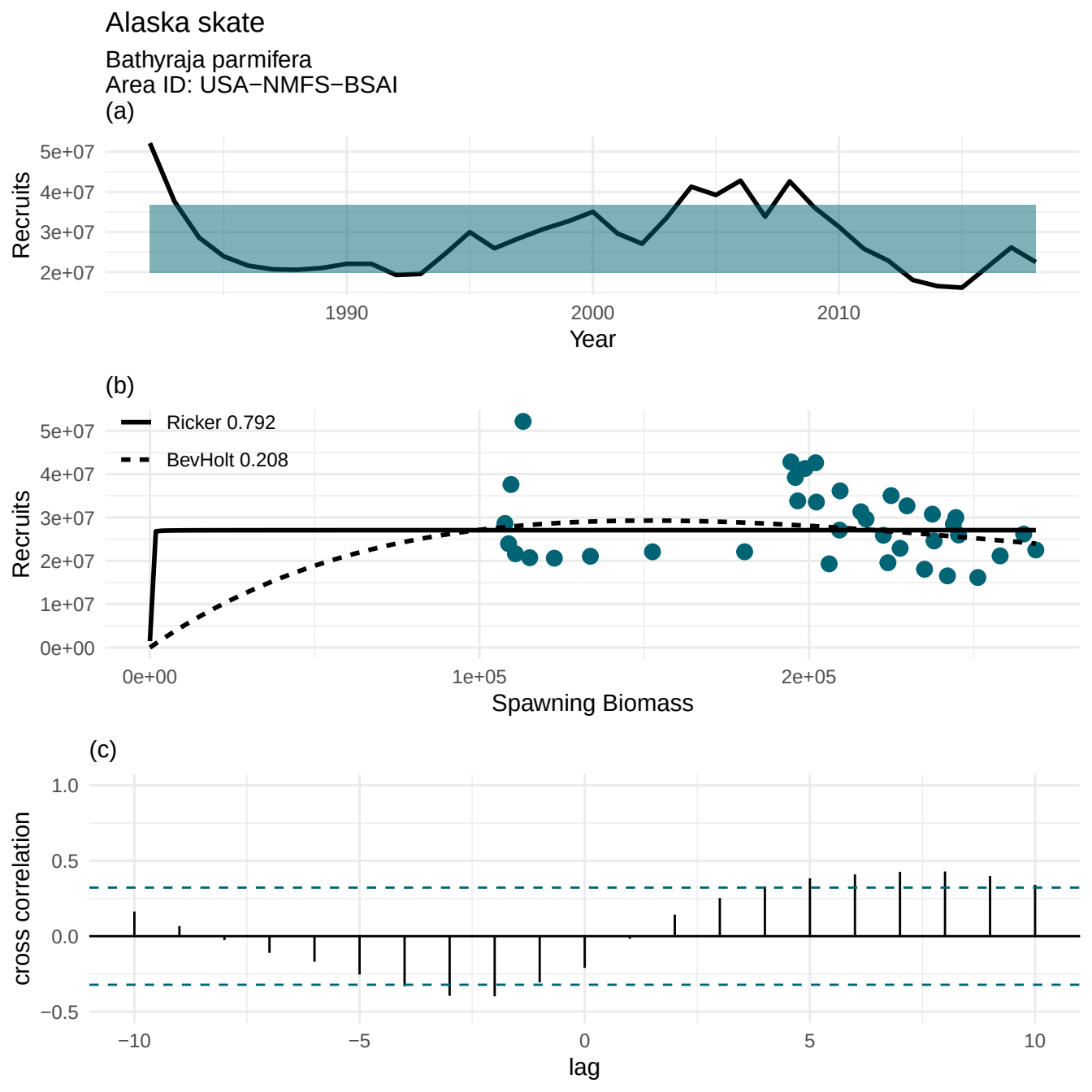

Acadian redfish
Sebastes fasciatus
Area ID: USA−NMFS−5YZ
(a)
Recruits
3e+08
2e+08
1e+08
0e+00
1980
1990
2000
2010
Year
(b)
Ricker 0.44
BevHolt 0.56
Recruits
3e+08
2e+08
1e+08
0e+00
0e+00
1e+05
2e+05
3e+05
4e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.74
0.55
−10
−5
0
5
10
lag

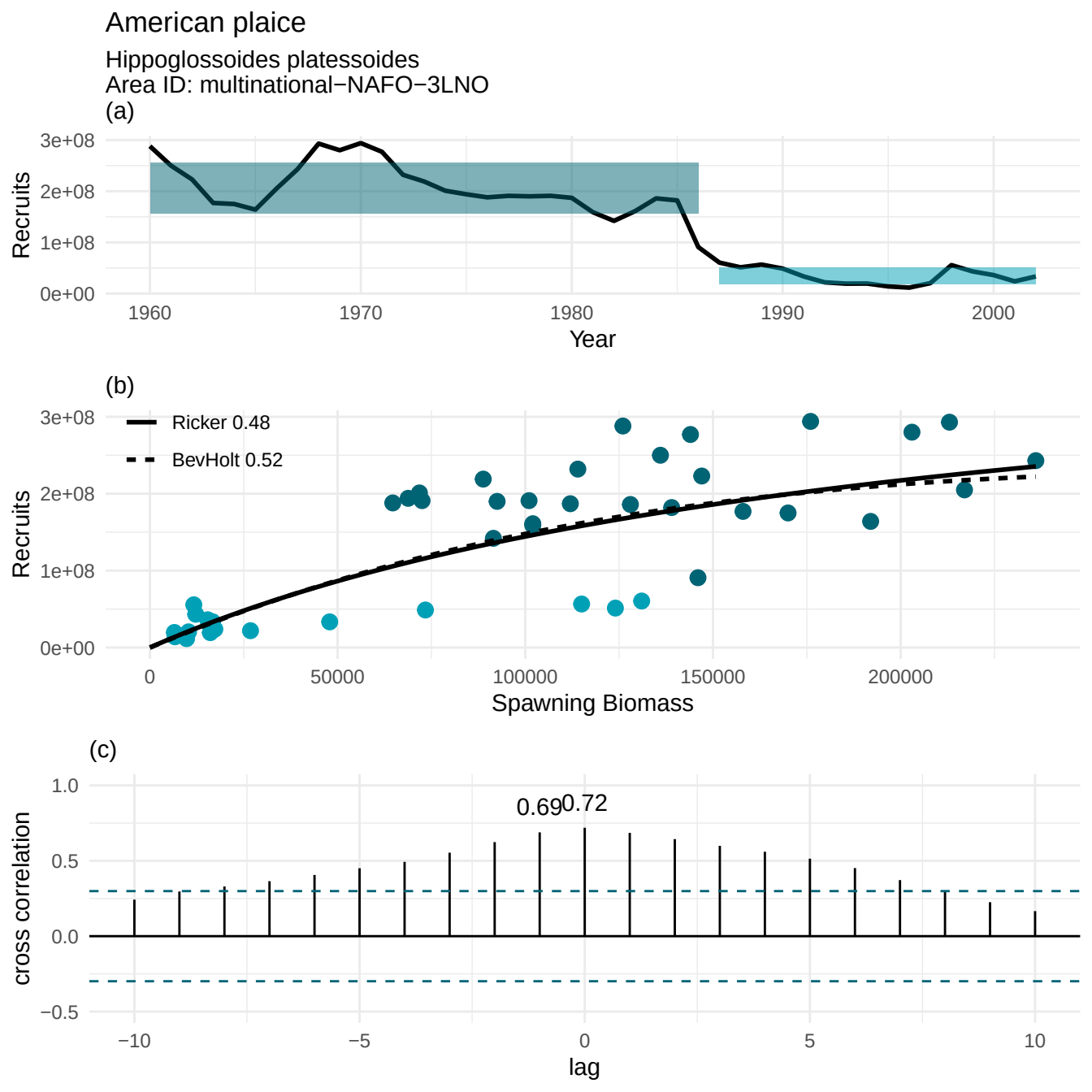

Argentine chub mackerel
Scomber colias
Area ID: Argentina−CFP−ARG−S
(a)
Recruits
3.5e+08
3.0e+08
2.5e+08
2.0e+08
1.5e+08
1990
2000
2010
Year
(b)
Ricker 0.362
BevHolt 0.638
Recruits
3e+08
2e+08
1e+08
0e+00
0
50000
100000
150000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.53
−10
−5
0
5
10
lag

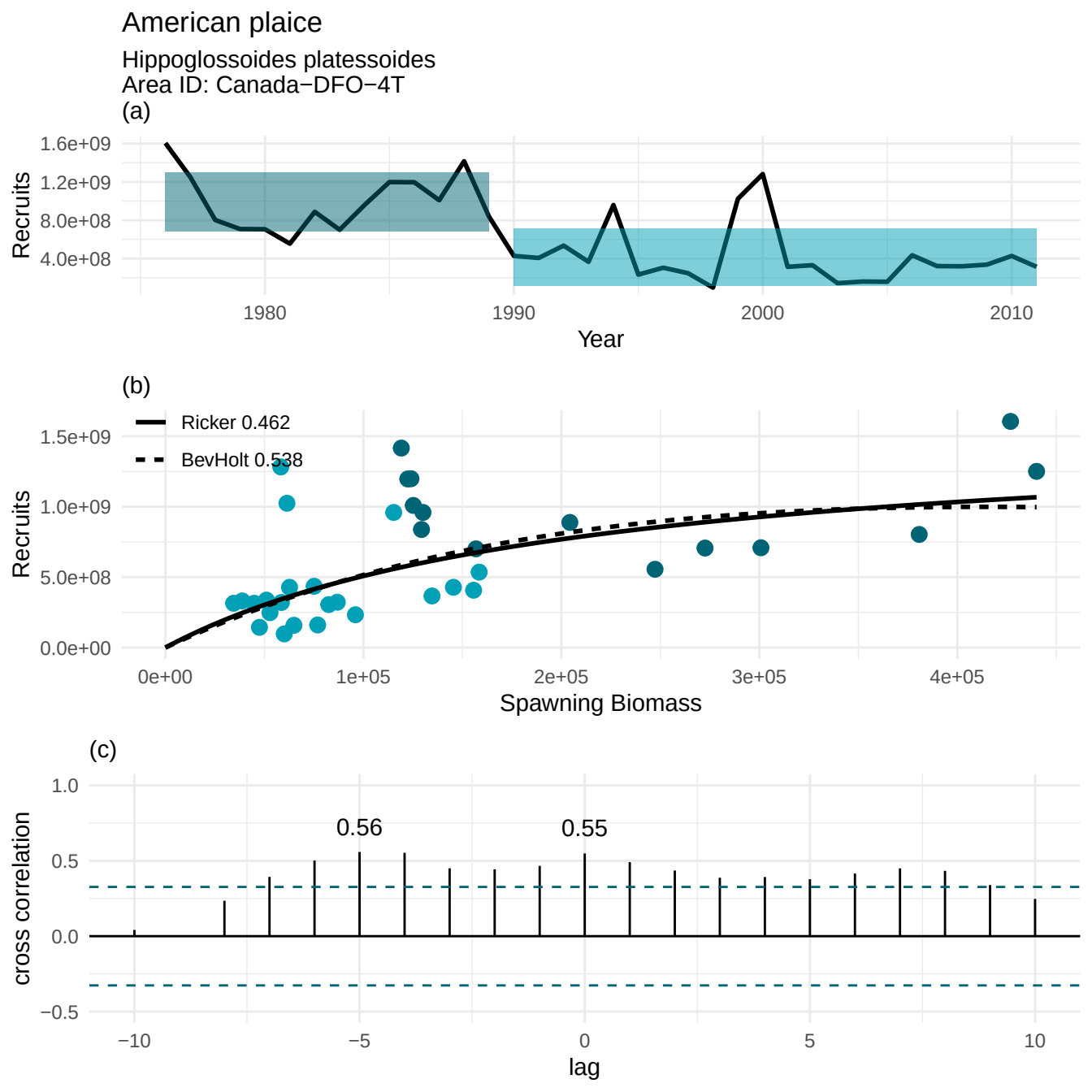

Albacore tuna
Thunnus alalunga
Area ID: multinational−ISC−NPAC
(a)
Recruits
300000
250000
200000
150000
1995
2000
2005
2010
2015
Year
(b)
Ricker 0.57
BevHolt 0.43
Recruits
3e+05
2e+05
1e+05
0e+00
0e+00
5e+04
1e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

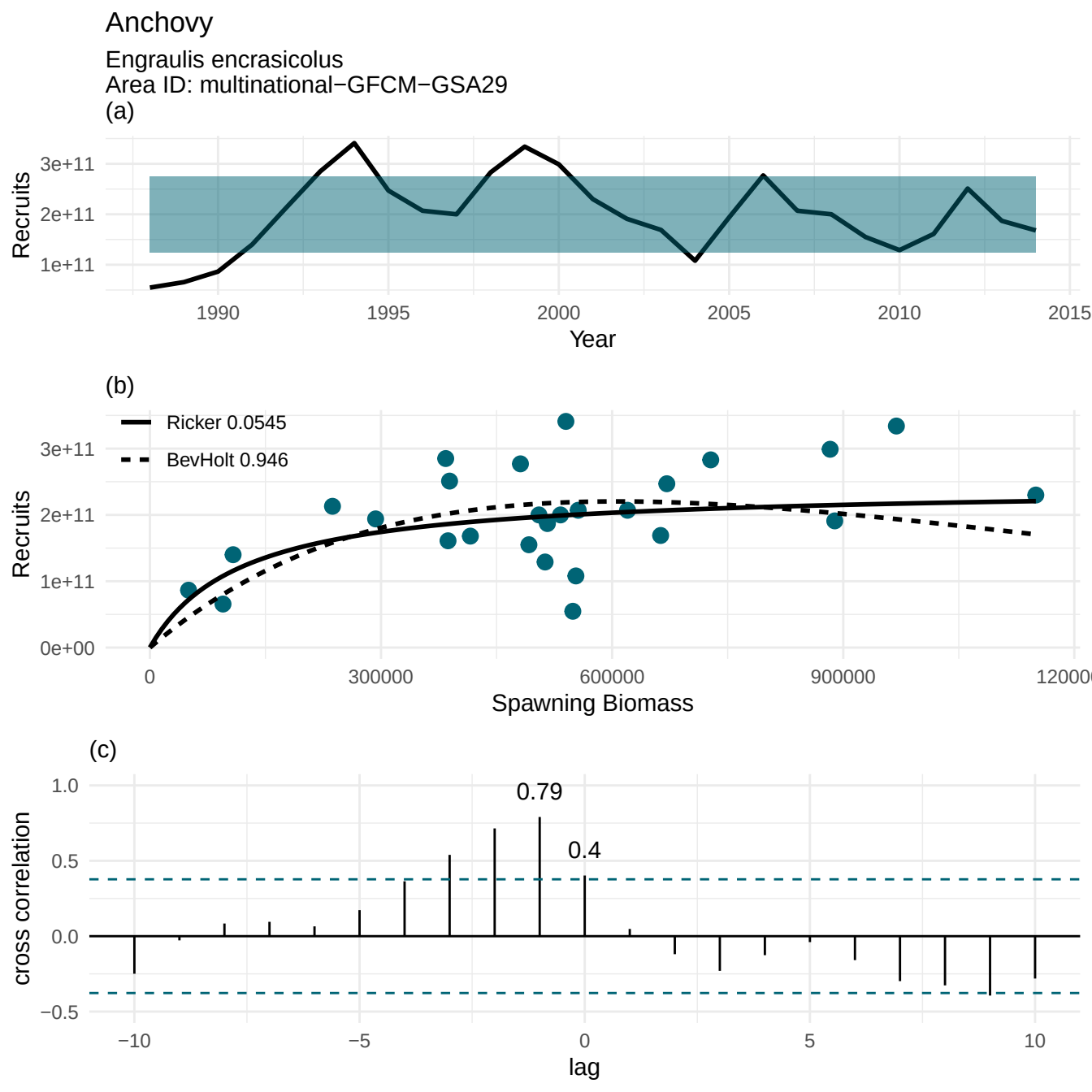

Albacore tuna
Thunnus alalunga
Area ID: multinational−WCPFC−SPAC
(a)
Recruits
5e+07
4e+07
3e+07
2e+07
1e+07
1960
1980
2000
Year
(b)
Ricker 0.506
BevHolt 0.494
Recruits
4e+07
2e+07
0e+00
0e+00
1e+05
2e+05
3e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

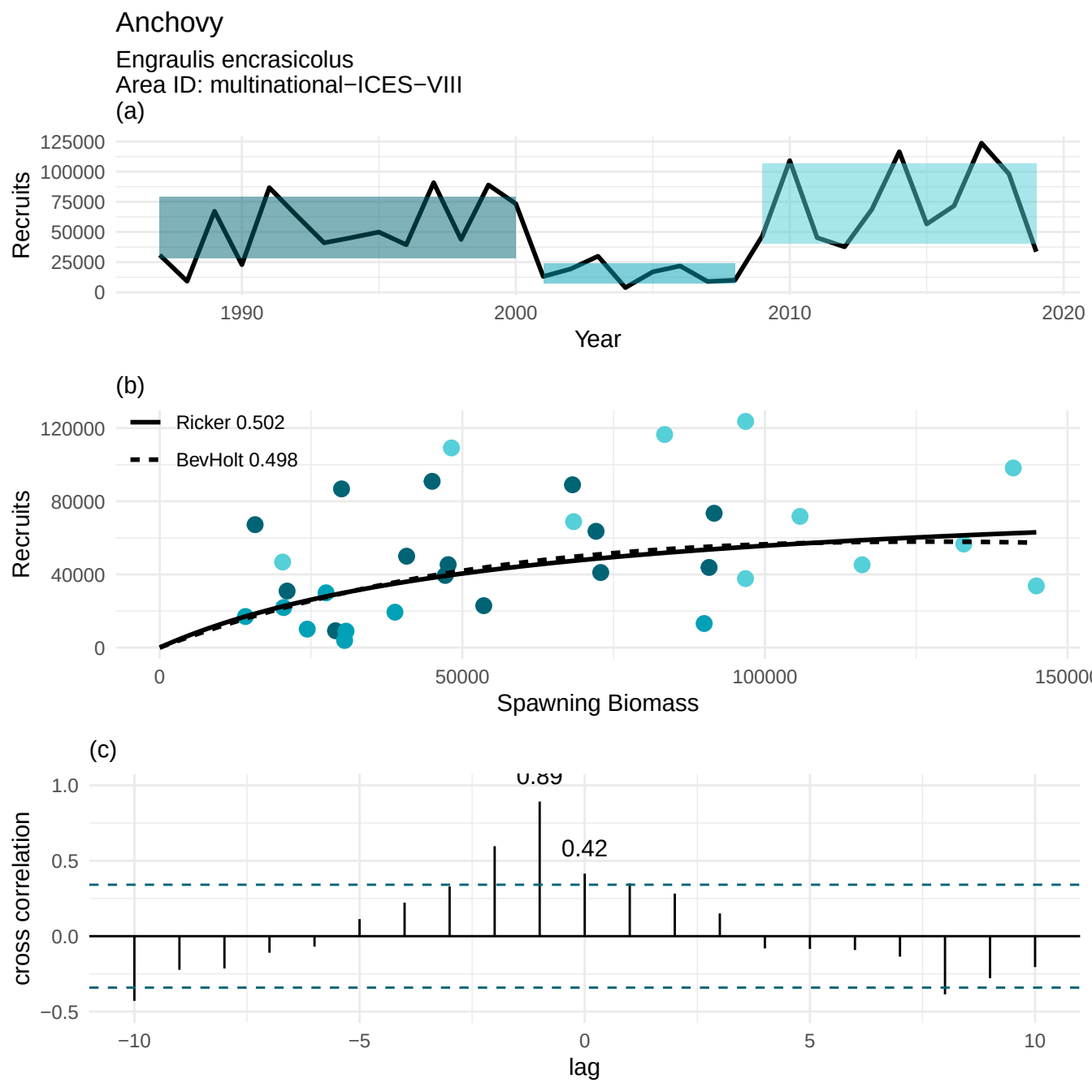

Alaska plaice
Pleuronectes quadrituberculatus
Area ID: USA−NMFS−BSAI
(a)
Recruits
2.5e+12
2.0e+12
1.5e+12
1.0e+12
5.0e+11
1980
1990
2000
2010
Year
(b)
Ricker 0.128
BevHolt 0.872
Recruits
2.5e+12
2.0e+12
1.5e+12
1.0e+12
5.0e+11
0.0e+00
0e+00
1e+05
2e+05
3e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.58
−10
−5
0
5
10
lag

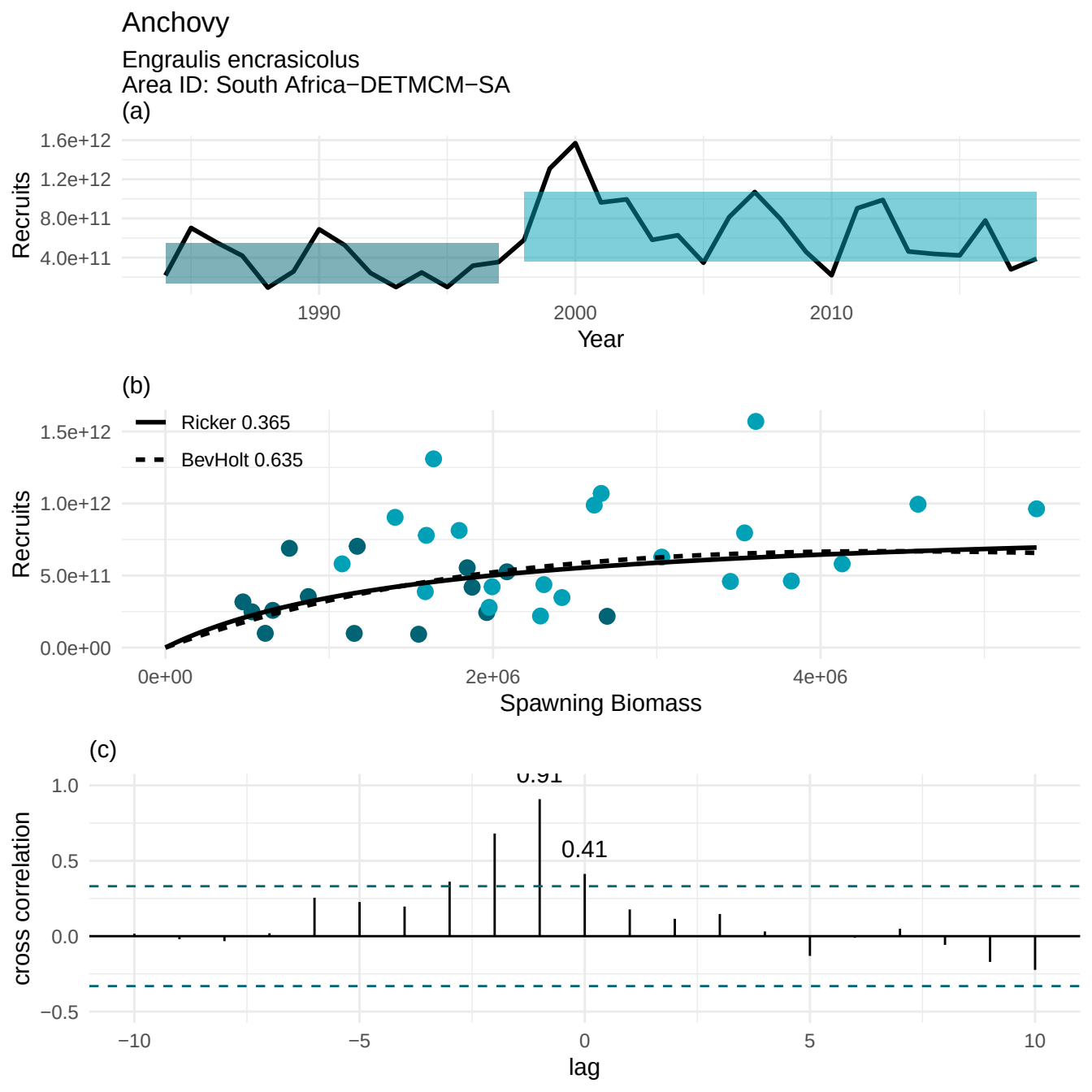

Alaska skate
Bathyraja parmifera
Area ID: USA−NMFS−BSAI
(a)
Recruits
5e+07
4e+07
3e+07
2e+07
1990
2000
2010
Year
(b)
Ricker 0.792
BevHolt 0.208
Recruits
5e+07
4e+07
3e+07
2e+07
1e+07
0e+00
0e+00
1e+05
2e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

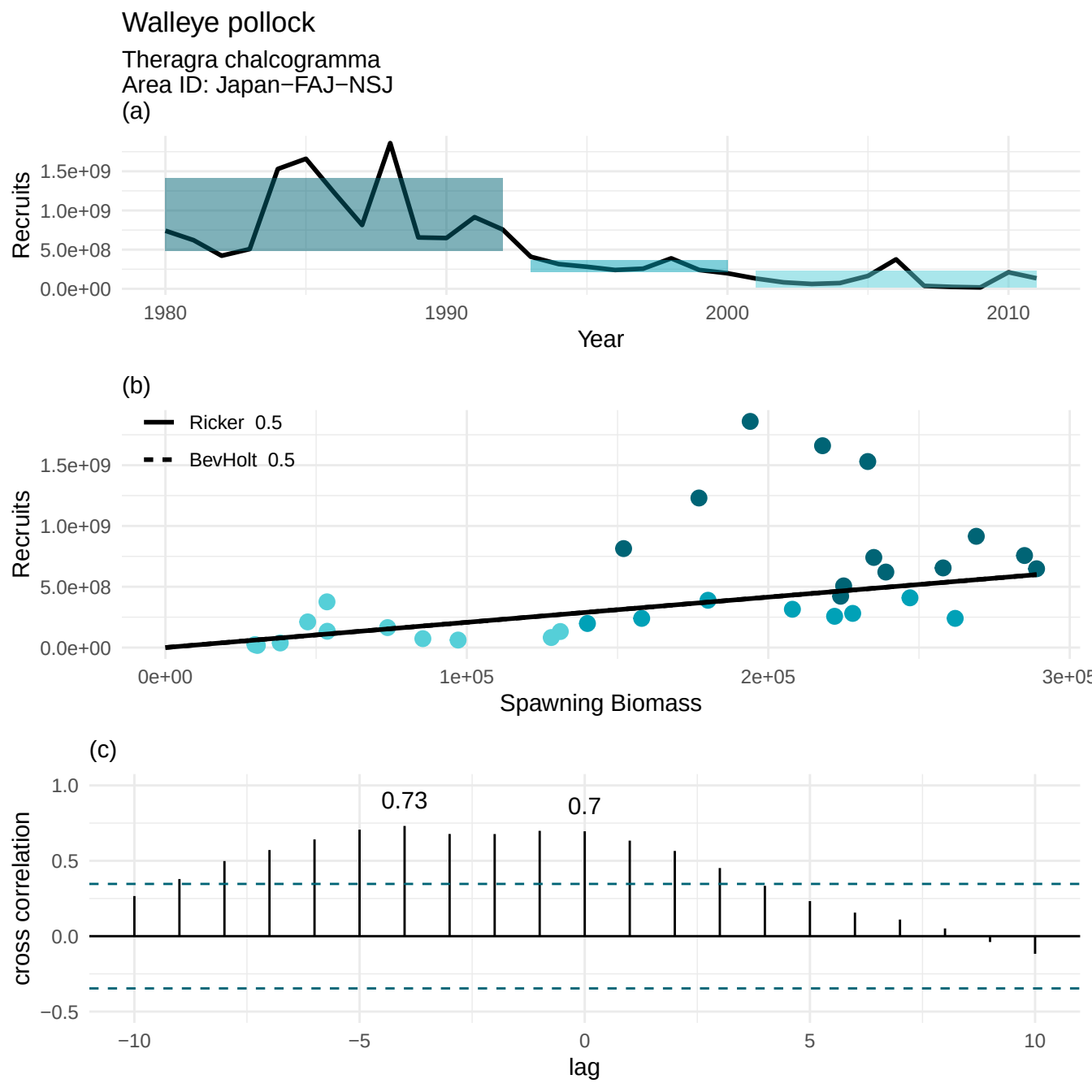

American plaice
Hippoglossoides platessoides
Area ID: multinational−NAFO−3LNO
(a)
Recruits
3e+08
2e+08
1e+08
0e+00
1960
1970
1980
1990
2000
Year
(b)
Ricker 0.48
BevHolt 0.52
Recruits
3e+08
2e+08
1e+08
0e+00
0
50000
100000
150000
200000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.69
0.72
−10
−5
0
5
10
lag

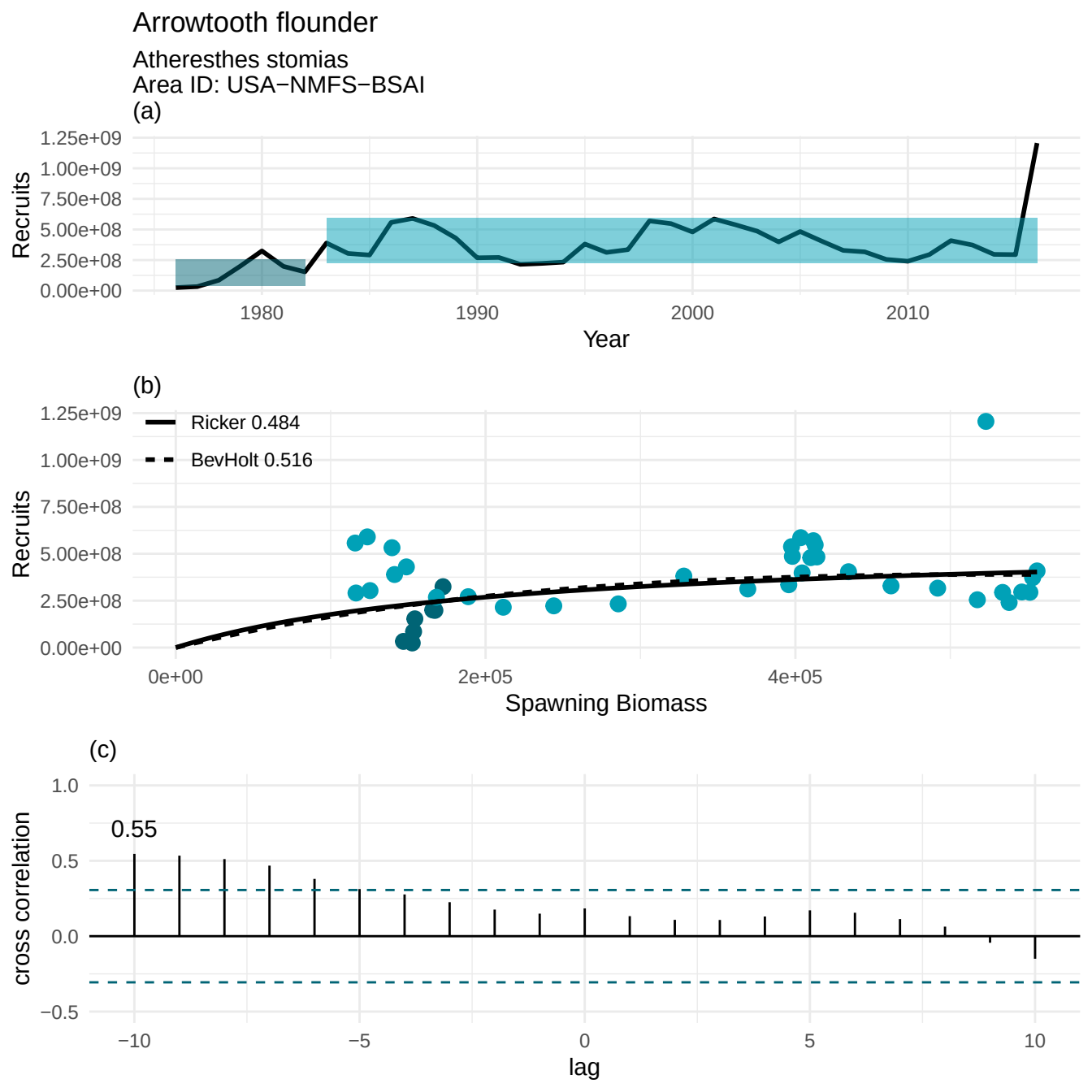

American plaice
Hippoglossoides platessoides
Area ID: Canada−DFO−4T
(a)
Recruits
1.6e+09
1.2e+09
8.0e+08
4.0e+08
1980
1990
2000
2010
Year
(b)
Ricker 0.462
BevHolt 0.538
Recruits
1.5e+09
1.0e+09
5.0e+08
0.0e+00
0e+00
1e+05
2e+05
3e+05
4e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.56
0.55
−10
−5
0
5
10
lag

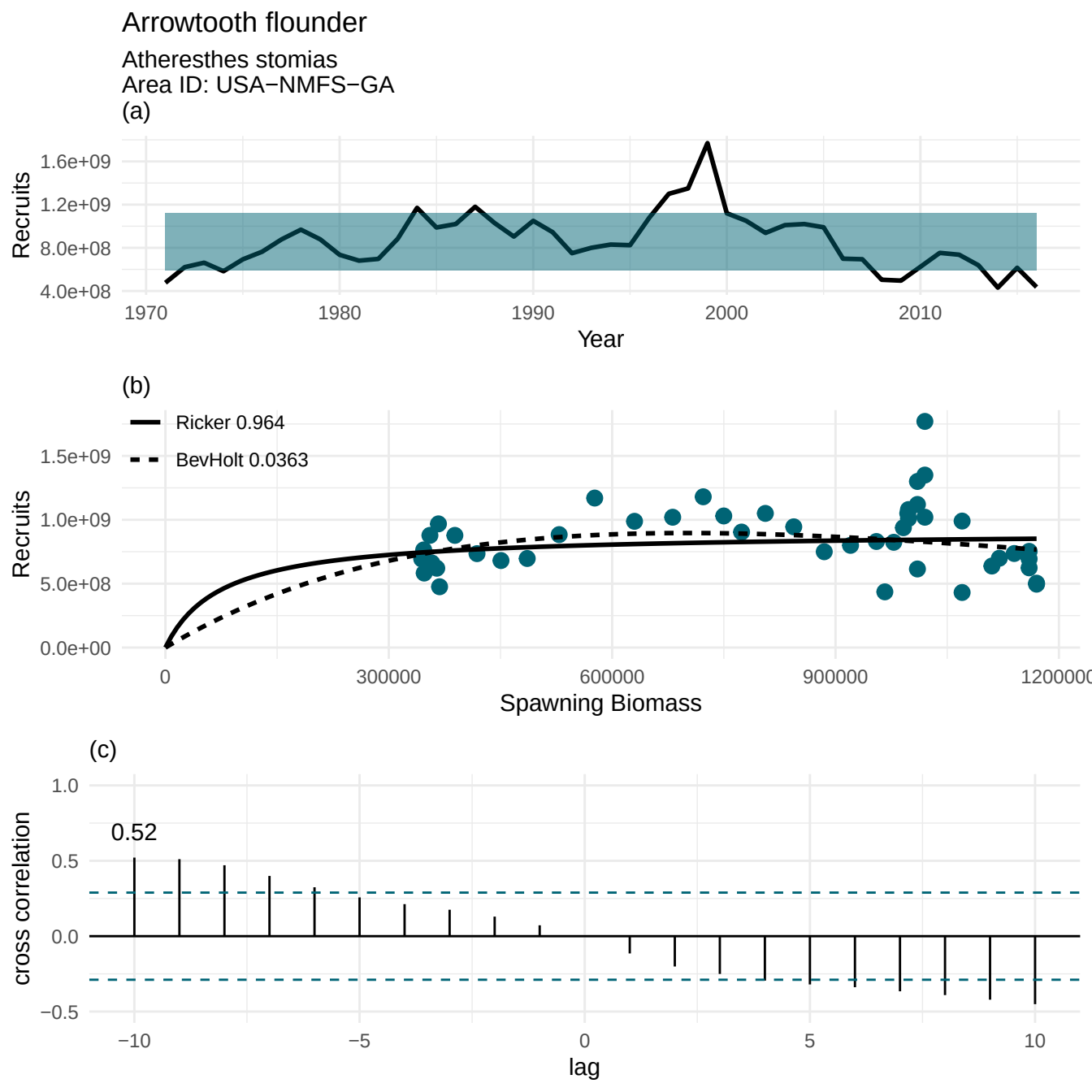

Anchovy
Engraulis encrasicolus
Area ID: multinational−GFCM−GSA29
(a)
Recruits
3e+11
2e+11
1e+11
1990
1995
2000
2005
2010
2015
Year
(b)
Ricker 0.0545
BevHolt 0.946
Recruits
3e+11
2e+11
1e+11
0e+00
0
300000
600000
900000
12000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.79
0.4
−10
−5
0
5
10
lag

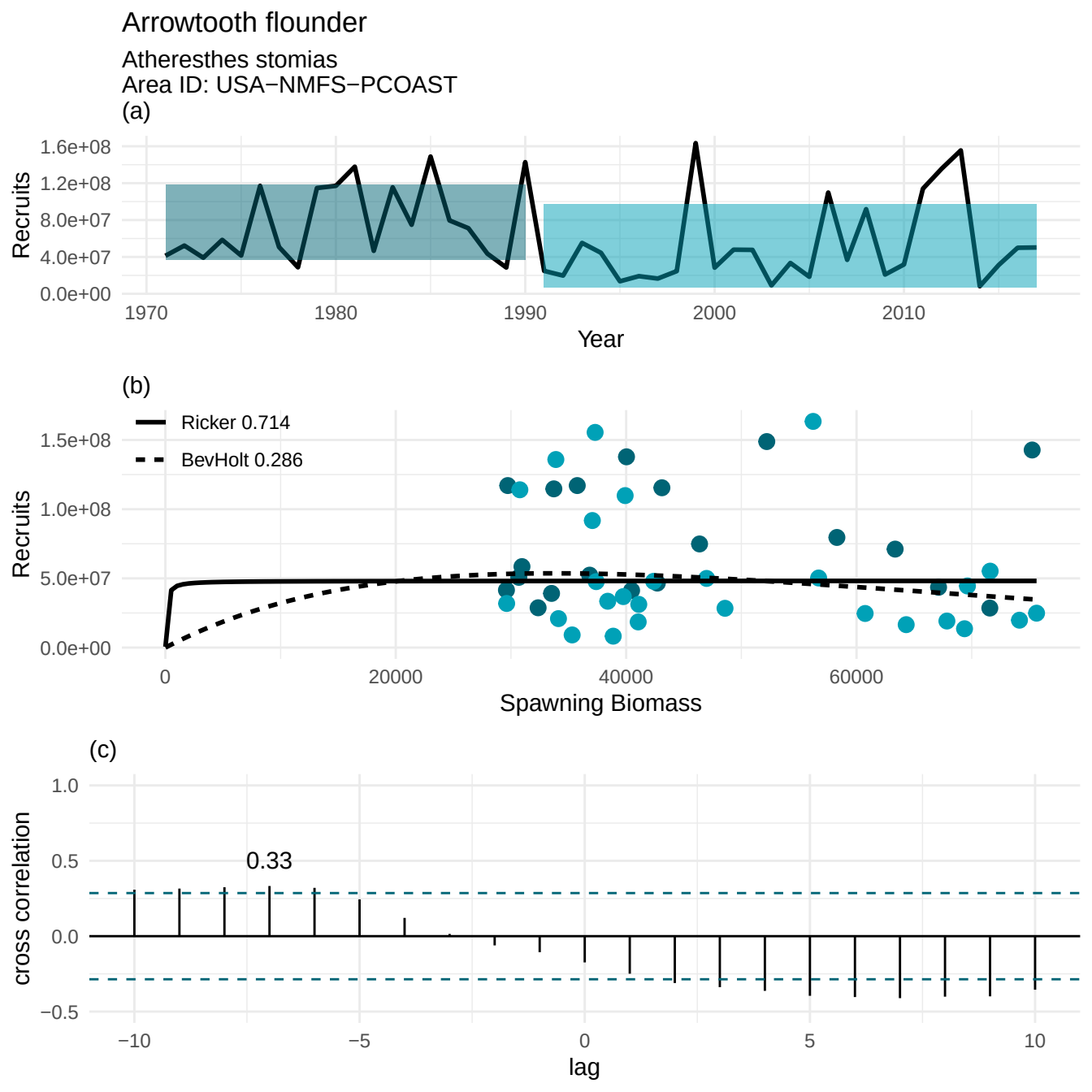

Anchovy
Engraulis encrasicolus
Area ID: multinational−ICES−VIII
(a)
Recruits
125000
100000
75000
50000
25000
0
1990
2000
2010
2020
Year
(b)
Ricker 0.502
BevHolt 0.498
Recruits
120000
80000
40000
0
0
50000
100000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.89
0.42
−10
−5
0
5
10
lag

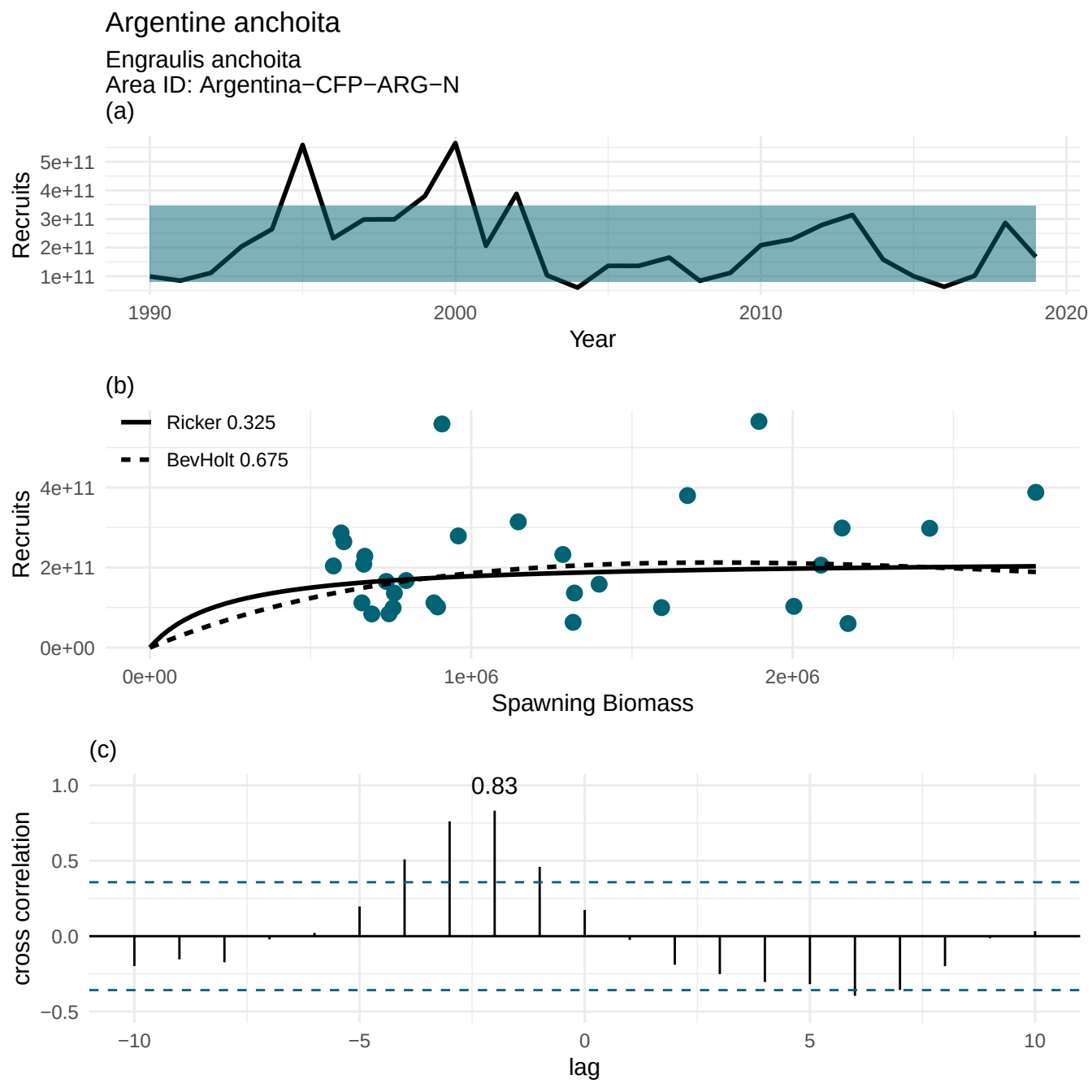

Anchovy
Engraulis encrasicolus
Area ID: South Africa−DETMCM−SA
(a)
Recruits
1.6e+12
1.2e+12
8.0e+11
4.0e+11
1990
2000
2010
Year
(b)
Ricker 0.365
BevHolt 0.635
Recruits
1.5e+12
1.0e+12
5.0e+11
0.0e+00
0e+00
2e+06
4e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.91
0.41
−10
−5
0
5
10
lag

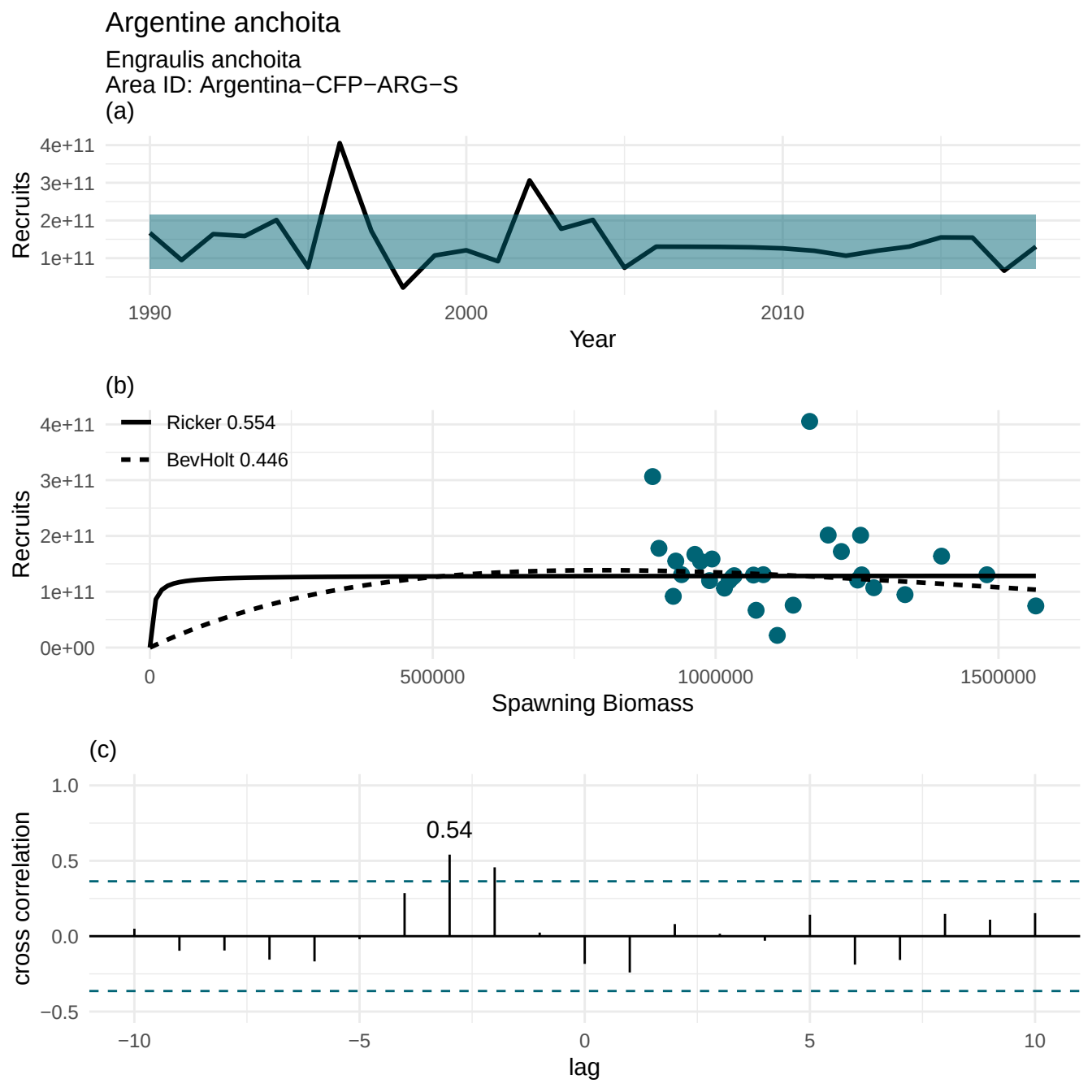

Walleye pollock
Theragra chalcogramma
Area ID: Japan−FAJ−NSJ
(a)
Recruits
1.5e+09
1.0e+09
5.0e+08
0.0e+00
1980
1990
2000
2010
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
1.5e+09
1.0e+09
5.0e+08
0.0e+00
0e+00
1e+05
2e+05
3e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.73
0.7
−10
−5
0
5
10
lag

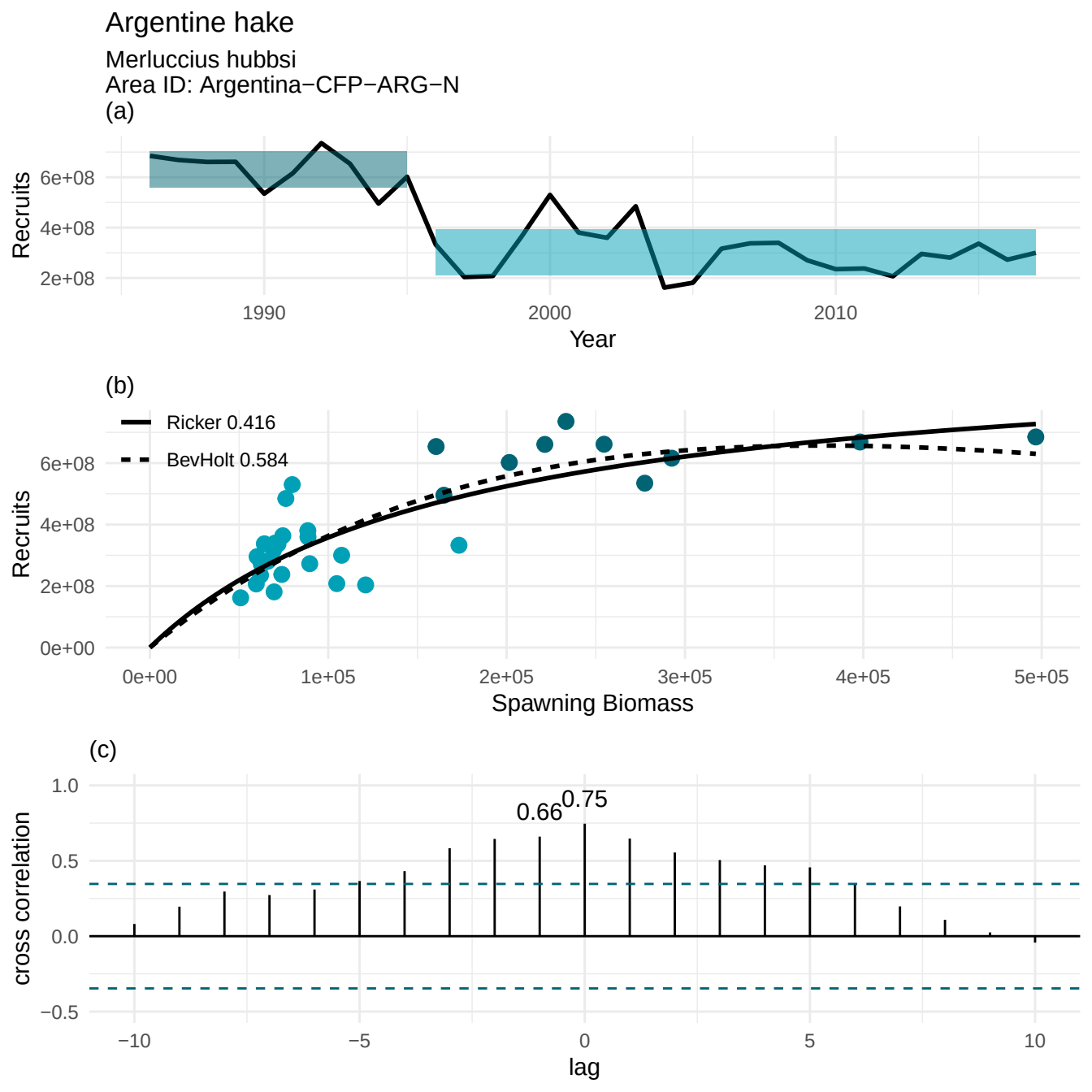

Arrowtooth flounder
Atheresthes stomias
Area ID: USA−NMFS−BSAI
(a)
Recruits
1.25e+09
1.00e+09
7.50e+08
5.00e+08
2.50e+08
0.00e+00
1980
1990
2000
2010
Year
(b)
Ricker 0.484
BevHolt 0.516
Recruits
0e+00
2e+05
4e+05
Spawning Biomass
(c)
cross correlation
0.55
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

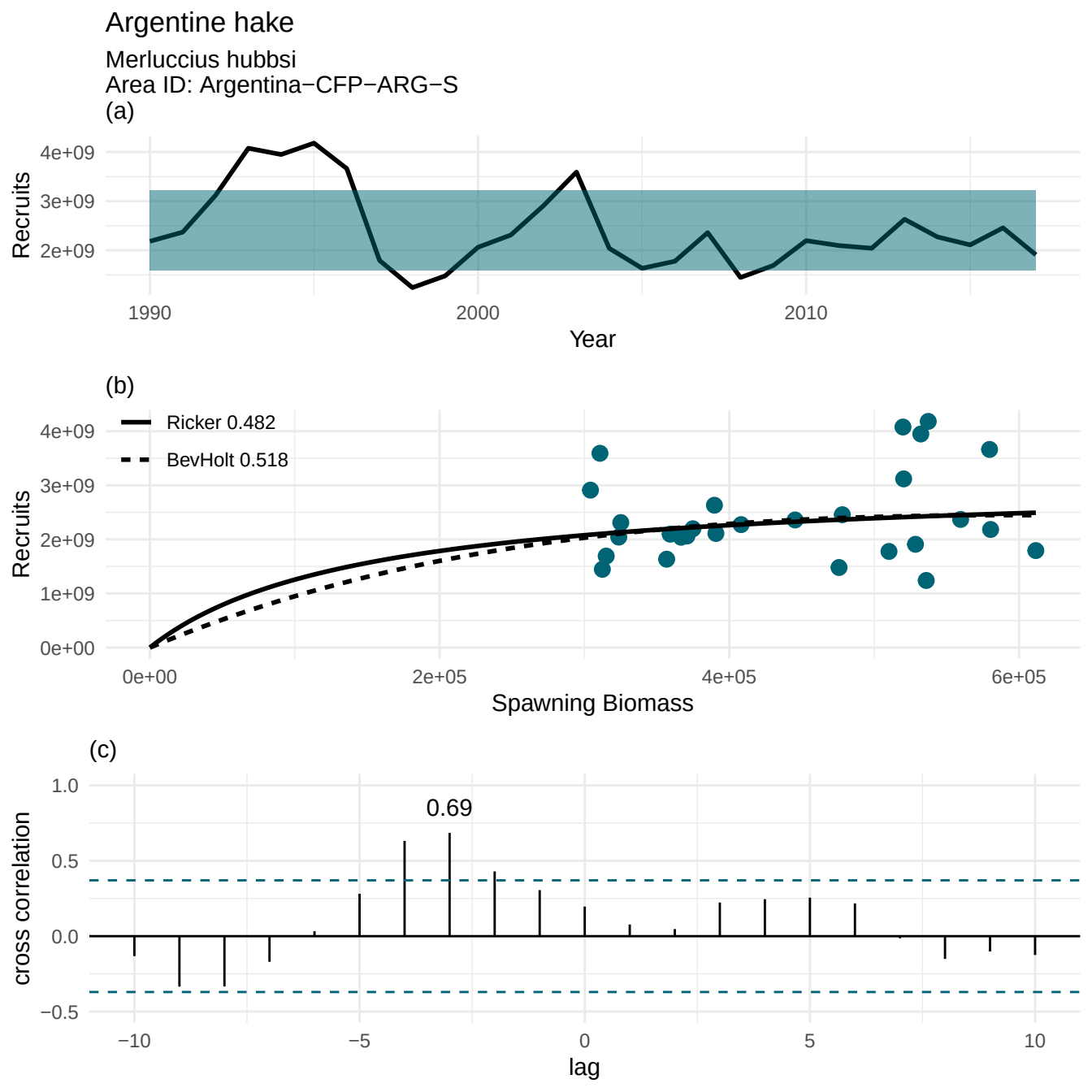

Arrowtooth flounder
Atheresthes stomias
Area ID: USA−NMFS−GA
(a)
Recruits
1.6e+09
1.2e+09
8.0e+08
4.0e+08
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.964
BevHolt 0.0363
Recruits
1.5e+09
1.0e+09
5.0e+08
0.0e+00
0
300000
600000
900000
1200000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.52
−10
−5
0
5
10
lag

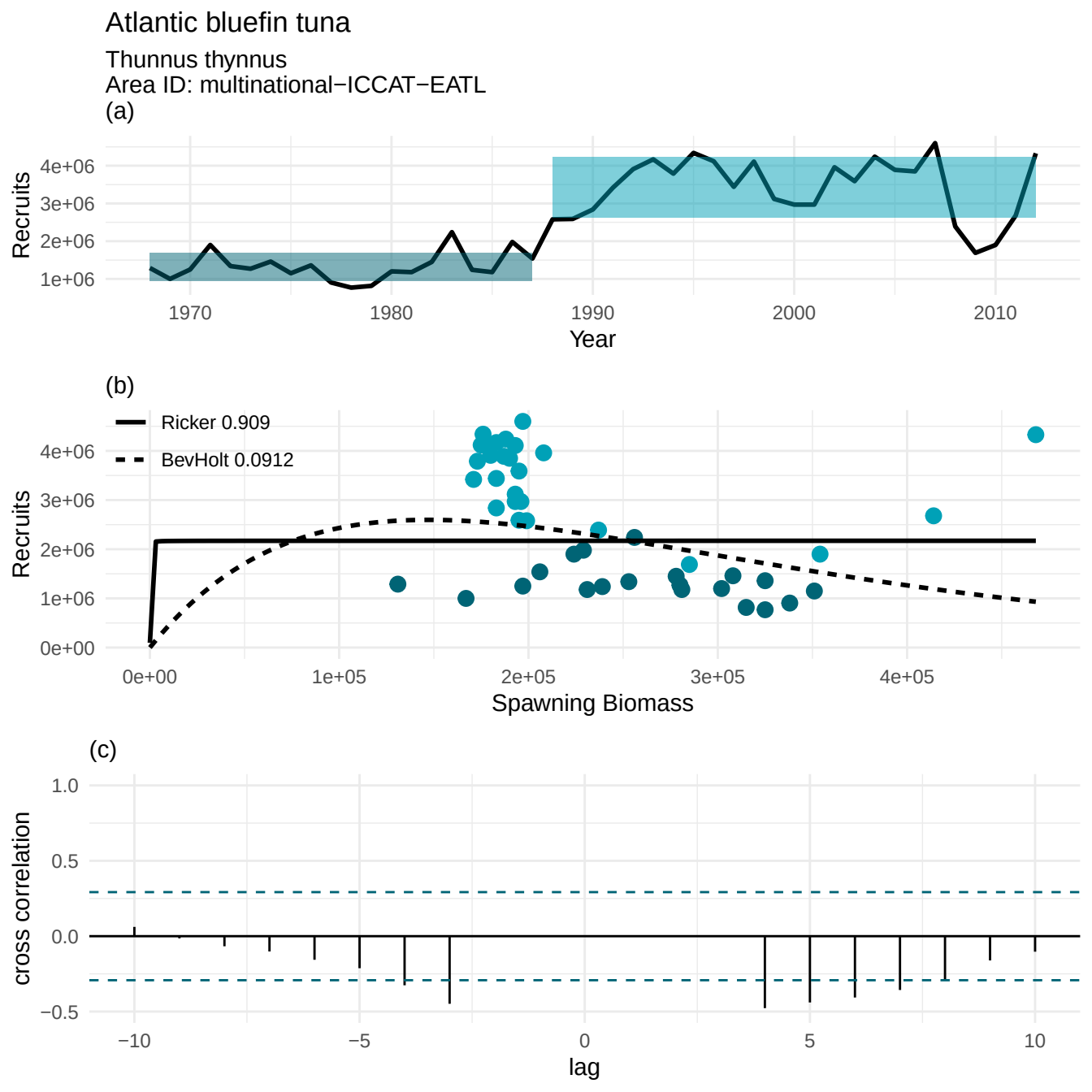

Arrowtooth flounder
Atheresthes stomias
Area ID: USA−NMFS−PCOAST
(a)
Recruits
1.6e+08
1.2e+08
8.0e+07
4.0e+07
0.0e+00
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.714
BevHolt 0.286
Recruits
1.5e+08
1.0e+08
5.0e+07
0.0e+00
0
20000
40000
60000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.33
−10
−5
0
5
10
lag

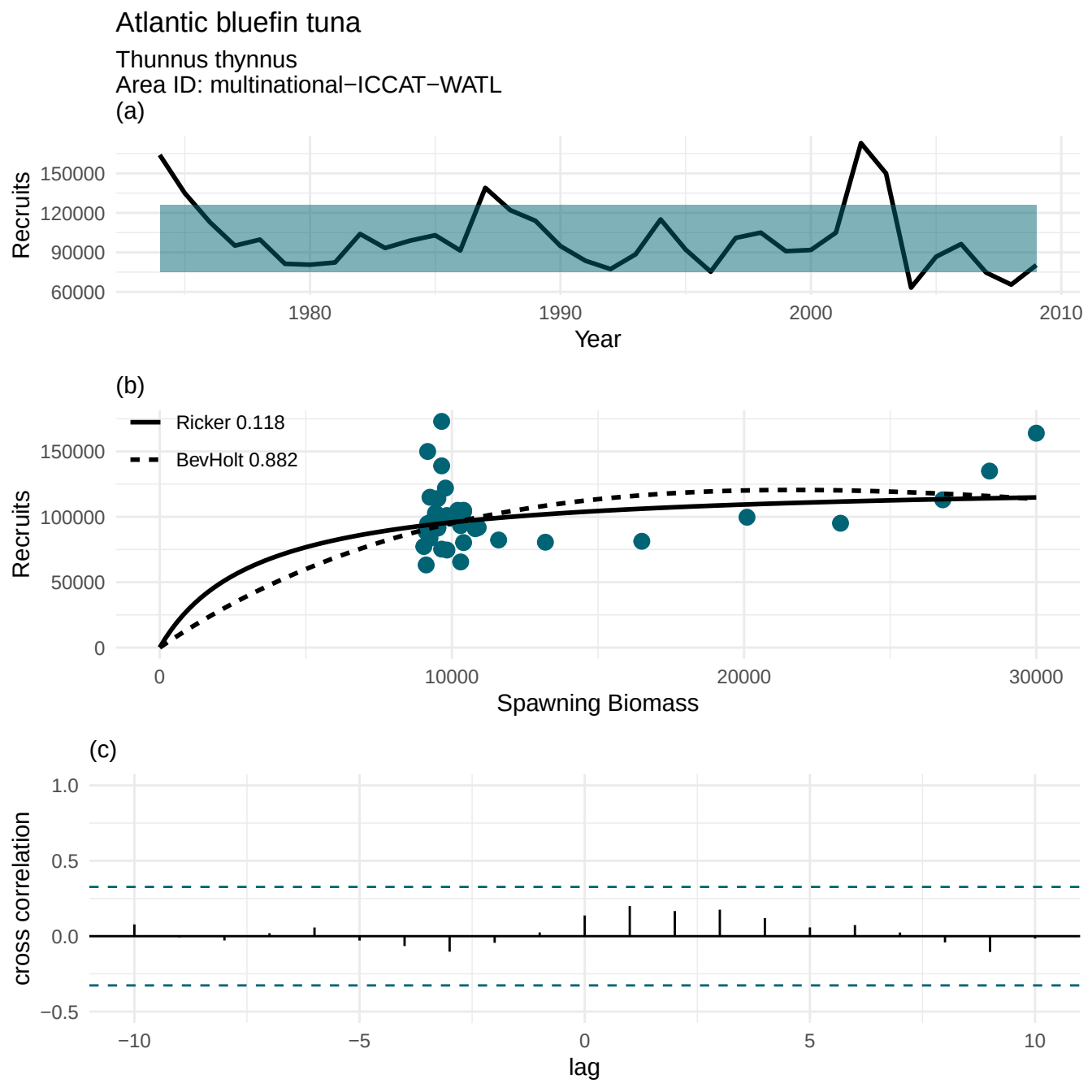

Argentine anchoita
Engraulis anchoita
Area ID: Argentina−CFP−ARG−N
(a)
Recruits
5e+11
4e+11
3e+11
2e+11
1e+11
1990
2000
2010
2020
Year
(b)
Ricker 0.325
BevHolt 0.675
Recruits
4e+11
2e+11
0e+00
0e+00
1e+06
2e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.83
−10
−5
0
5
10
lag

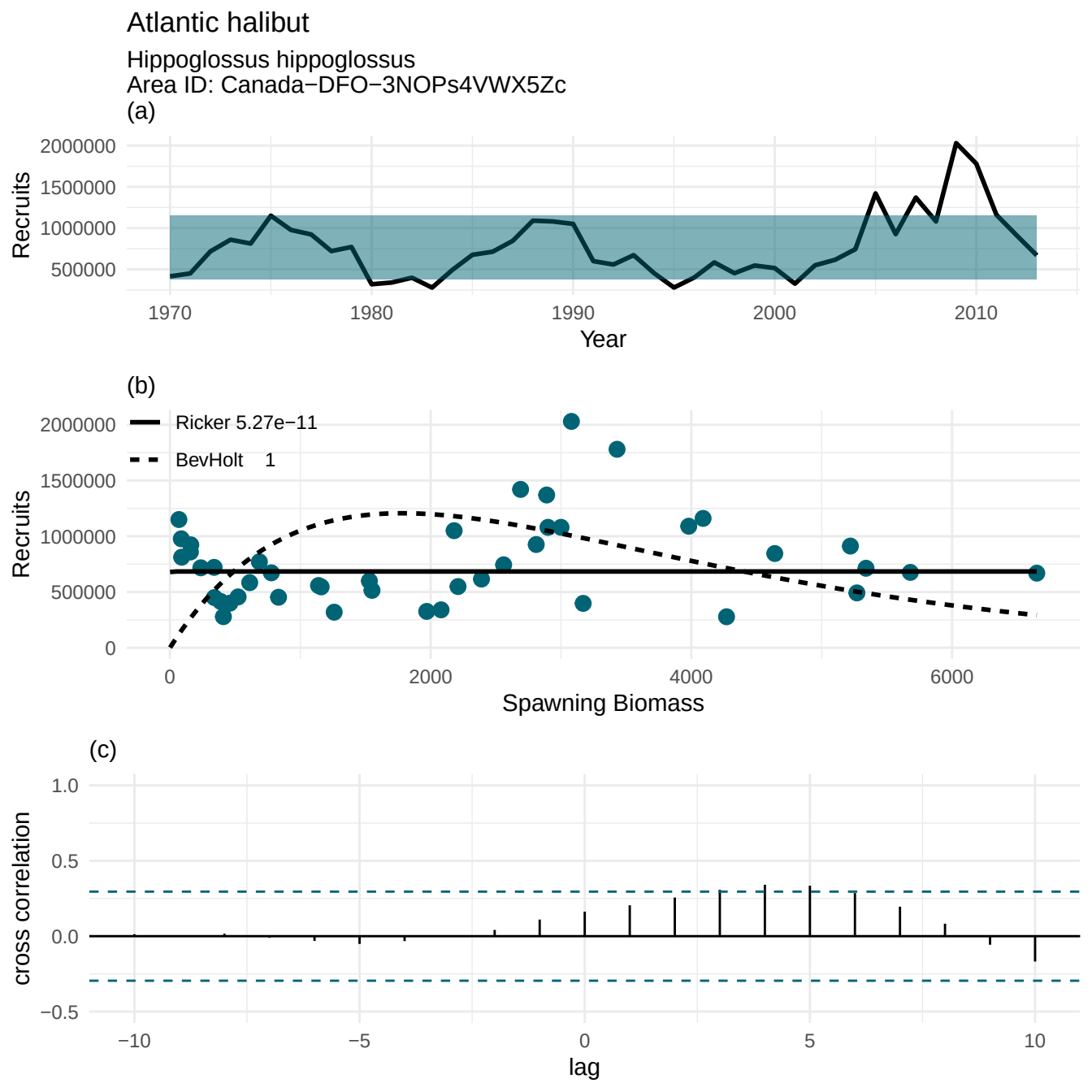

Argentine anchoita
Engraulis anchoita
Area ID: Argentina−CFP−ARG−S
(a)
Recruits
4e+11
3e+11
2e+11
1e+11
1990
2000
2010
Year
(b)
Ricker 0.554
BevHolt 0.446
Recruits
4e+11
3e+11
2e+11
1e+11
0e+00
0
500000
1000000
1500000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.54
−10
−5
0
5
10
lag

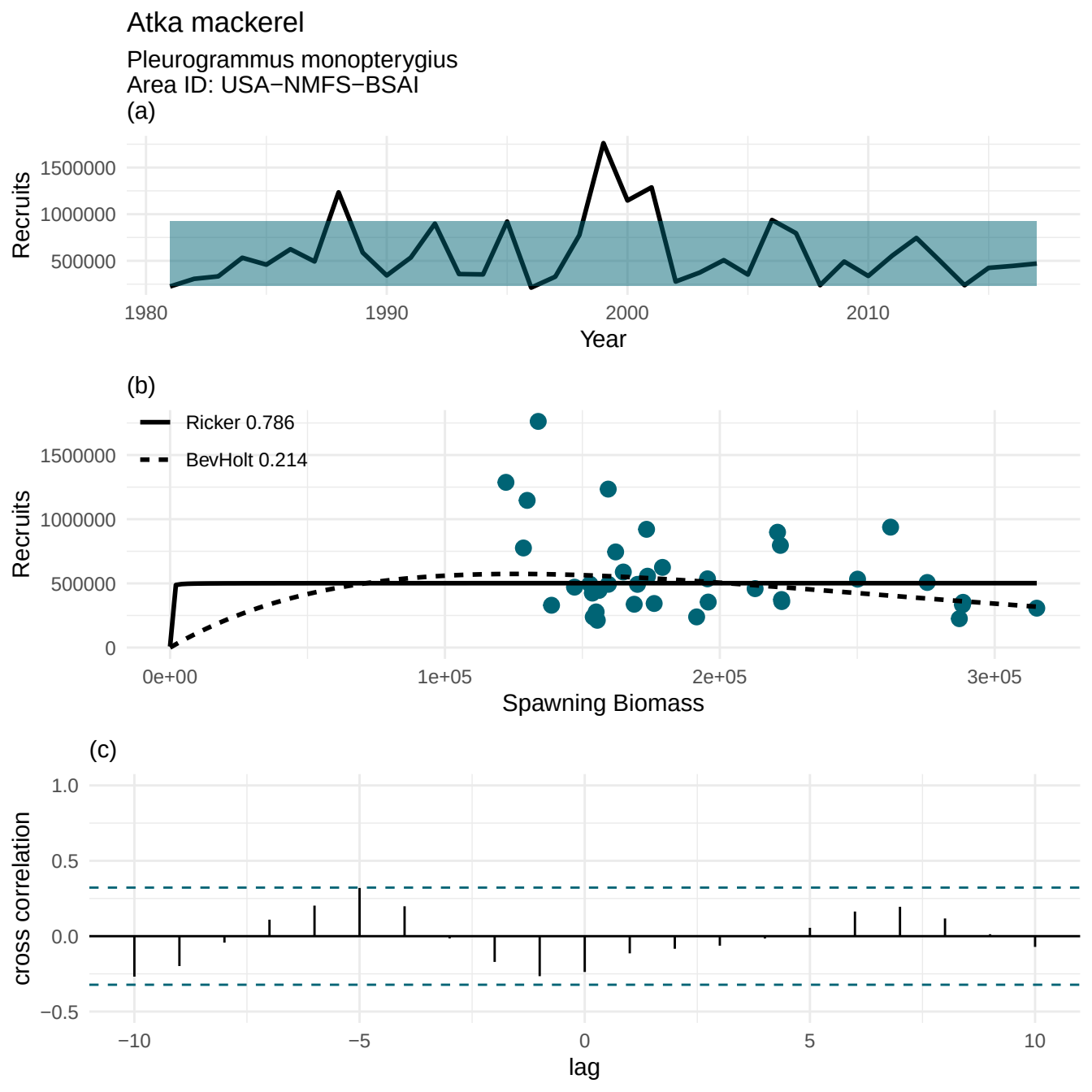

Argentine hake
Merluccius hubbsi
Area ID: Argentina−CFP−ARG−N
(a)
Recruits
6e+08
4e+08
2e+08
1990
2000
2010
Year
(b)
Ricker 0.416
BevHolt 0.584
Recruits
6e+08
4e+08
2e+08
0e+00
0e+00
1e+05
2e+05
3e+05
4e+05
5e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.66
0.75
−10
−5
0
5
10
lag

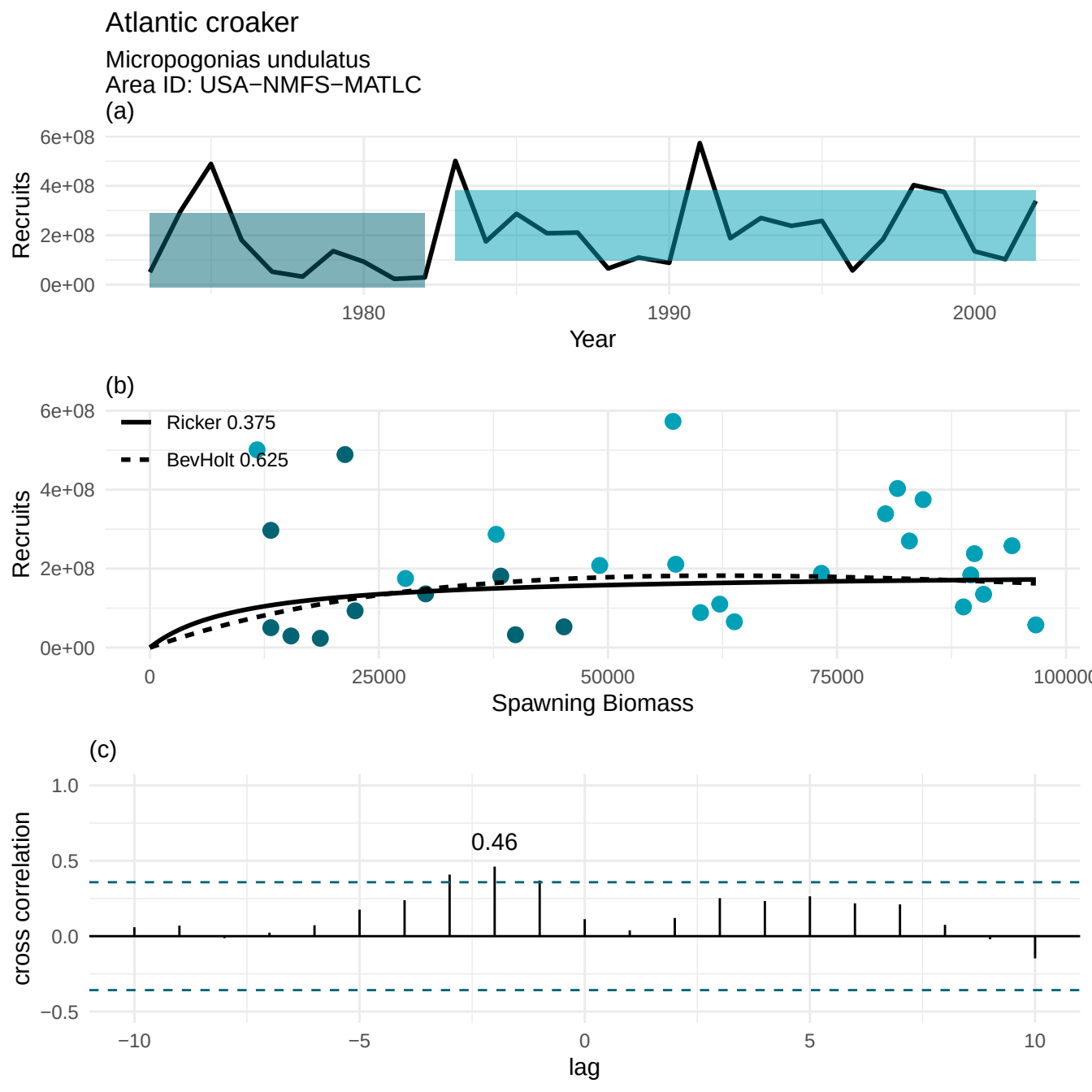

Argentine hake
Merluccius hubbsi
Area ID: Argentina−CFP−ARG−S
(a)
Recruits
4e+09
3e+09
2e+09
1990
2000
2010
Year
(b)
Ricker 0.482
BevHolt 0.518
Recruits
4e+09
3e+09
2e+09
1e+09
0e+00
0e+00
2e+05
4e+05
6e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.69
−10
−5
0
5
10
lag

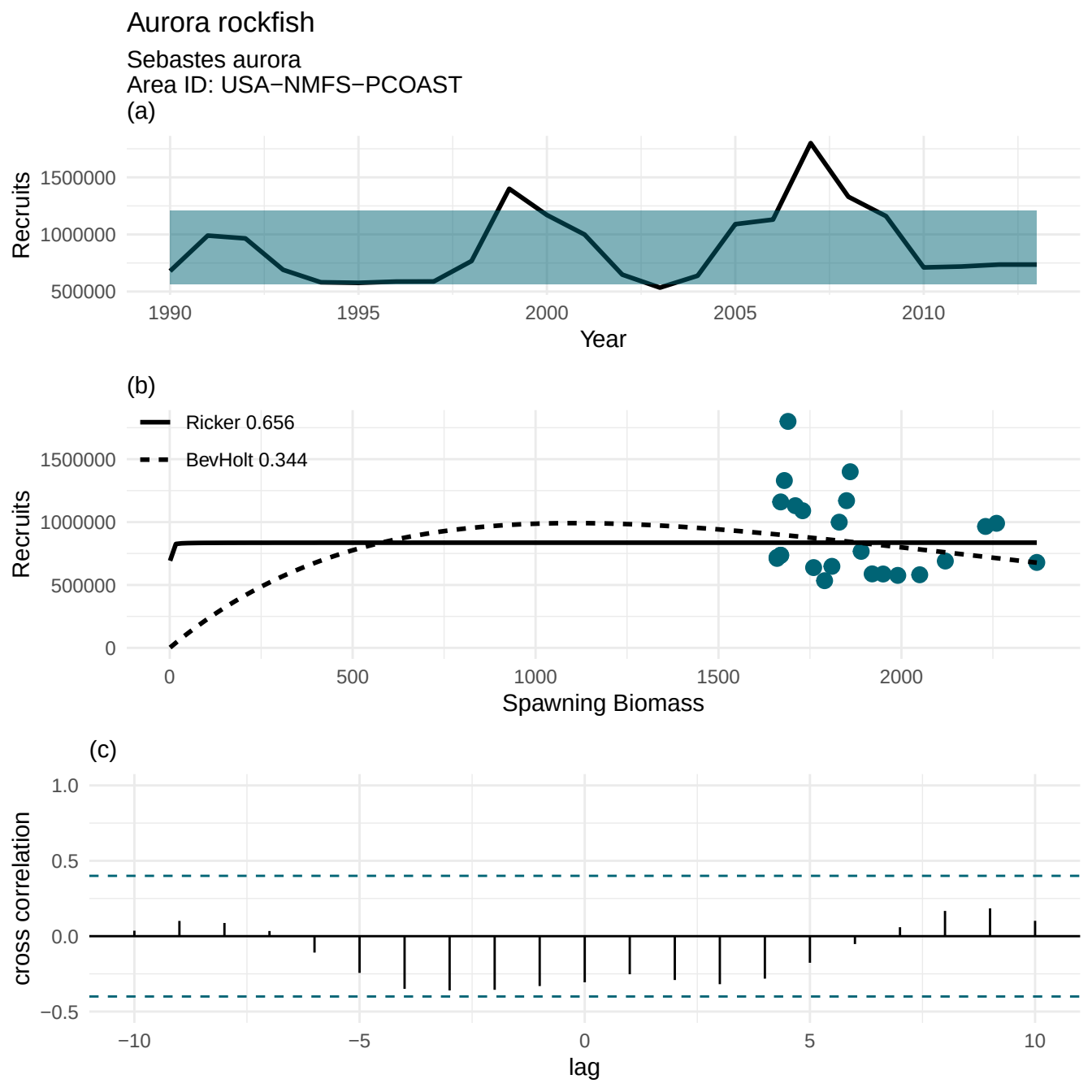

Atlantic bluefin tuna
Thunnus thynnus
Area ID: multinational−ICCAT−EATL
(a)
Recruits
4e+06
3e+06
2e+06
1e+06
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.909
BevHolt 0.0912
Recruits
4e+06
3e+06
2e+06
1e+06
0e+00
0e+00
1e+05
2e+05
3e+05
4e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

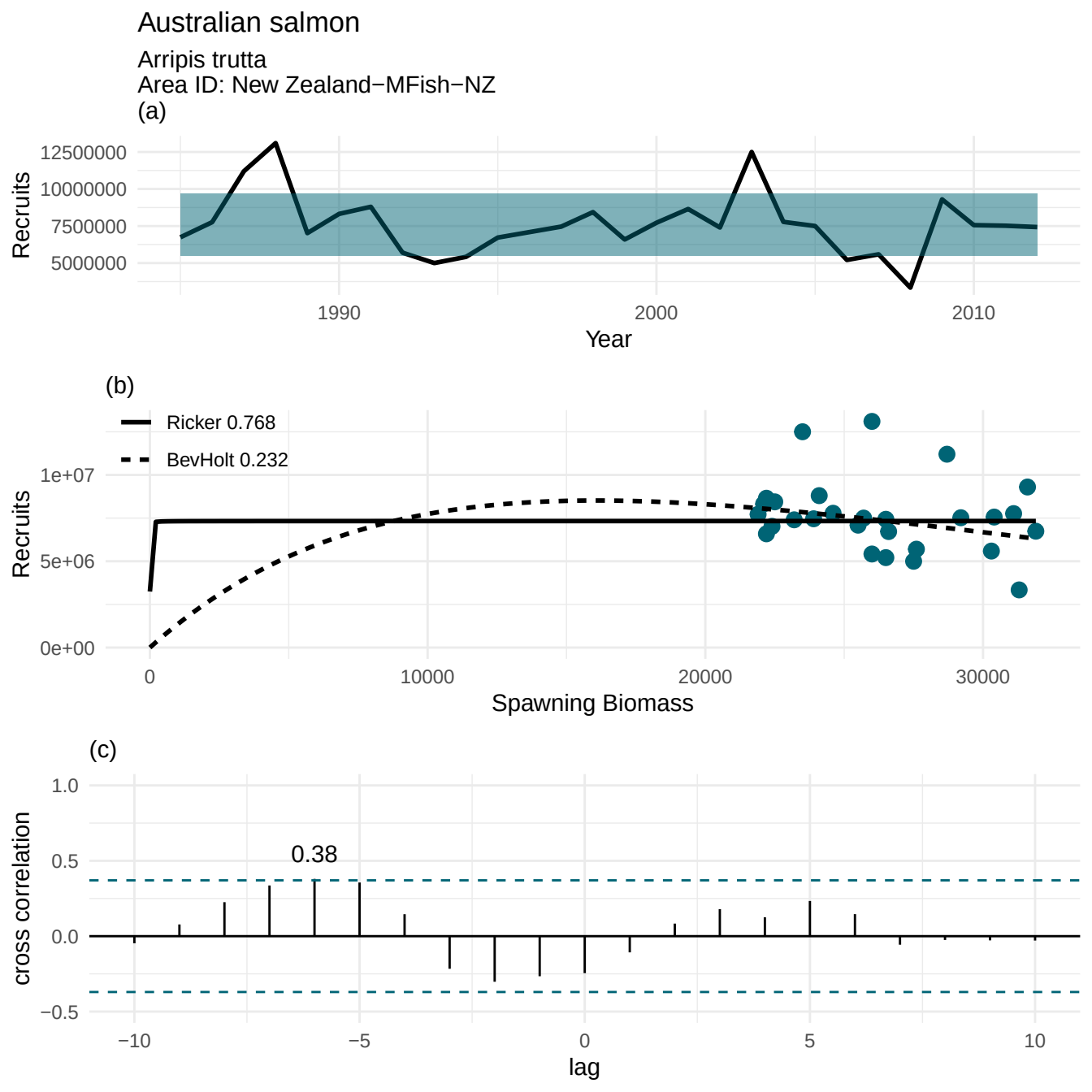

Atlantic bluefin tuna
Thunnus thynnus
Area ID: multinational−ICCAT−WATL
(a)
Recruits
150000
120000
90000
60000
1980
1990
2000
2010
Year
(b)
Ricker 0.118
BevHolt 0.882
Recruits
150000
100000
50000
0
0
10000
20000
30000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

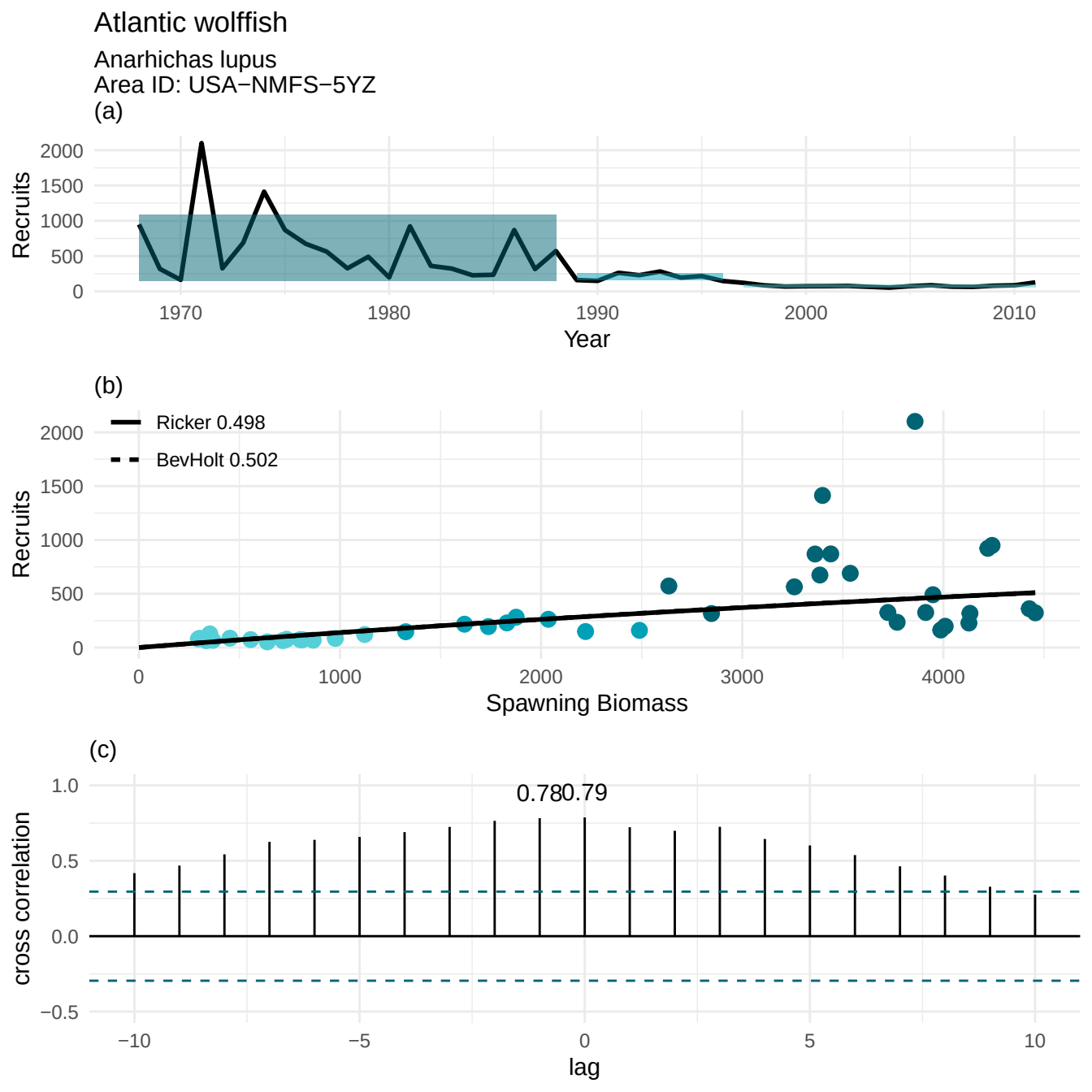

Atlantic halibut
Hippoglossus hippoglossus
Area ID: Canada−DFO−3NOPs4VWX5Zc
(a)
Recruits
2000000
1500000
1000000
500000
1970
1980
1990
2000
2010
Year
(b)
Ricker 5.27e−11
BevHolt 1
Recruits
2000000
1500000
1000000
500000
0
0
2000
4000
6000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

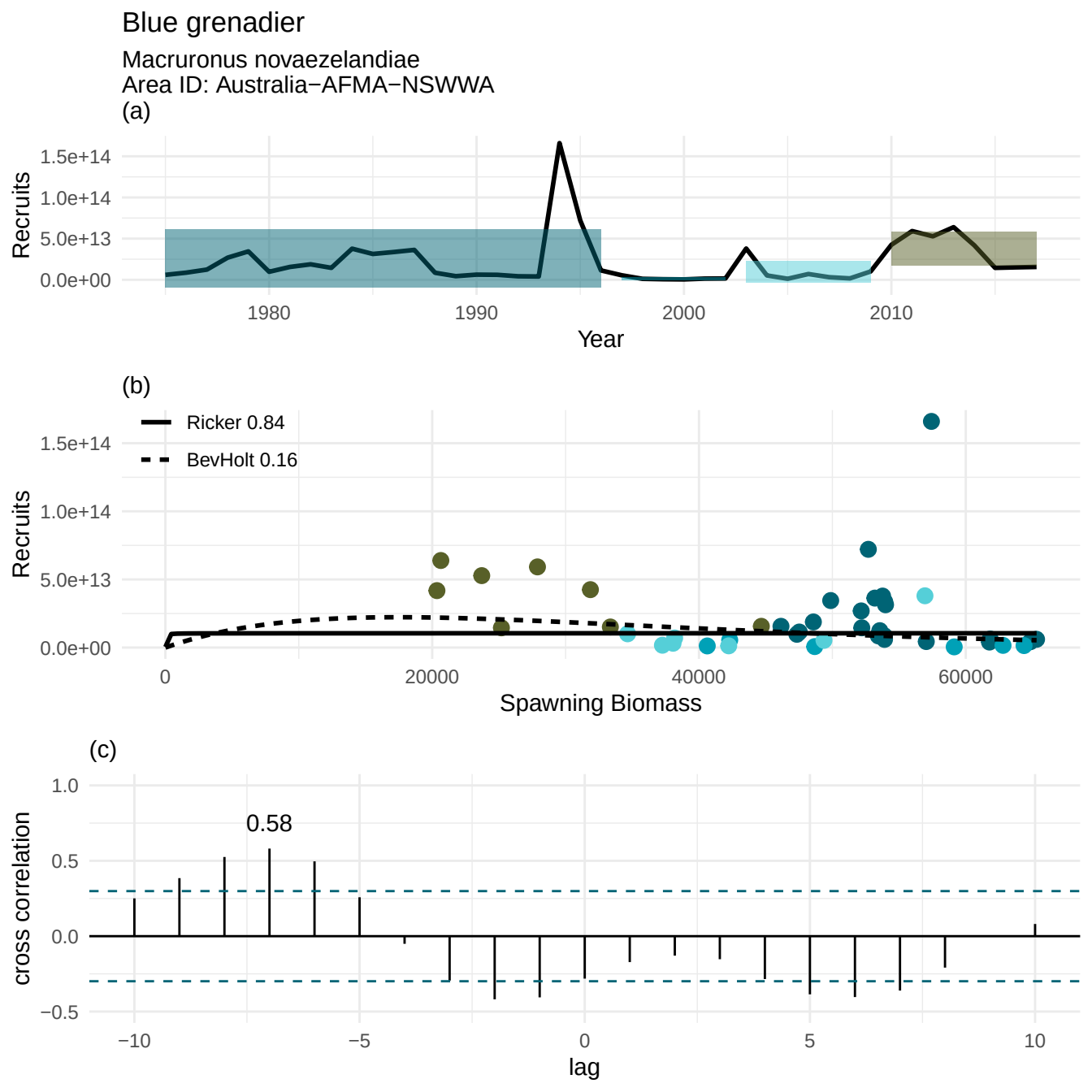

Atka mackerel
Pleurogrammus monopterygius
Area ID: USA−NMFS−BSAI
(a)
Recruits
1500000
1000000
500000
1980
1990
2000
2010
Year
(b)
Ricker 0.786
BevHolt 0.214
Recruits
1500000
1000000
500000
0
0e+00
1e+05
2e+05
3e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

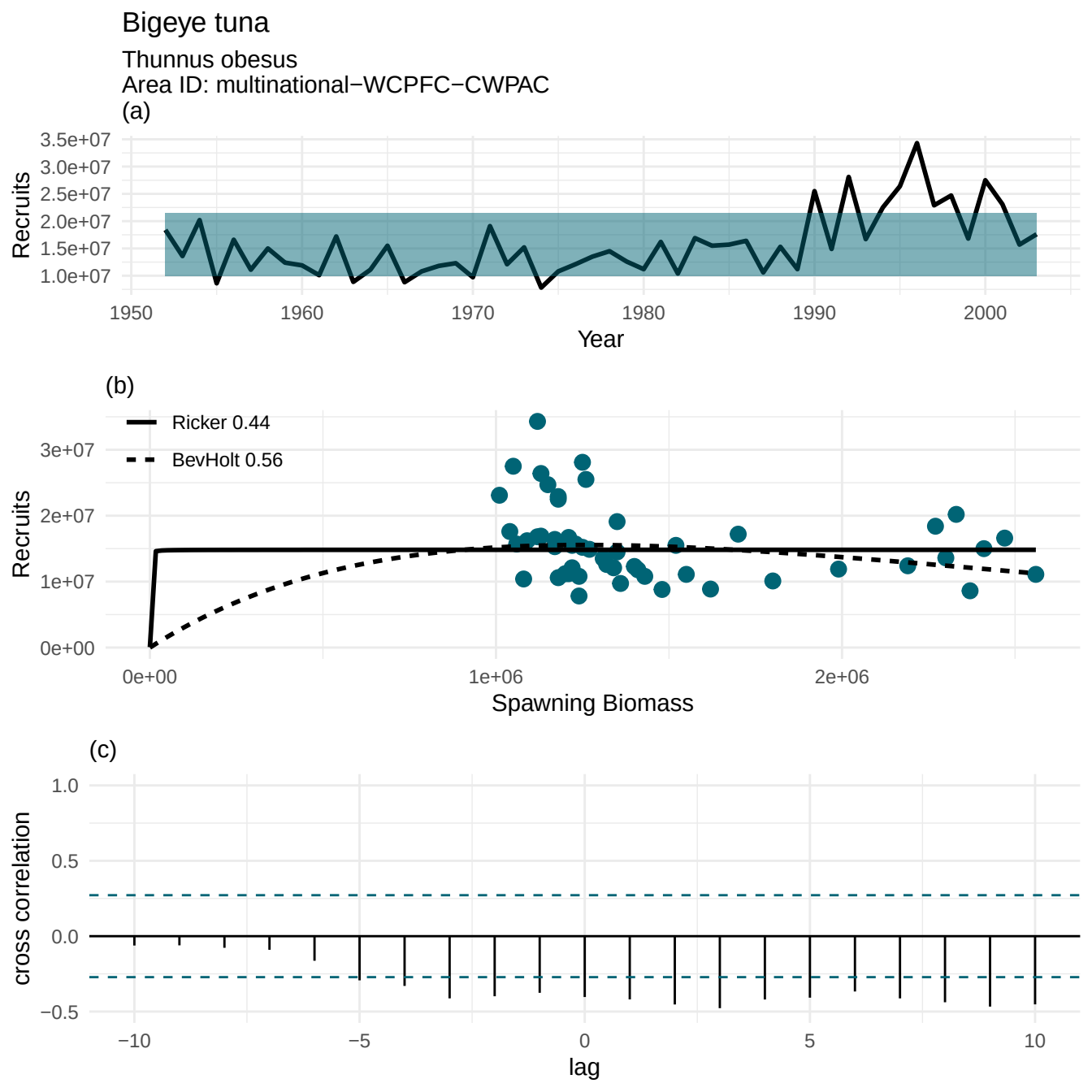

Atlantic croaker
Micropogonias undulatus
Area ID: USA−NMFS−MATLC
(a)
Recruits
6e+08
4e+08
2e+08
0e+00
1980
1990
2000
Year
(b)
Ricker 0.375
BevHolt 0.625
Recruits
6e+08
4e+08
2e+08
0e+00
0
25000
50000
75000
100000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.46
−10
−5
0
5
10
lag

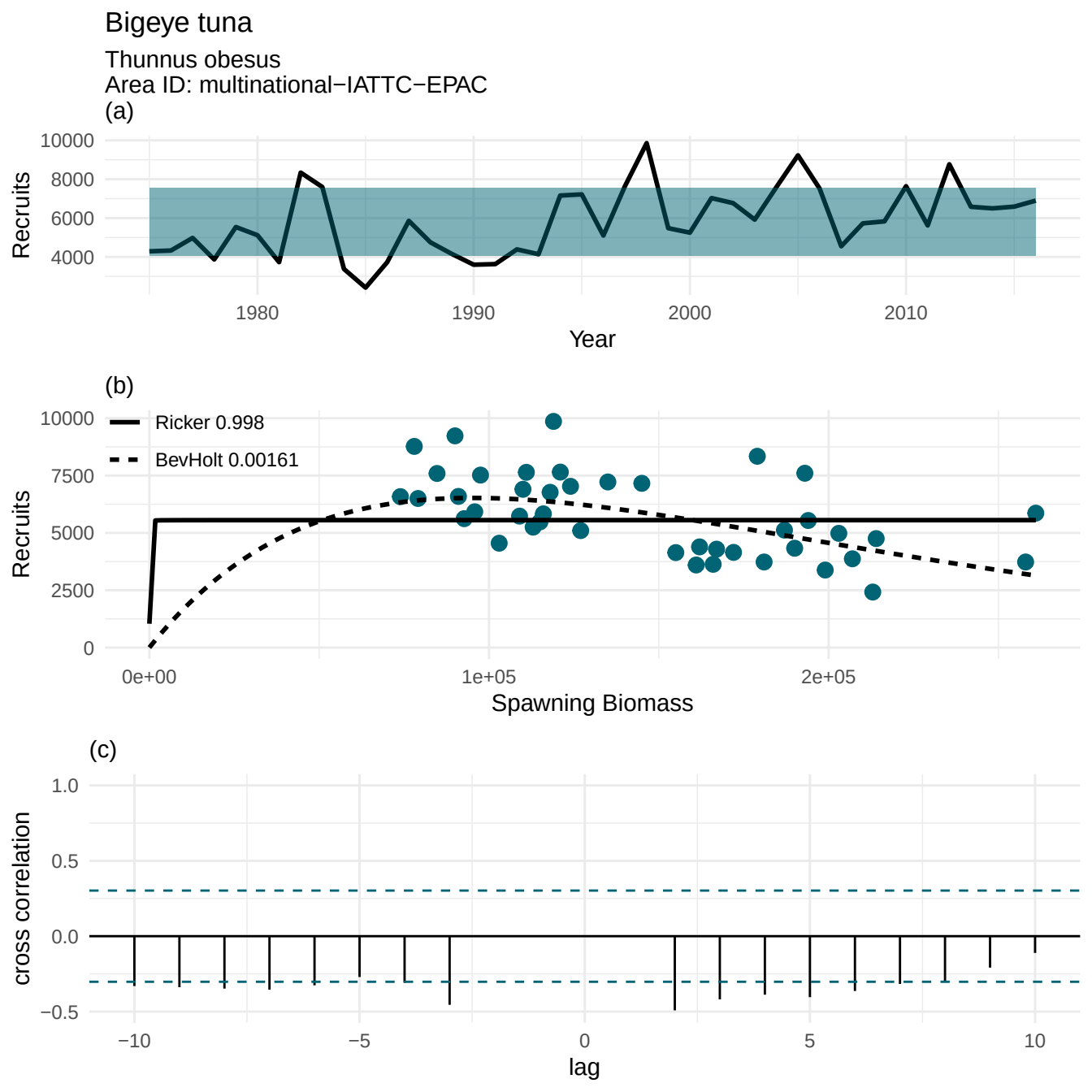

Aurora rockfish
Sebastes aurora
Area ID: USA−NMFS−PCOAST
(a)
Recruits
1500000
1000000
500000
1990
1995
2000
2005
2010
Year
(b)
Ricker 0.656
BevHolt 0.344
Recruits
1500000
1000000
500000
0
0
500
1000
1500
2000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

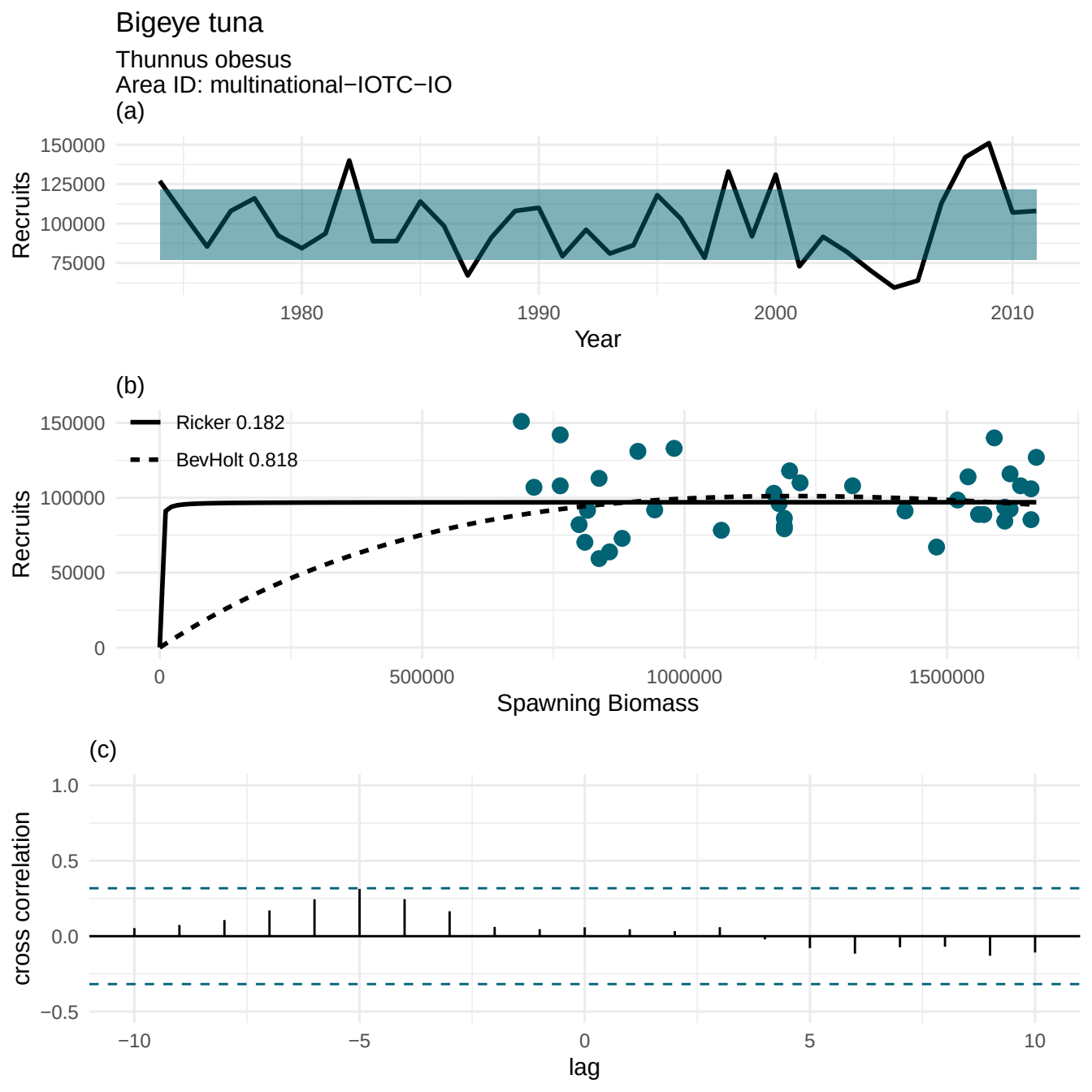

Australian salmon
Arripis trutta
Area ID: New Zealand−MFish−NZ
(a)
Recruits
12500000
10000000
7500000
5000000
1990
2000
2010
Year
(b)
Ricker 0.768
BevHolt 0.232
Recruits
1e+07
5e+06
0e+00
0
10000
20000
30000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.38
−10
−5
0
5
10
lag

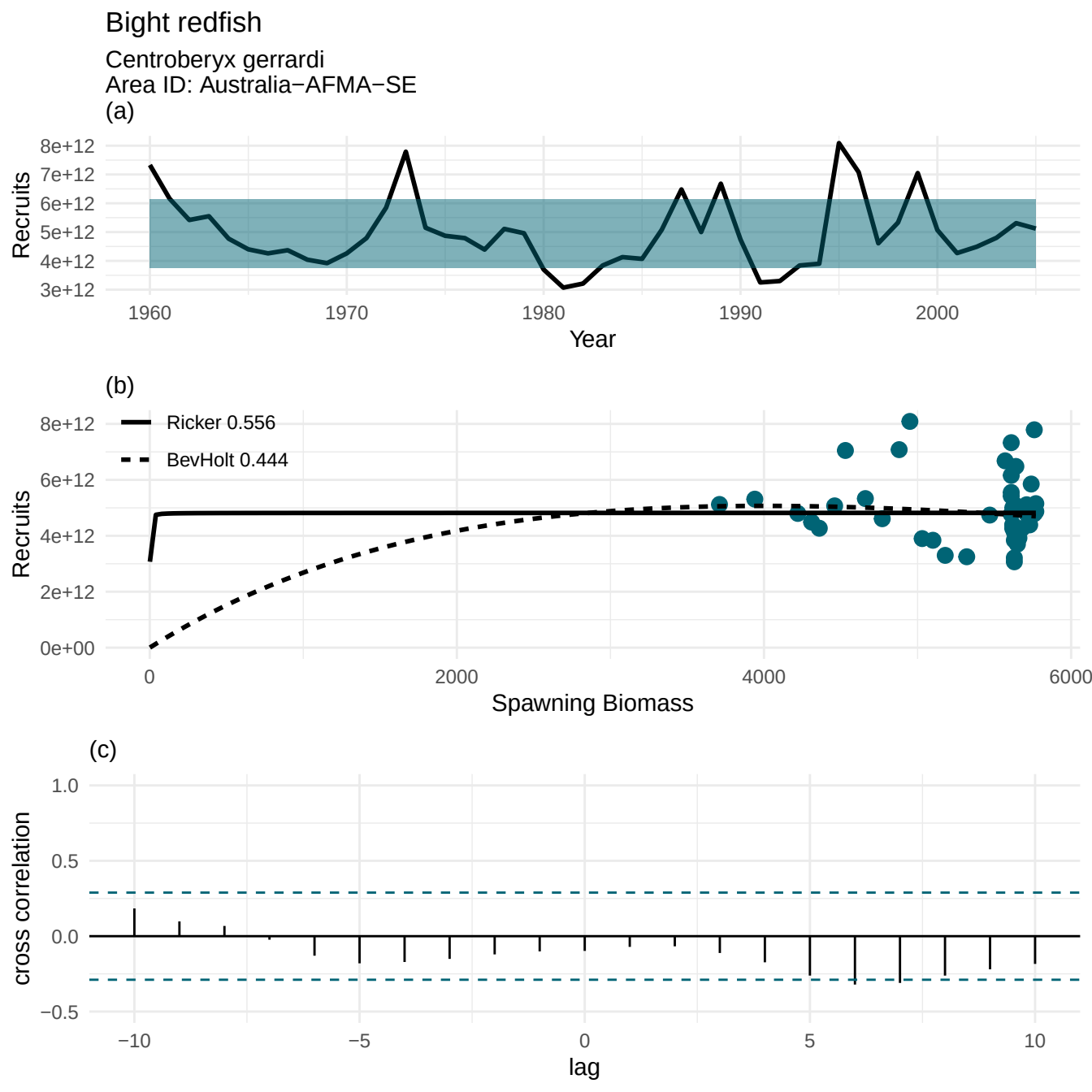

Atlantic wolffish
Anarhichas lupus
Area ID: USA−NMFS−5YZ
(a)
Recruits
2000
1500
1000
500
0
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.498
BevHolt 0.502
Recruits
2000
1500
1000
500
0
0
1000
2000
3000
4000
Spawning Biomass
(c)
0.780.79
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

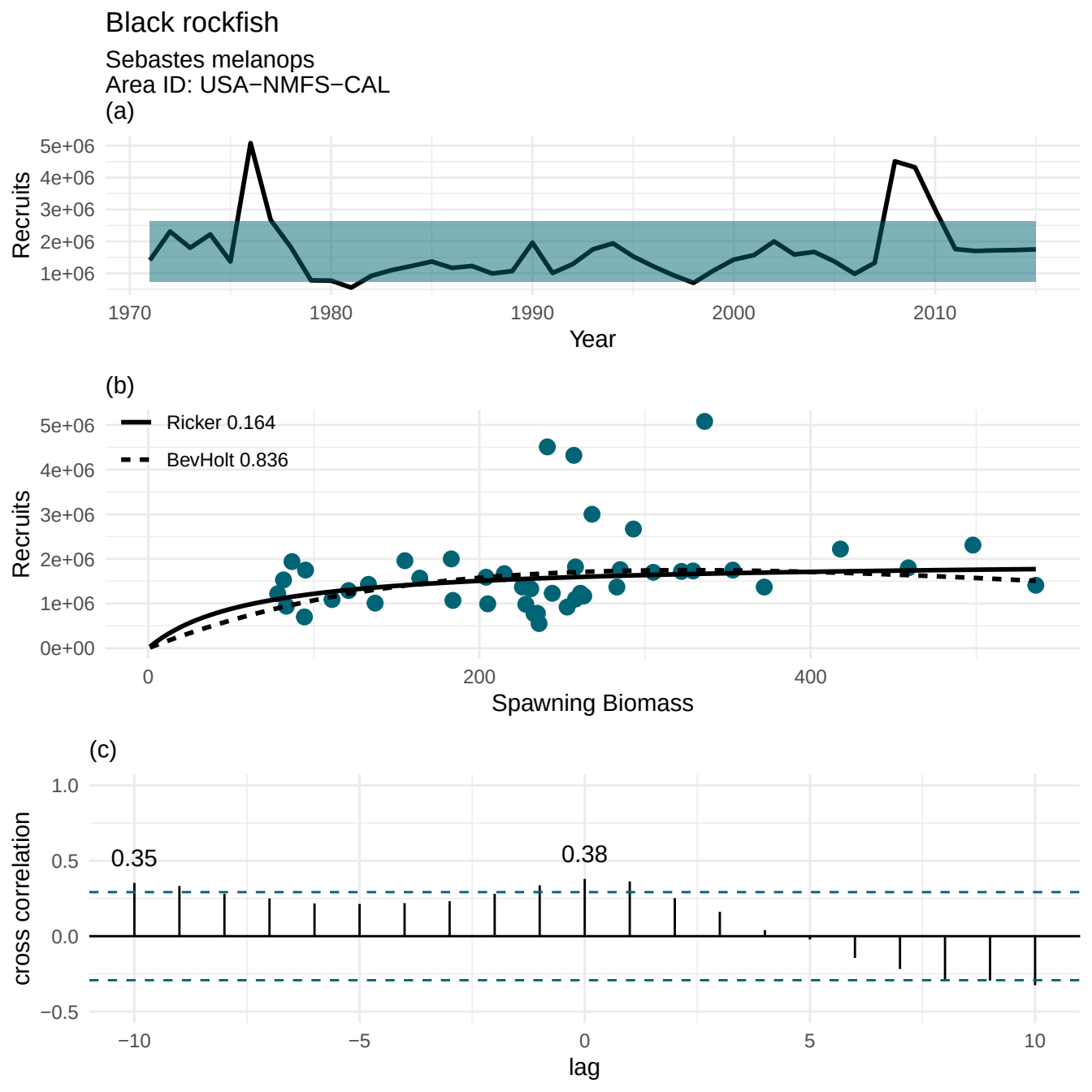

Blue grenadier
Macruronus novaezelandiae
Area ID: Australia−AFMA−NSWWA
(a)
Recruits
1.5e+14
1.0e+14
5.0e+13
0.0e+00
1980
1990
2000
2010
Year
(b)
Ricker 0.84
BevHolt 0.16
Recruits
1.5e+14
1.0e+14
5.0e+13
0.0e+00
0
20000
40000
60000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.58
−10
−5
0
5
10
lag

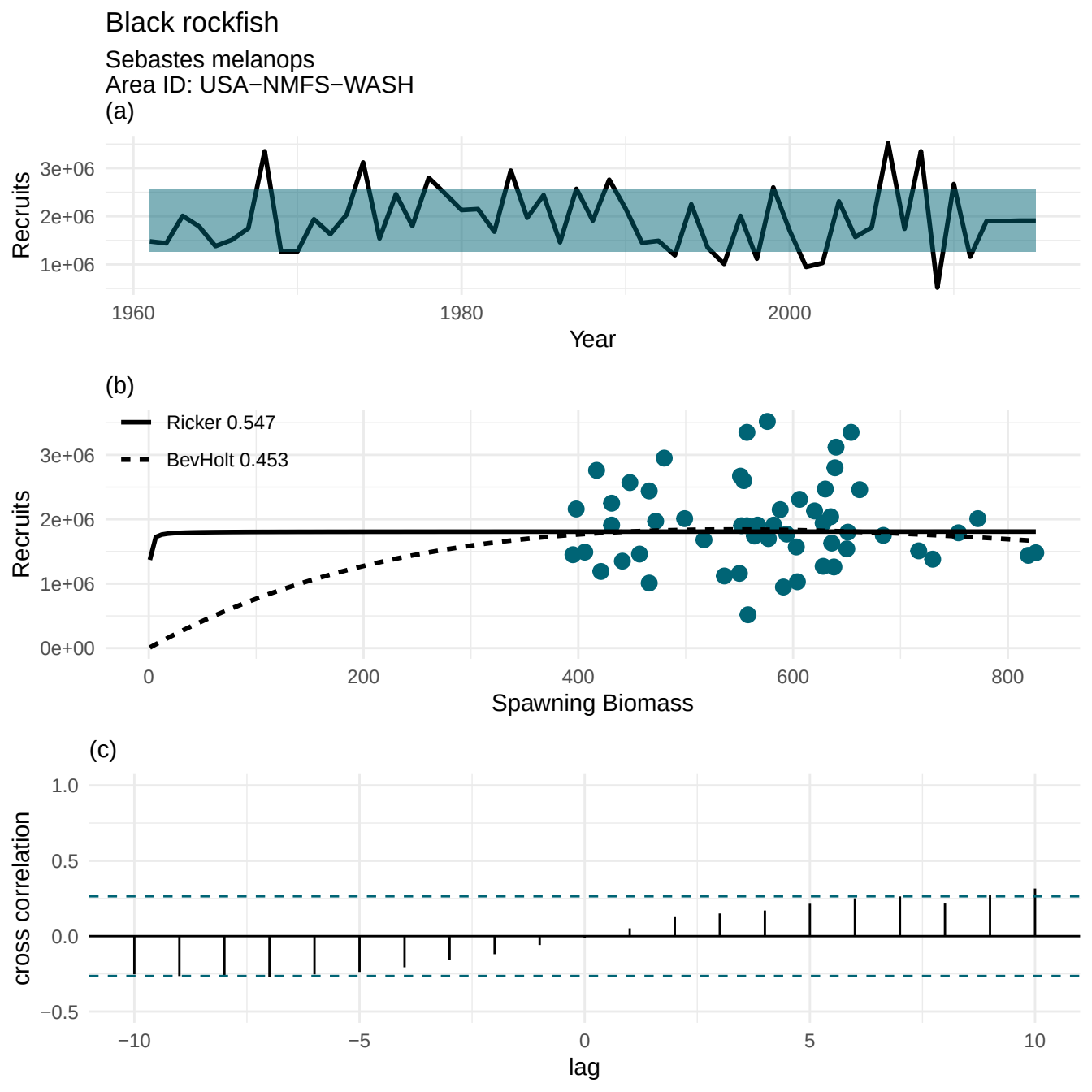

Bigeye tuna
Thunnus obesus
Area ID: multinational−WCPFC−CWPAC
(a)
Recruits
3.5e+07
3.0e+07
2.5e+07
2.0e+07
1.5e+07
1.0e+07
1950
1960
1970
1980
1990
2000
Year
(b)
Ricker 0.44
BevHolt 0.56
Recruits
3e+07
2e+07
1e+07
0e+00
0e+00
1e+06
2e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

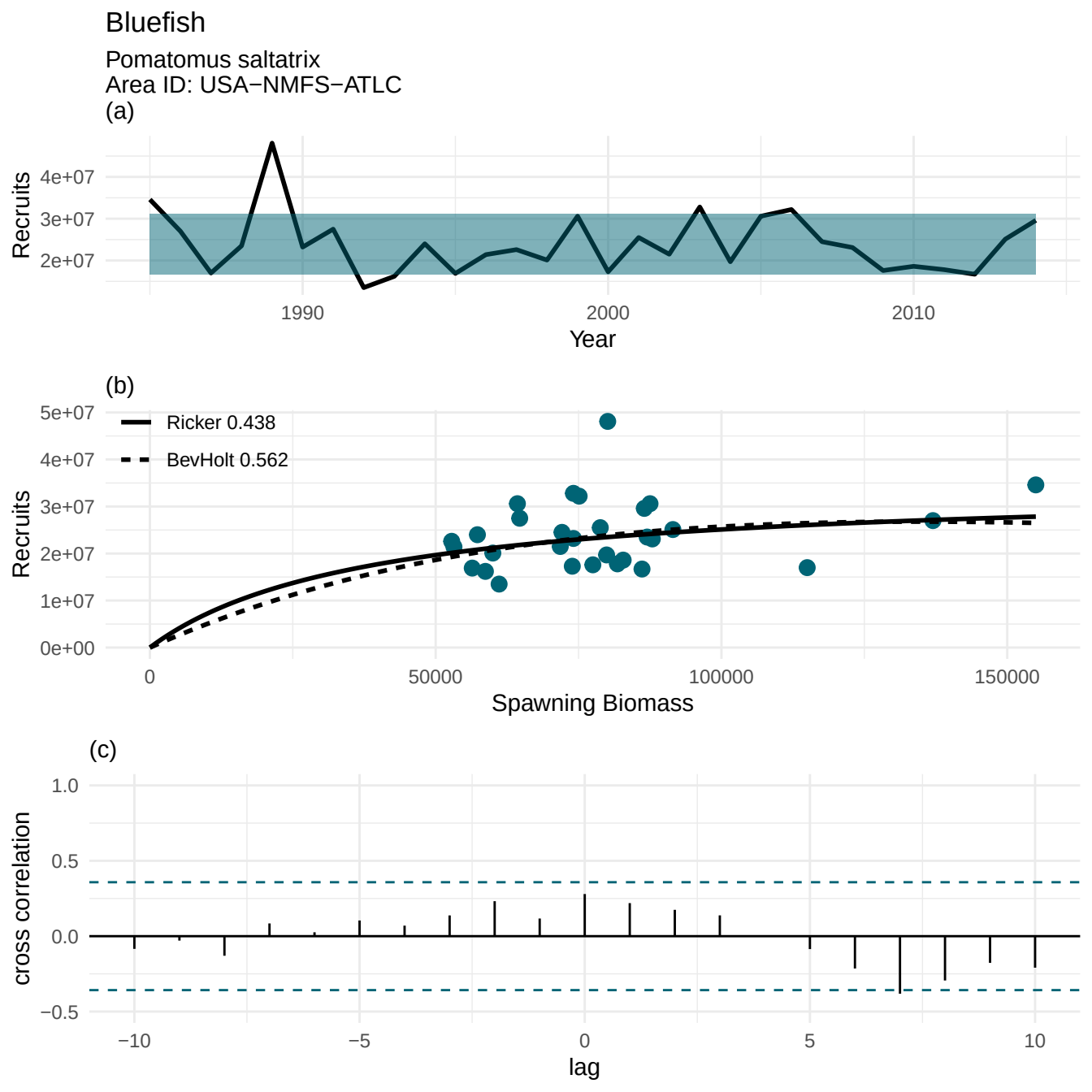

Bigeye tuna
Thunnus obesus
Area ID: multinational−IATTC−EPAC
(a)
Recruits
10000
8000
6000
4000
1980
1990
2000
2010
Year
(b)
Ricker 0.998
BevHolt 0.00161
Recruits
10000
7500
5000
2500
0
0e+00
1e+05
2e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

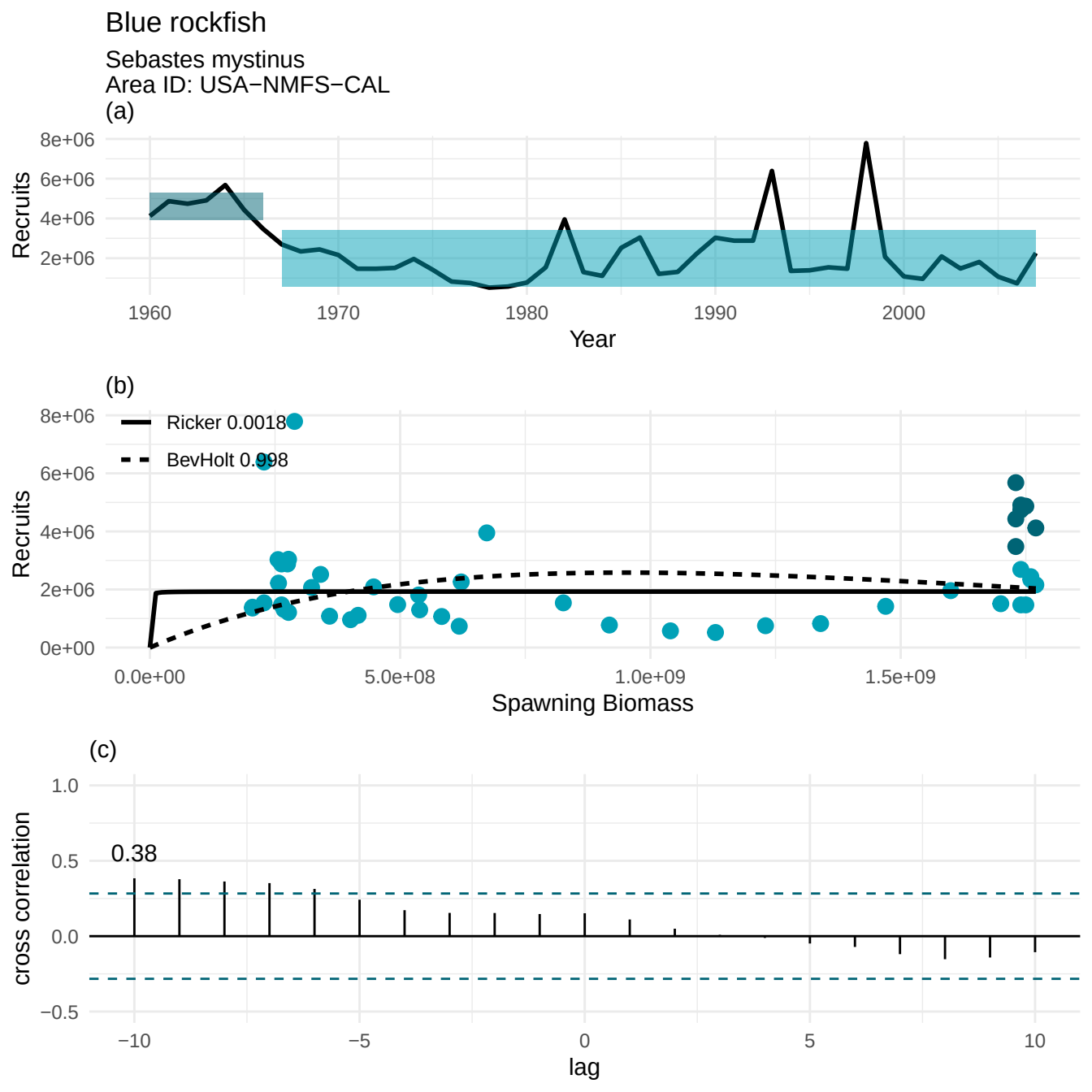

Bigeye tuna
Thunnus obesus
Area ID: multinational−IOTC−IO
(a)
Recruits
150000
125000
100000
75000
1980
1990
2000
2010
Year
(b)
Ricker 0.182
BevHolt 0.818
Recruits
150000
100000
50000
0
0
500000
1000000
1500000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

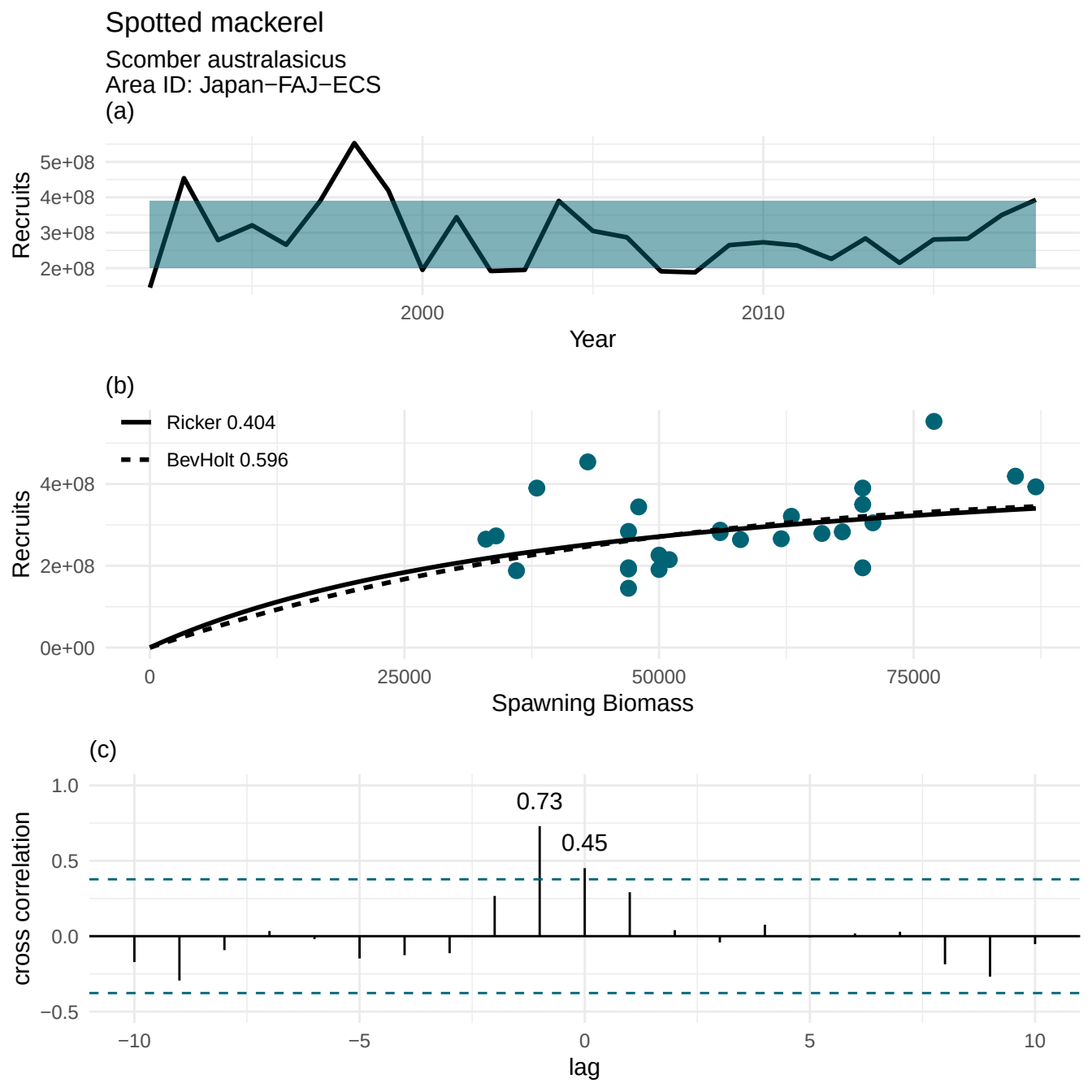

Bight redfish
Centroberyx gerrardi
Area ID: Australia−AFMA−SE
(a)
Recruits
8e+12
7e+12
6e+12
5e+12
4e+12
3e+12
1960
1970
1980
1990
2000
Year
(b)
Ricker 0.556
BevHolt 0.444
Recruits
8e+12
6e+12
4e+12
2e+12
0e+00
0
2000
4000
6000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

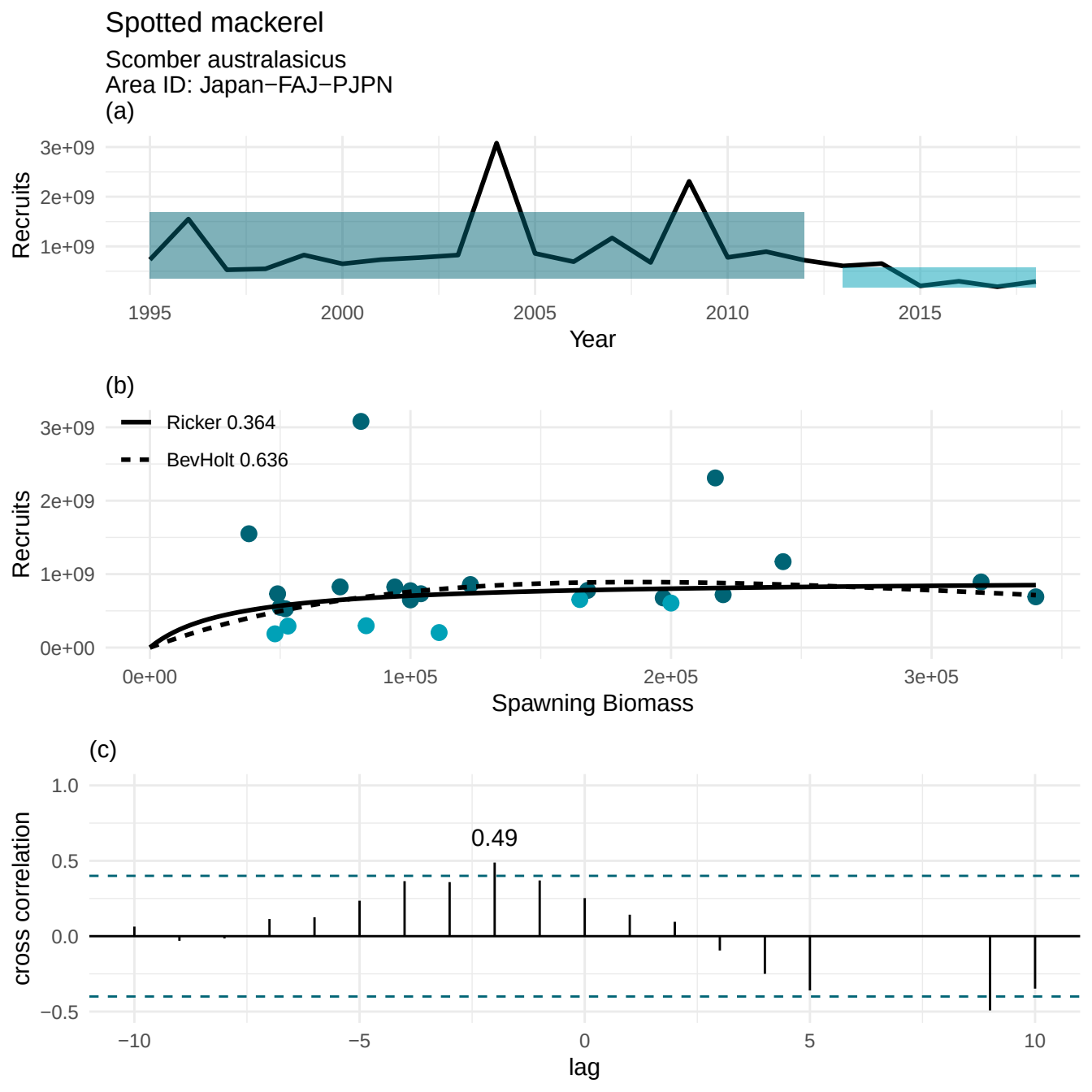

Black rockfish
Sebastes melanops
Area ID: USA−NMFS−CAL
(a)
Recruits
5e+06
4e+06
3e+06
2e+06
1e+06
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.164
BevHolt 0.836
Recruits
5e+06
4e+06
3e+06
2e+06
1e+06
0e+00
0
200
400
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.35
0.38
−10
−5
0
5
10
lag

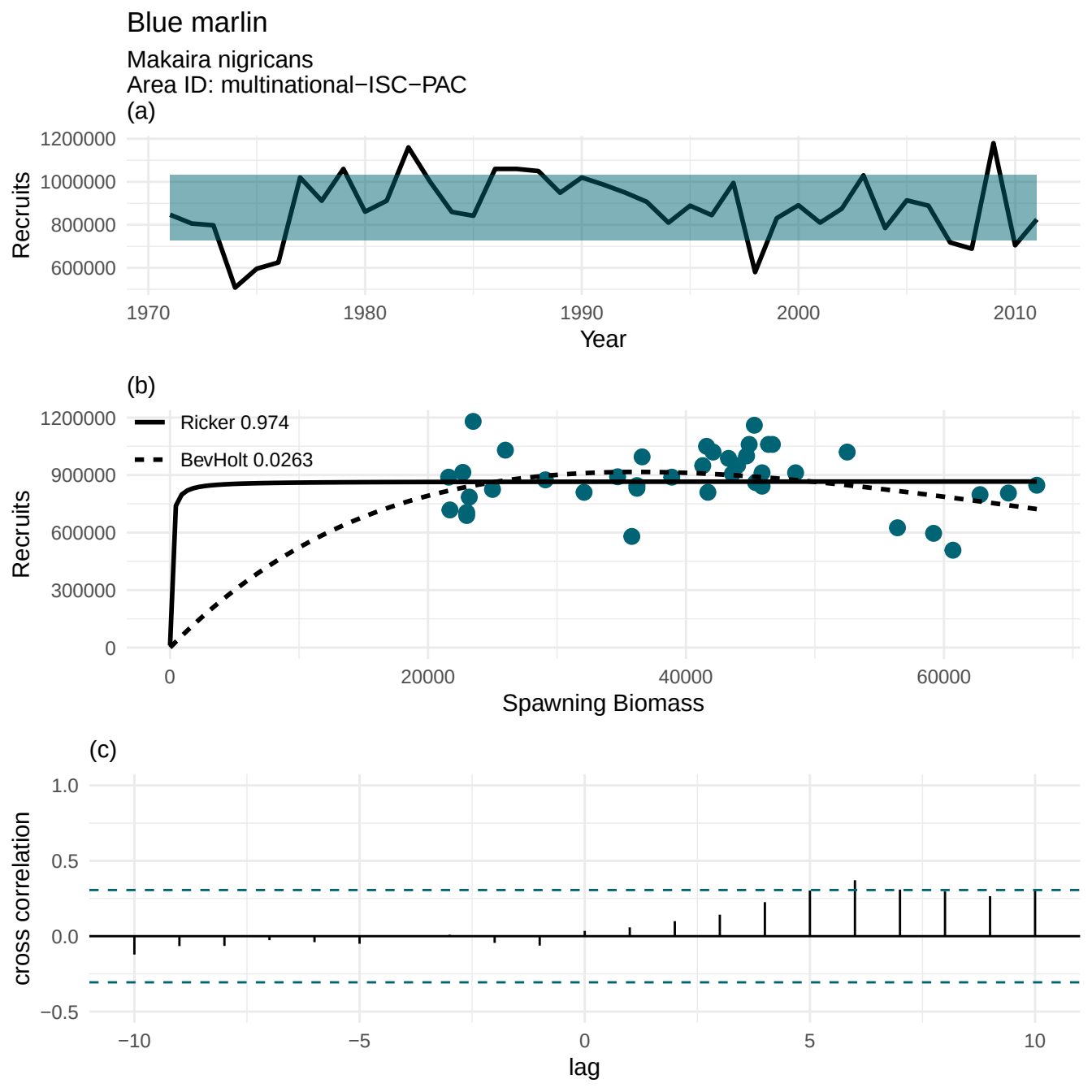

Black rockfish
Sebastes melanops
Area ID: USA−NMFS−WASH
(a)
Recruits
3e+06
2e+06
1e+06
1960
1980
2000
Year
(b)
Ricker 0.547
BevHolt 0.453
Recruits
3e+06
2e+06
1e+06
0e+00
0
200
400
600
800
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

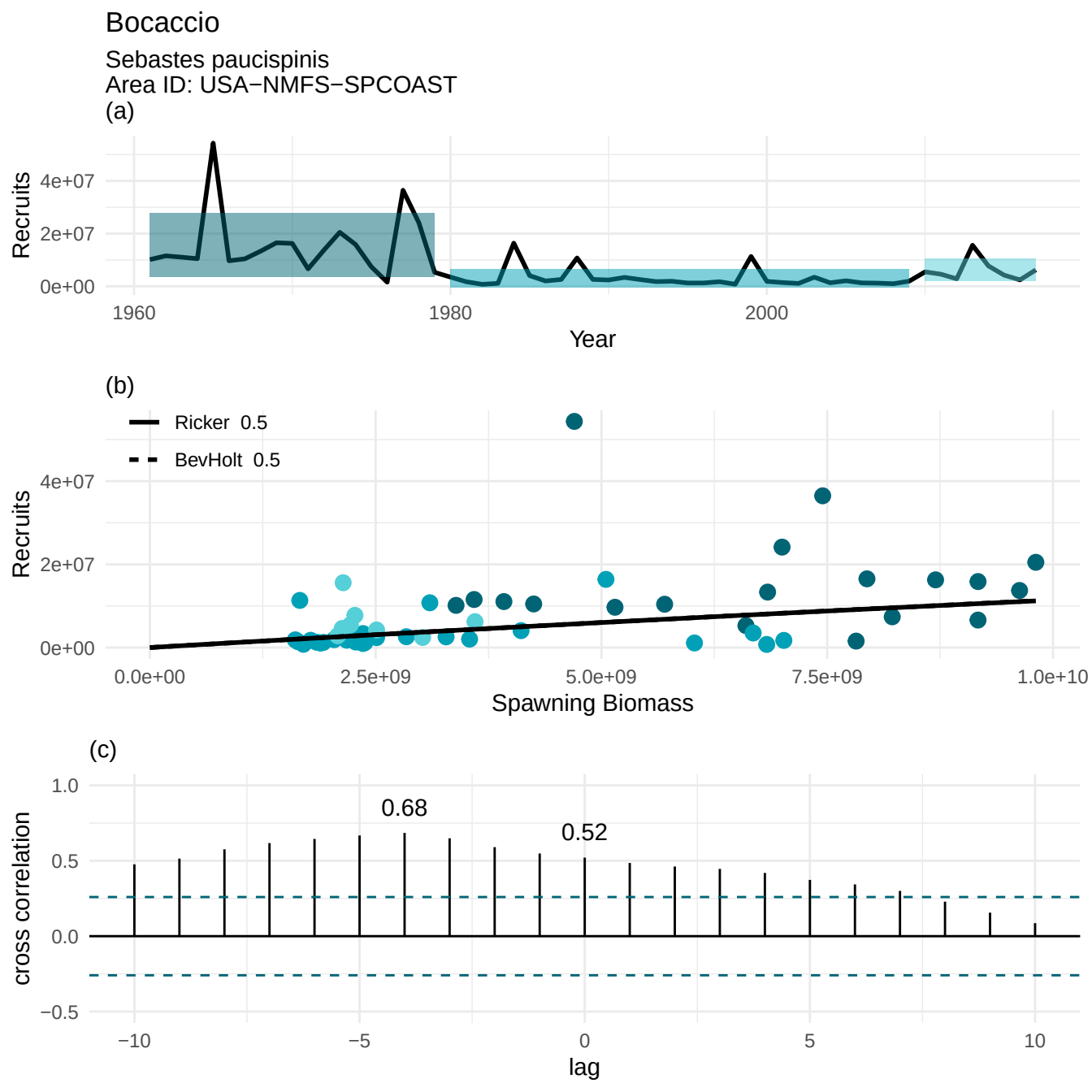

Bluefish
Pomatomus saltatrix
Area ID: USA−NMFS−ATLC
(a)
Recruits
4e+07
3e+07
2e+07
1990
2000
2010
Year
(b)
Ricker 0.438
BevHolt 0.562
Recruits
5e+07
4e+07
3e+07
2e+07
1e+07
0e+00
0
50000
100000
150000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

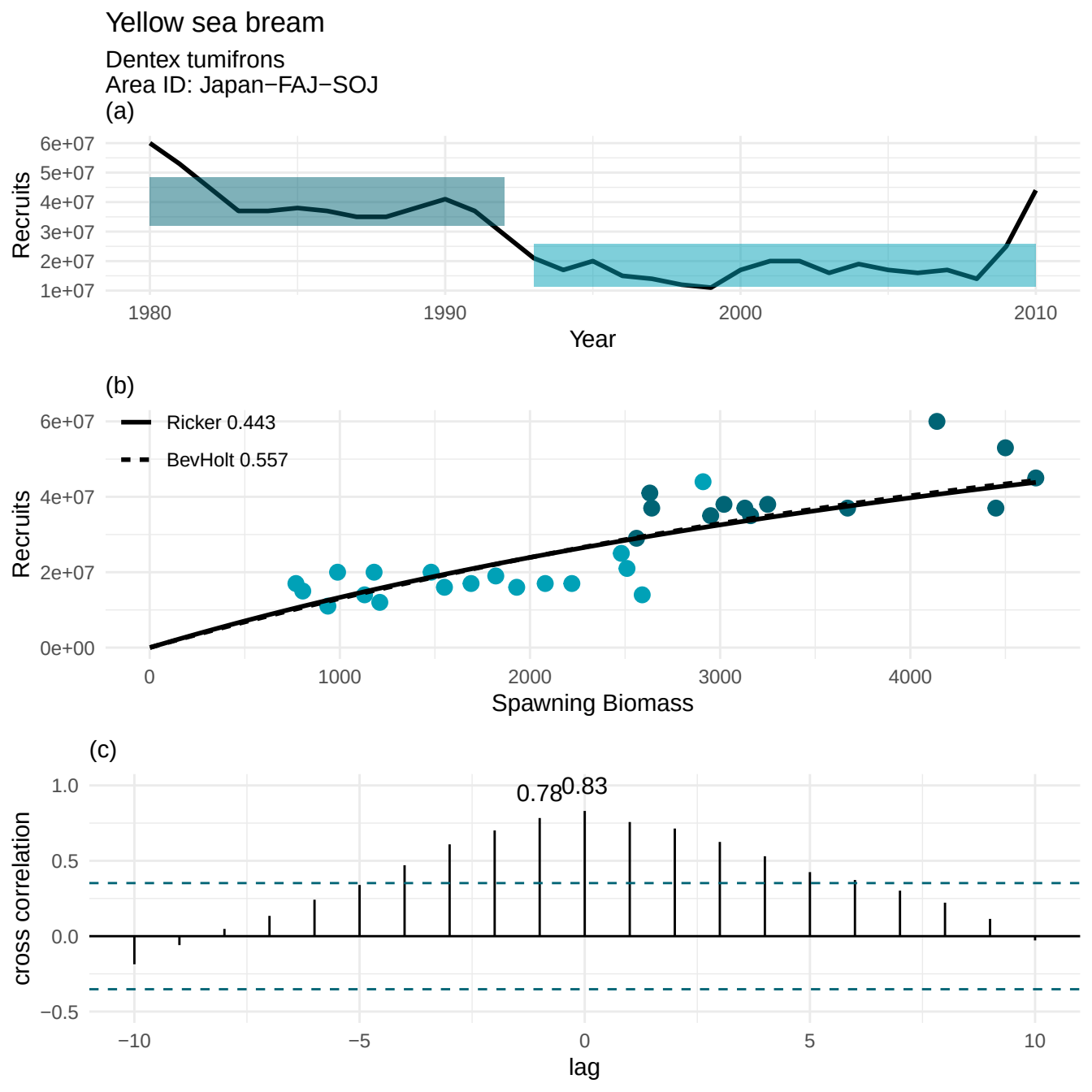

Blue rockfish
Sebastes mystinus
Area ID: USA−NMFS−CAL
(a)
Recruits
8e+06
6e+06
4e+06
2e+06
1960
1970
1980
1990
2000
Year
(b)
Ricker 0.0018
BevHolt 0.998
Recruits
8e+06
6e+06
4e+06
2e+06
0e+00
0.0e+00
5.0e+08
1.0e+09
1.5e+09
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.38
−10
−5
0
5
10
lag

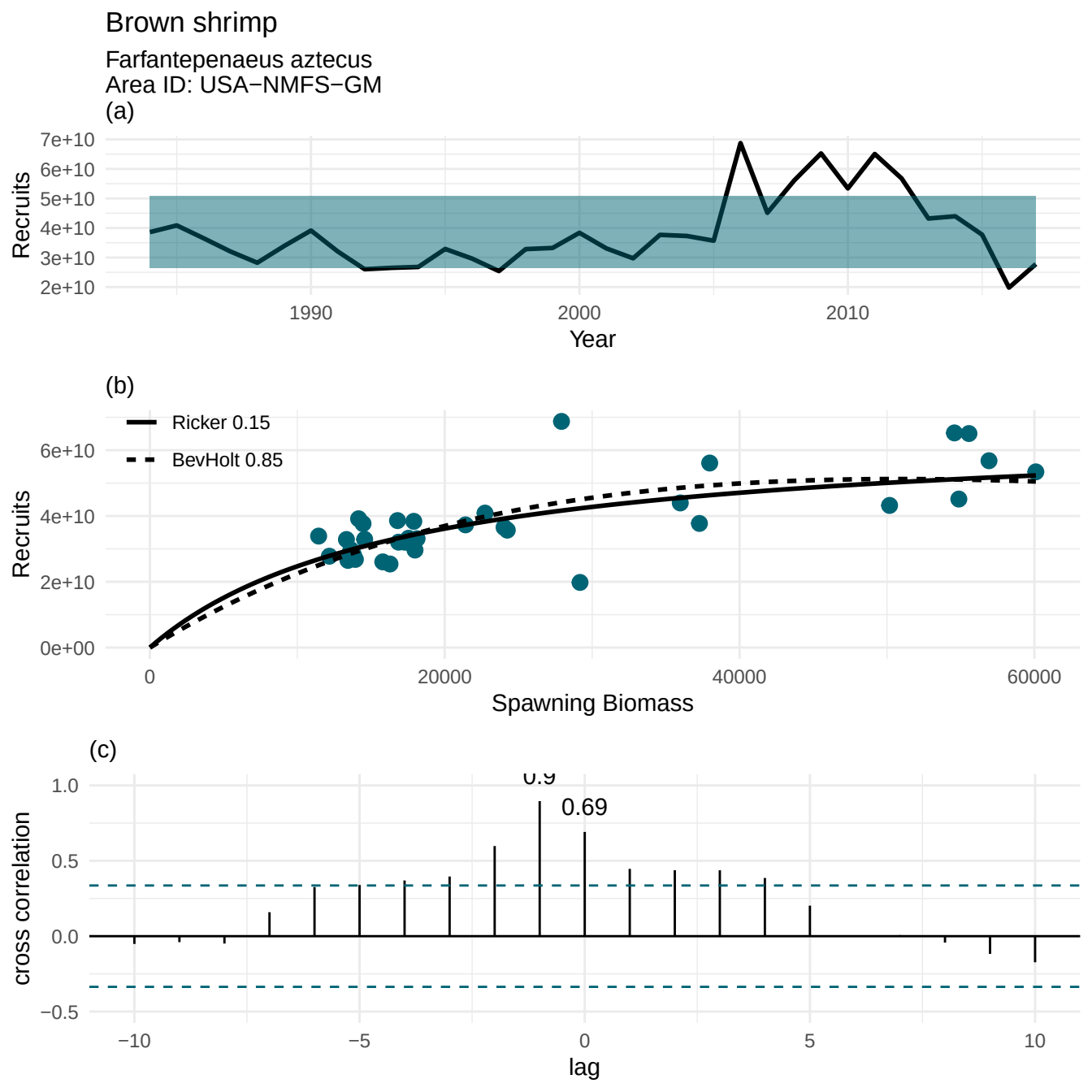

Spotted mackerel
Scomber australasicus
Area ID: Japan−FAJ−ECS
(a)
Recruits
5e+08
4e+08
3e+08
2e+08
2000
2010
Year
(b)
Ricker 0.404
BevHolt 0.596
Recruits
4e+08
2e+08
0e+00
0
25000
50000
75000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.73
0.45
−10
−5
0
5
10
lag

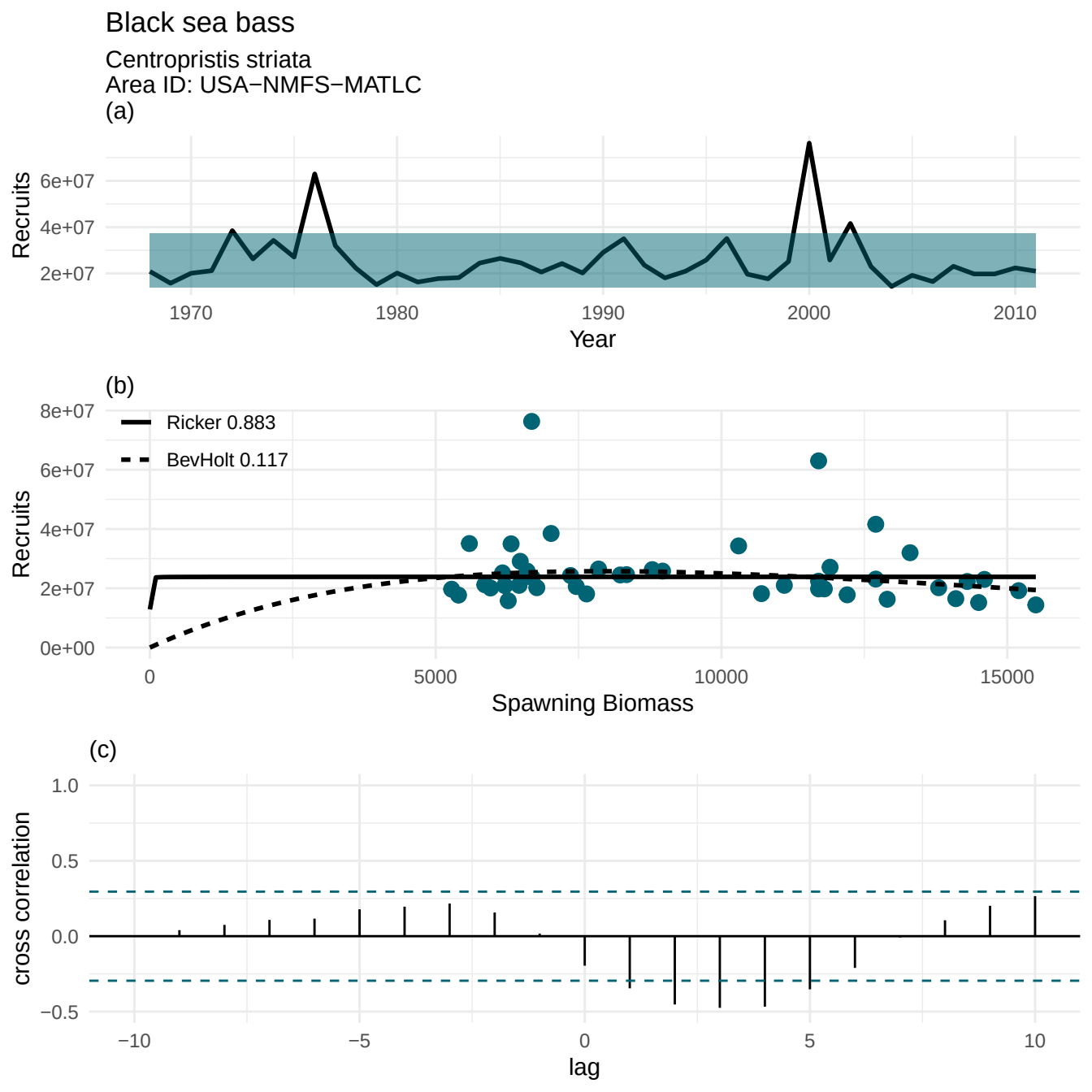

Spotted mackerel
Scomber australasicus
Area ID: Japan−FAJ−PJPN
(a)
Recruits
3e+09
2e+09
1e+09
1995
2000
2005
2010
2015
Year
(b)
Ricker 0.364
BevHolt 0.636
Recruits
3e+09
2e+09
1e+09
0e+00
0e+00
1e+05
2e+05
3e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.49
−10
−5
0
5
10
lag

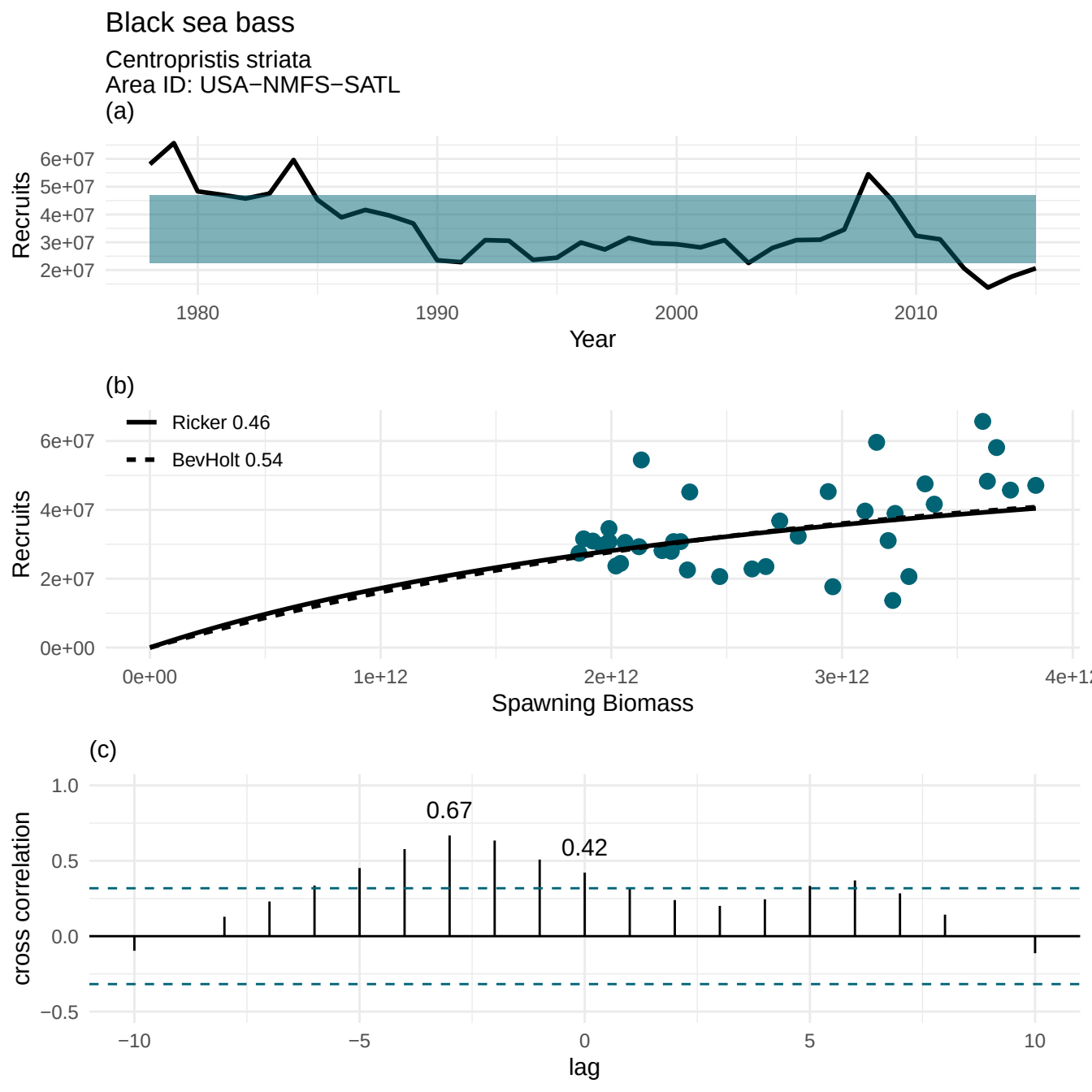

Blue marlin
Makaira nigricans
Area ID: multinational−ISC−PAC
(a)
Recruits
1200000
1000000
800000
600000
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.974
BevHolt 0.0263
Recruits
1200000
900000
600000
300000
0
0
20000
40000
60000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

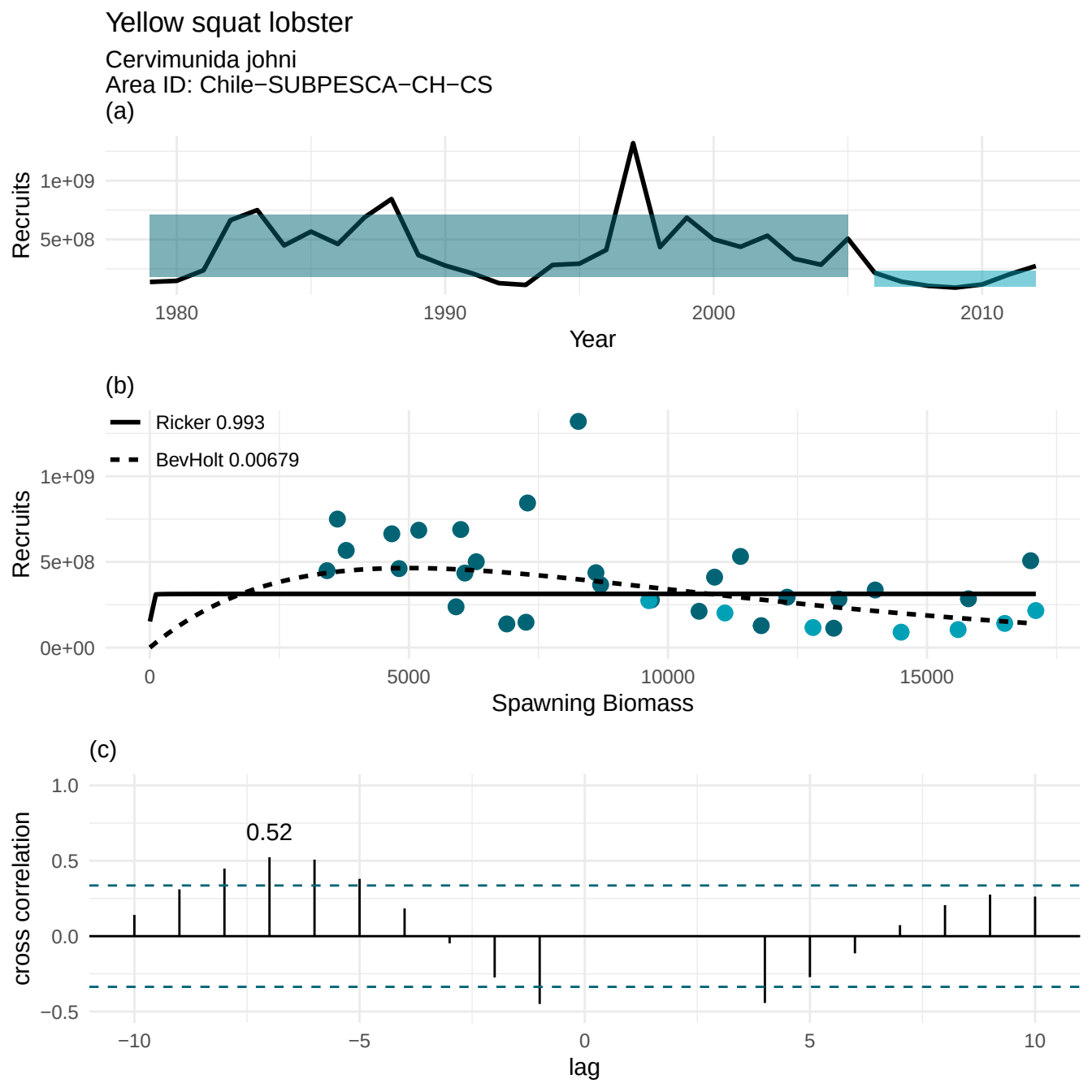

Bocaccio
Sebastes paucispinis
Area ID: USA−NMFS−SPCOAST
(a)
Recruits
4e+07
2e+07
0e+00
1960
1980
2000
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
4e+07
2e+07
0e+00
0.0e+00
2.5e+09
5.0e+09
7.5e+09
1.0e+10
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.68
0.52
−10
−5
0
5
10
lag

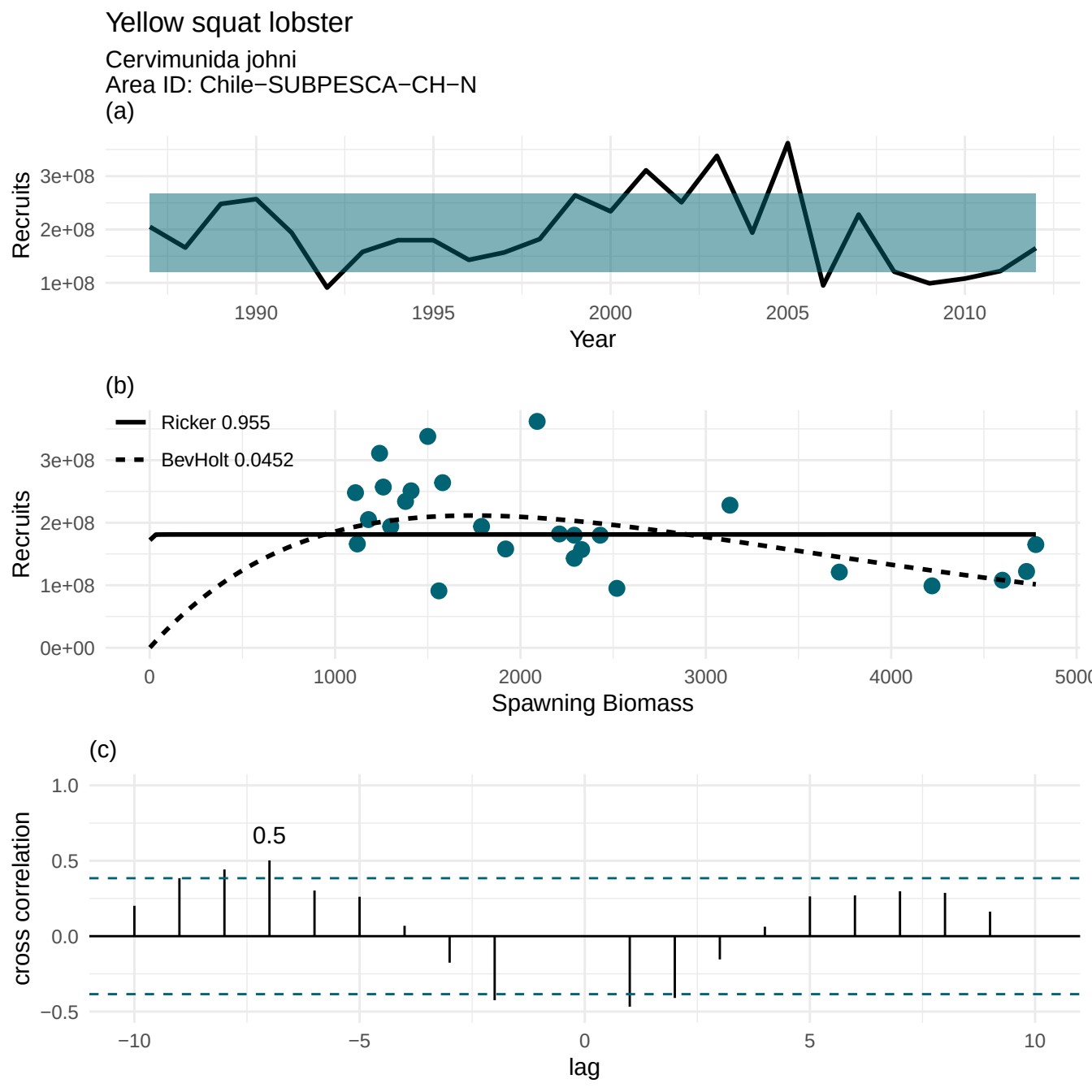

Yellow sea bream
Dentex tumifrons
Area ID: Japan−FAJ−SOJ
(a)
Recruits
6e+07
5e+07
4e+07
3e+07
2e+07
1e+07
1980
1990
2000
2010
Year
(b)
Ricker 0.443
BevHolt 0.557
Recruits
6e+07
4e+07
2e+07
0e+00
0
1000
2000
3000
4000
Spawning Biomass
(c)
0.78
0.83
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

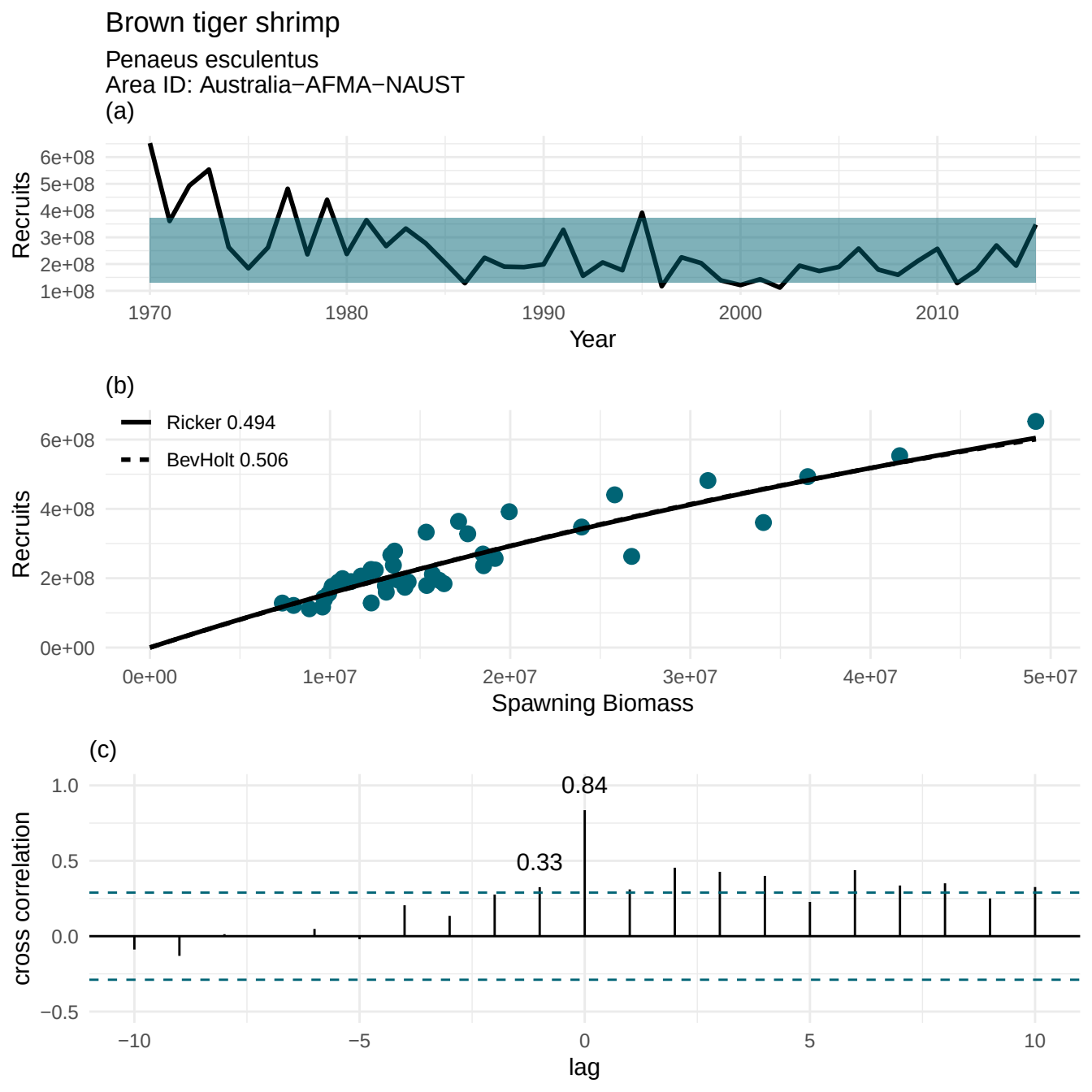

Brown shrimp
Farfantepenaeus aztecus
Area ID: USA−NMFS−GM
(a)
Recruits
7e+10
6e+10
5e+10
4e+10
3e+10
2e+10
1990
2000
2010
Year
(b)
Ricker 0.15
BevHolt 0.85
Recruits
6e+10
4e+10
2e+10
0e+00
0
20000
40000
60000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.9
0.69
−10
−5
0
5
10
lag

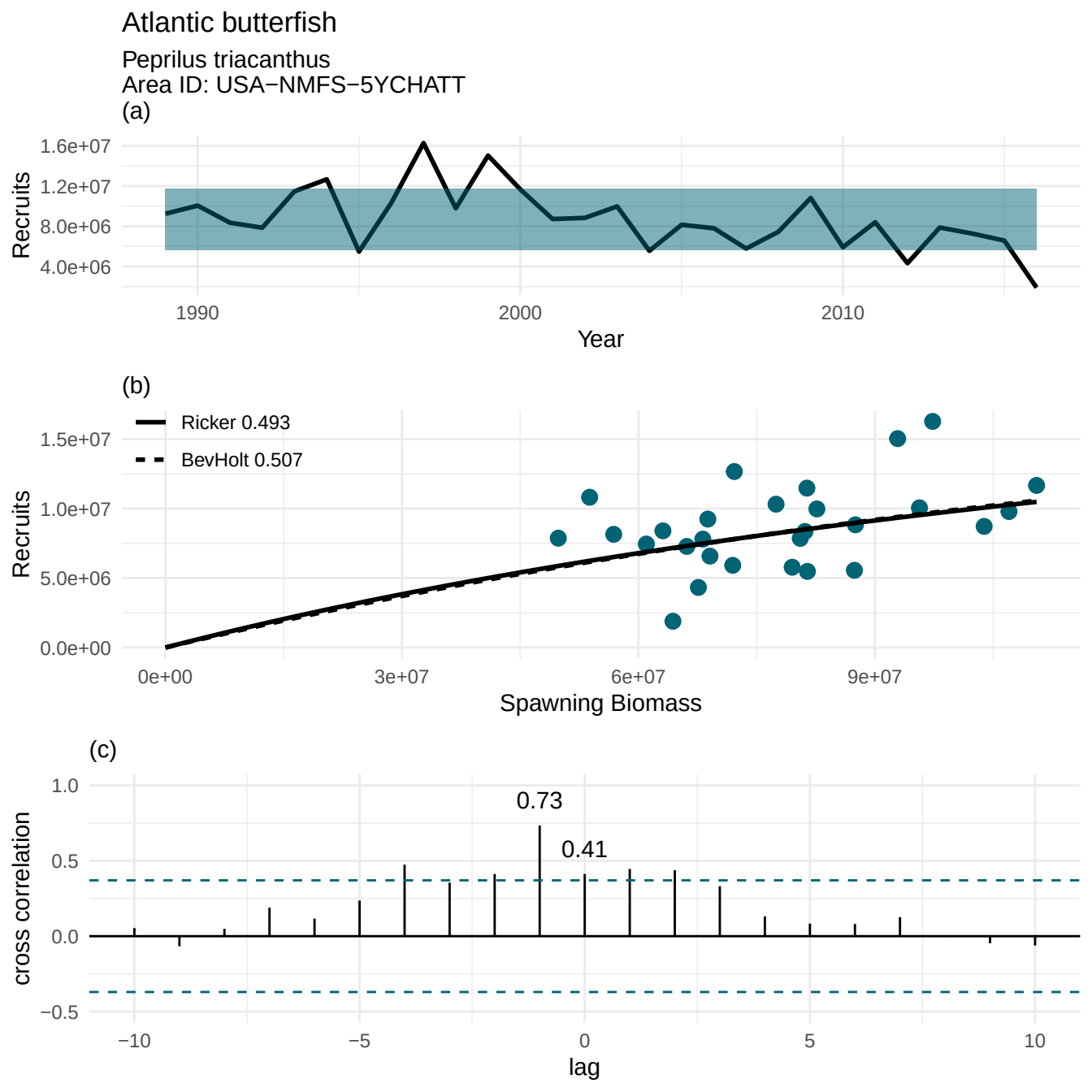

Black sea bass
Centropristis striata
Area ID: USA−NMFS−MATLC
(a)
Recruits
6e+07
4e+07
2e+07
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.883
BevHolt 0.117
Recruits
8e+07
6e+07
4e+07
2e+07
0e+00
0
5000
10000
15000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

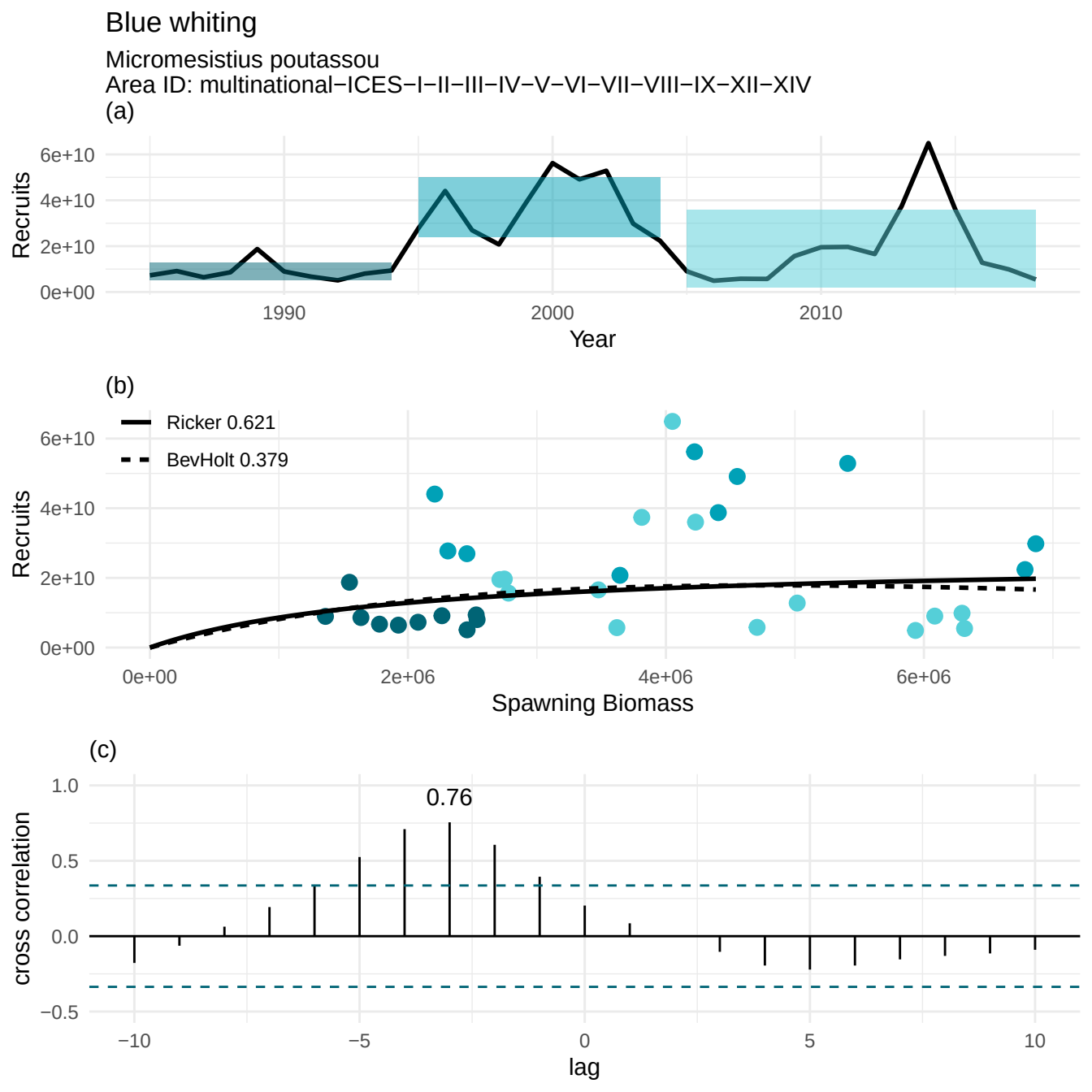

Black sea bass
Centropristis striata
Area ID: USA−NMFS−SATL
(a)
Recruits
6e+07
5e+07
4e+07
3e+07
2e+07
1980
1990
2000
2010
Year
(b)
Ricker 0.46
BevHolt 0.54
Recruits
6e+07
4e+07
2e+07
0e+00
0e+00
1e+12
2e+12
3e+12
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.67
0.42
−10
−5
0
5
10
lag

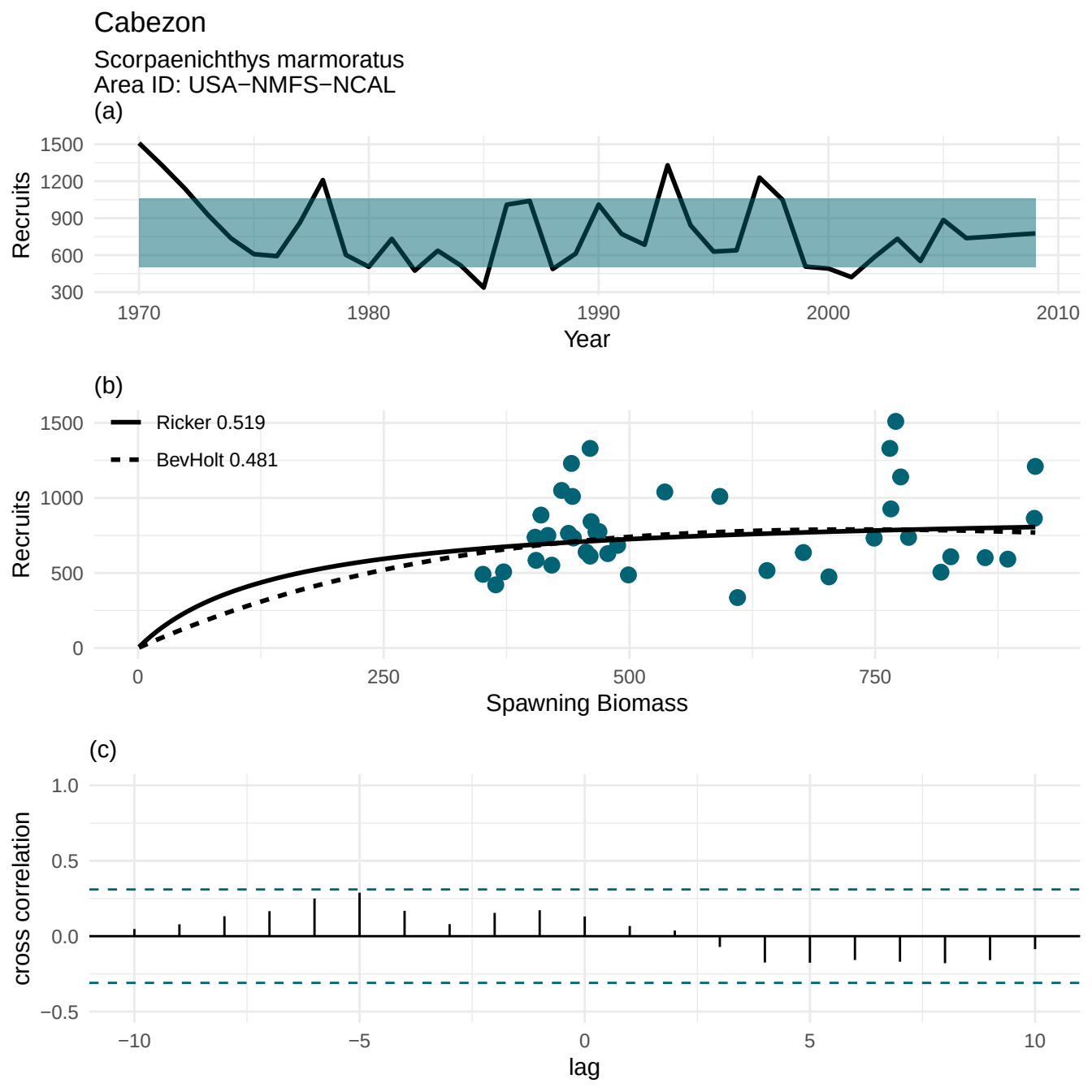

Yellow squat lobster
Cervimunida johni
Area ID: Chile−SUBPESCA−CH−CS
(a)
Recruits
1e+09
5e+08
1980
1990
2000
2010
Year
(b)
Ricker 0.993
BevHolt 0.00679
Recruits
1e+09
5e+08
0e+00
0
5000
10000
15000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.52
−10
−5
0
5
10
lag

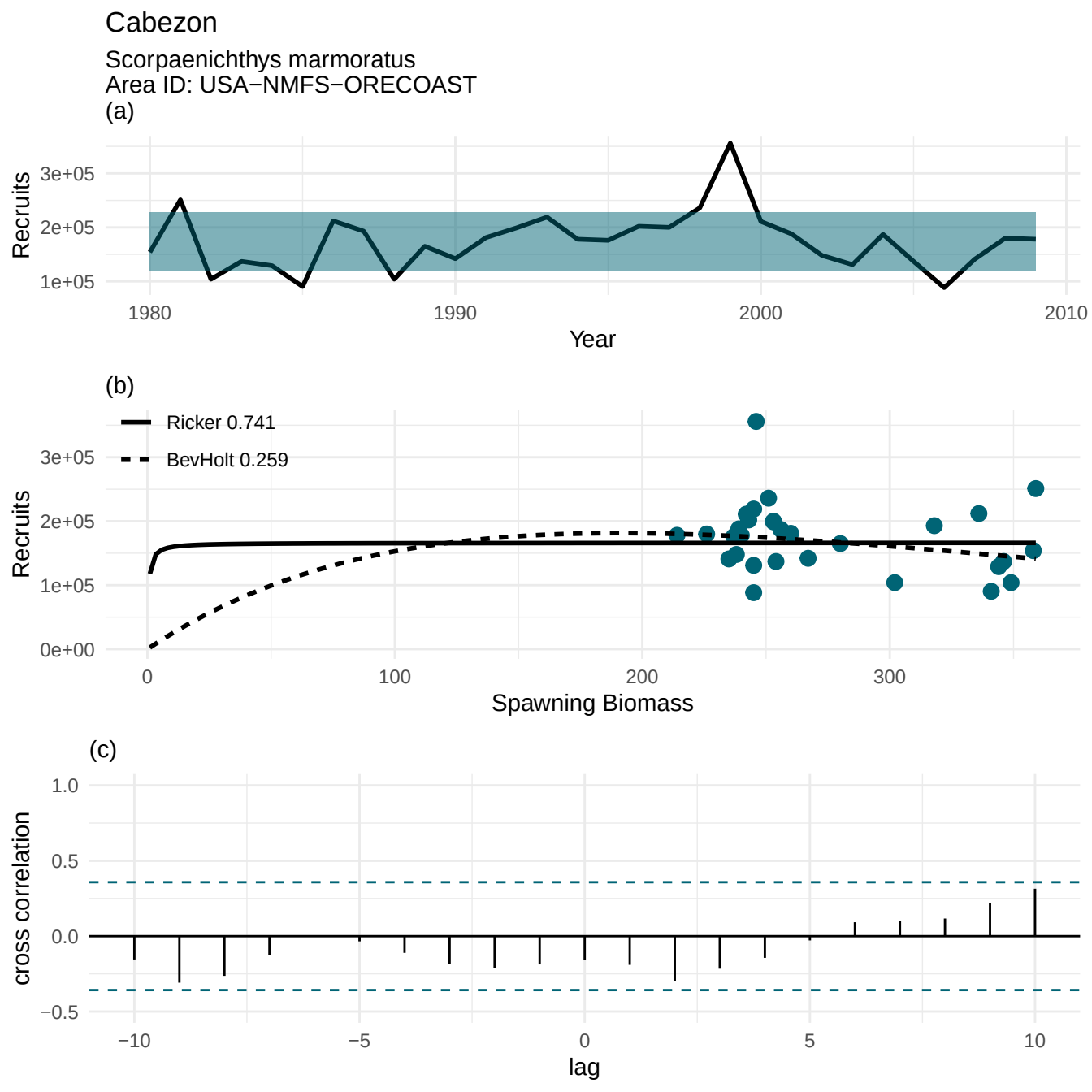

Yellow squat lobster
Cervimunida johni
Area ID: Chile−SUBPESCA−CH−N
(a)
Recruits
3e+08
2e+08
1e+08
1990
1995
2000
2005
2010
Year
(b)
Ricker 0.955
BevHolt 0.0452
Recruits
3e+08
2e+08
1e+08
0e+00
0
1000
2000
3000
4000
5000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.5
−10
−5
0
5
10
lag

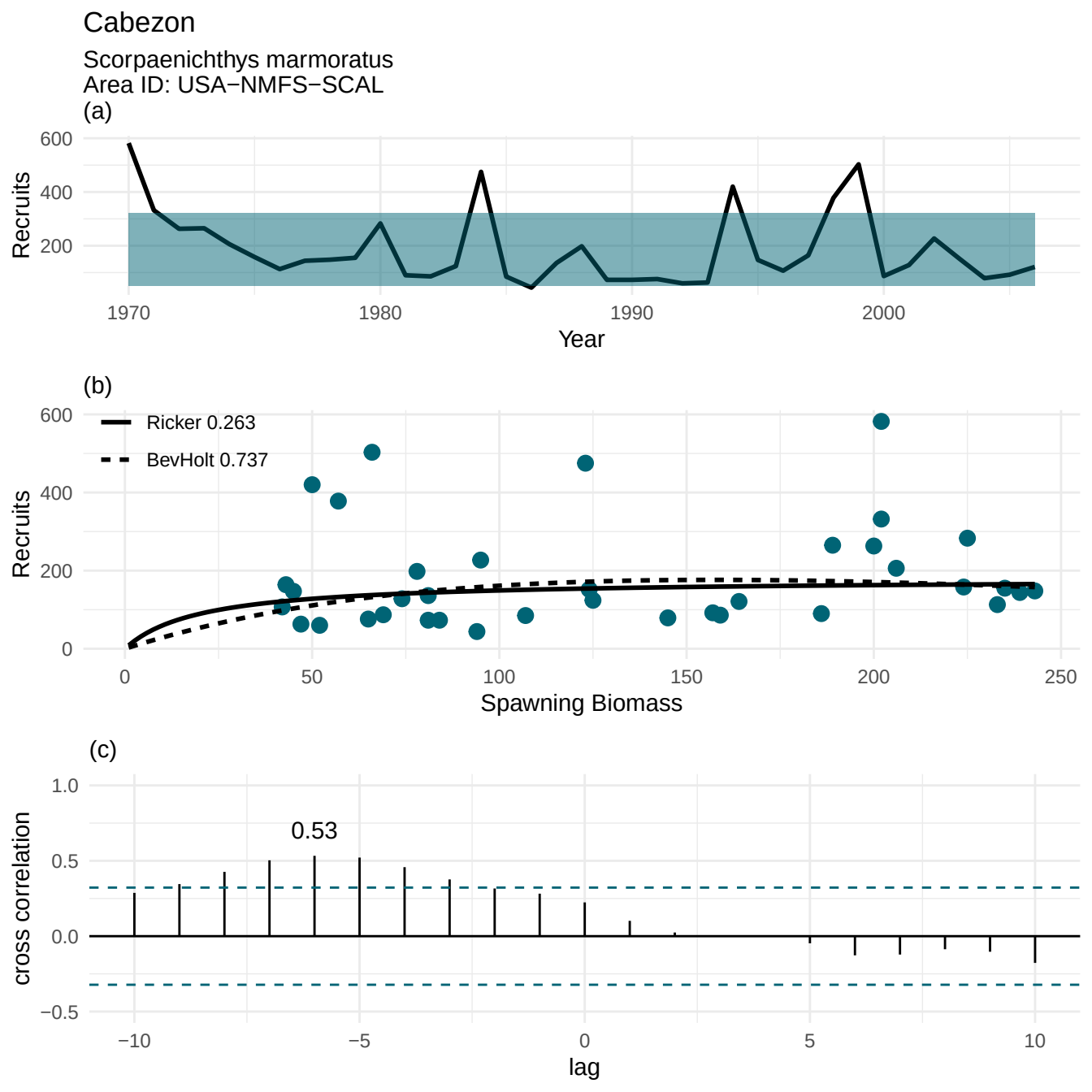

Brown tiger shrimp
Penaeus esculentus
Area ID: Australia−AFMA−NAUST
(a)
Recruits
6e+08
5e+08
4e+08
3e+08
2e+08
1e+08
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.494
BevHolt 0.506
Recruits
6e+08
4e+08
2e+08
0e+00
0e+00
1e+07
2e+07
3e+07
4e+07
5e+07
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.84
0.33
−10
−5
0
5
10
lag

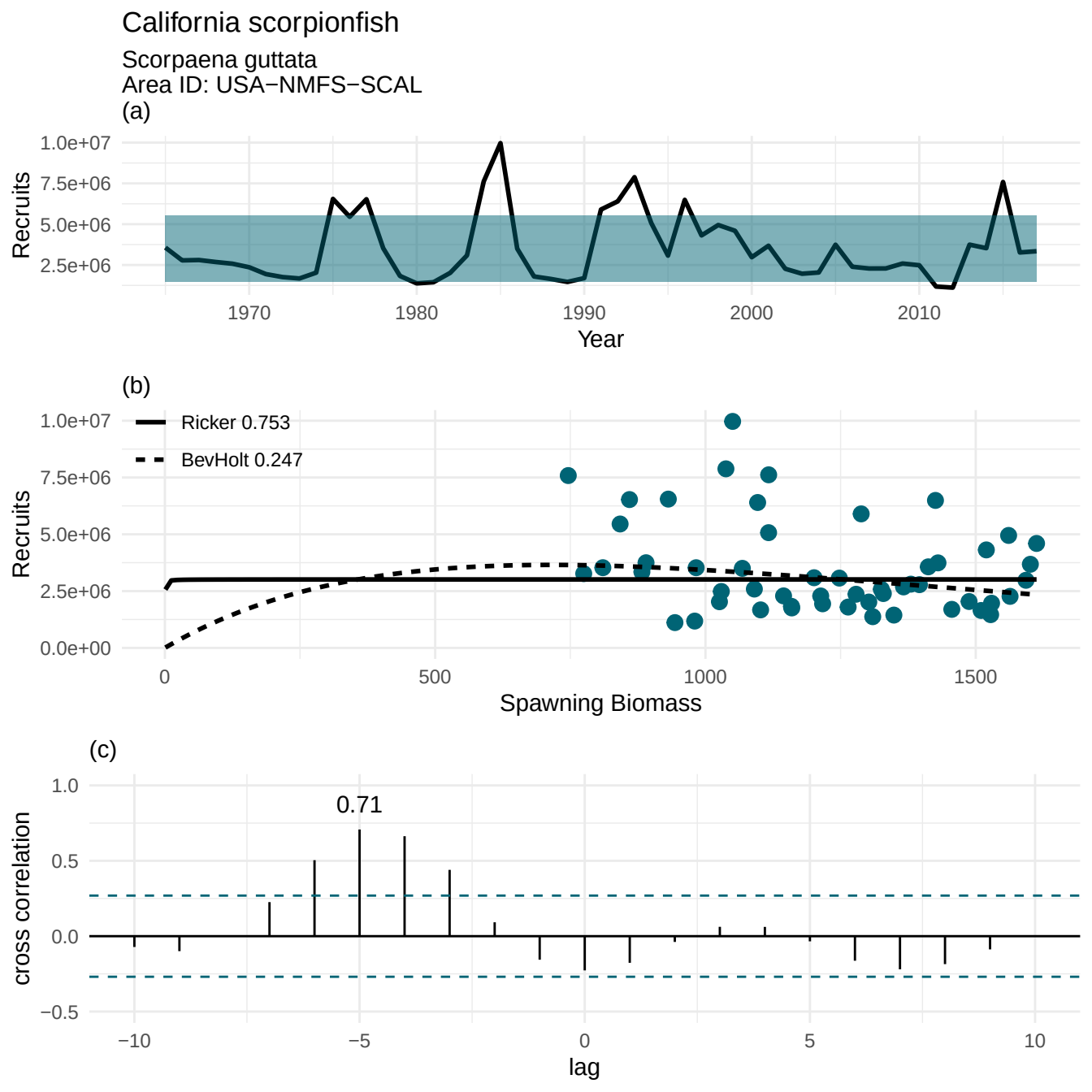

Atlantic butterfish
Peprilus triacanthus
Area ID: USA−NMFS−5YCHATT
(a)
Recruits
1.6e+07
1.2e+07
8.0e+06
4.0e+06
1990
2000
2010
Year
(b)
Ricker 0.493
BevHolt 0.507
Recruits
1.5e+07
1.0e+07
5.0e+06
0.0e+00
0e+00
3e+07
6e+07
9e+07
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.73
0.41
−10
−5
0
5
10
lag

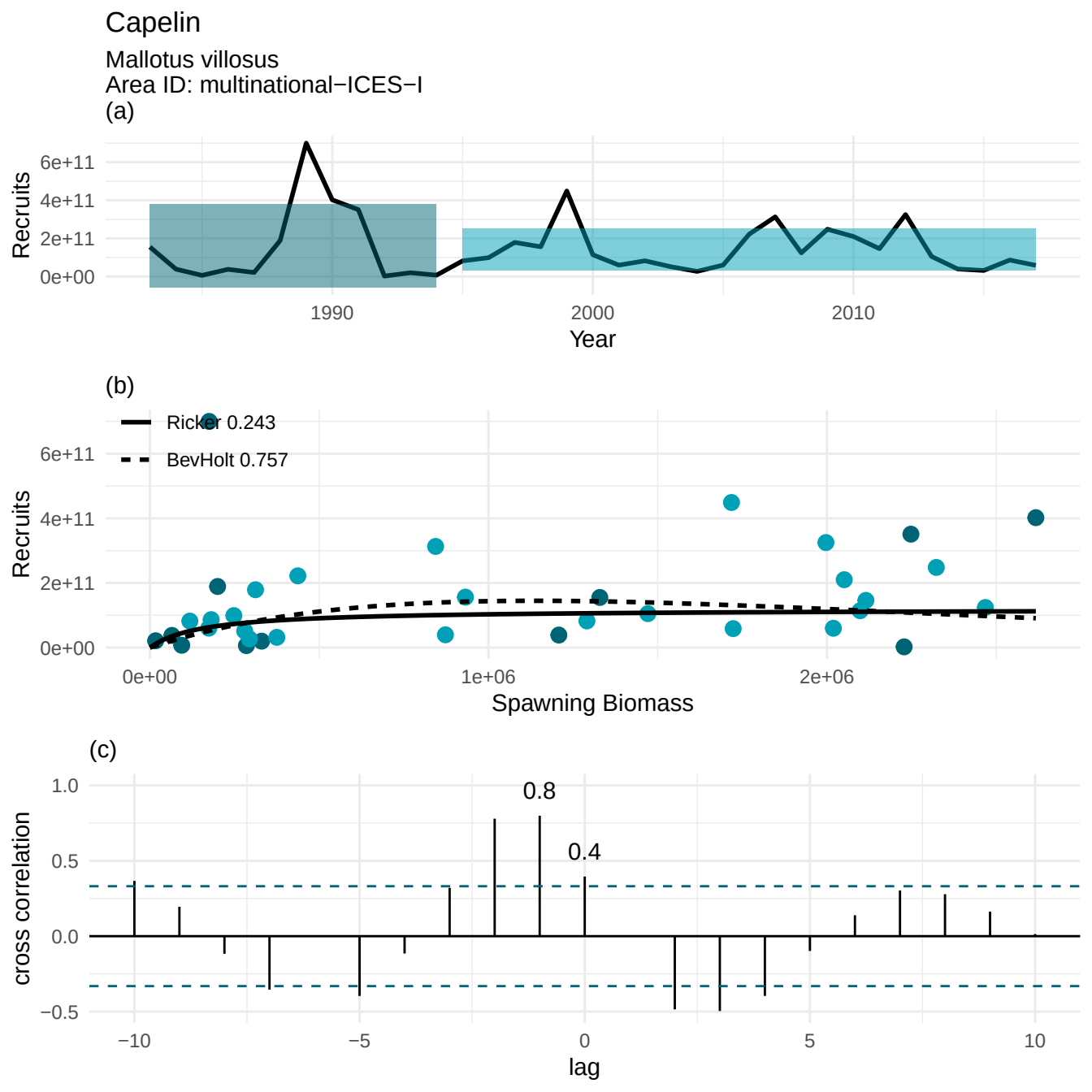

Blue whiting
Micromesistius poutassou
Area ID: multinational−ICES−I−II−III−IV−V−VI−VII−VIII−IX−XII−XIV
(a)
Recruits
6e+10
4e+10
2e+10
0e+00
1990
2000
2010
Year
(b)
Ricker 0.621
BevHolt 0.379
Recruits
6e+10
4e+10
2e+10
0e+00
0e+00
2e+06
4e+06
6e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.76
−10
−5
0
5
10
lag

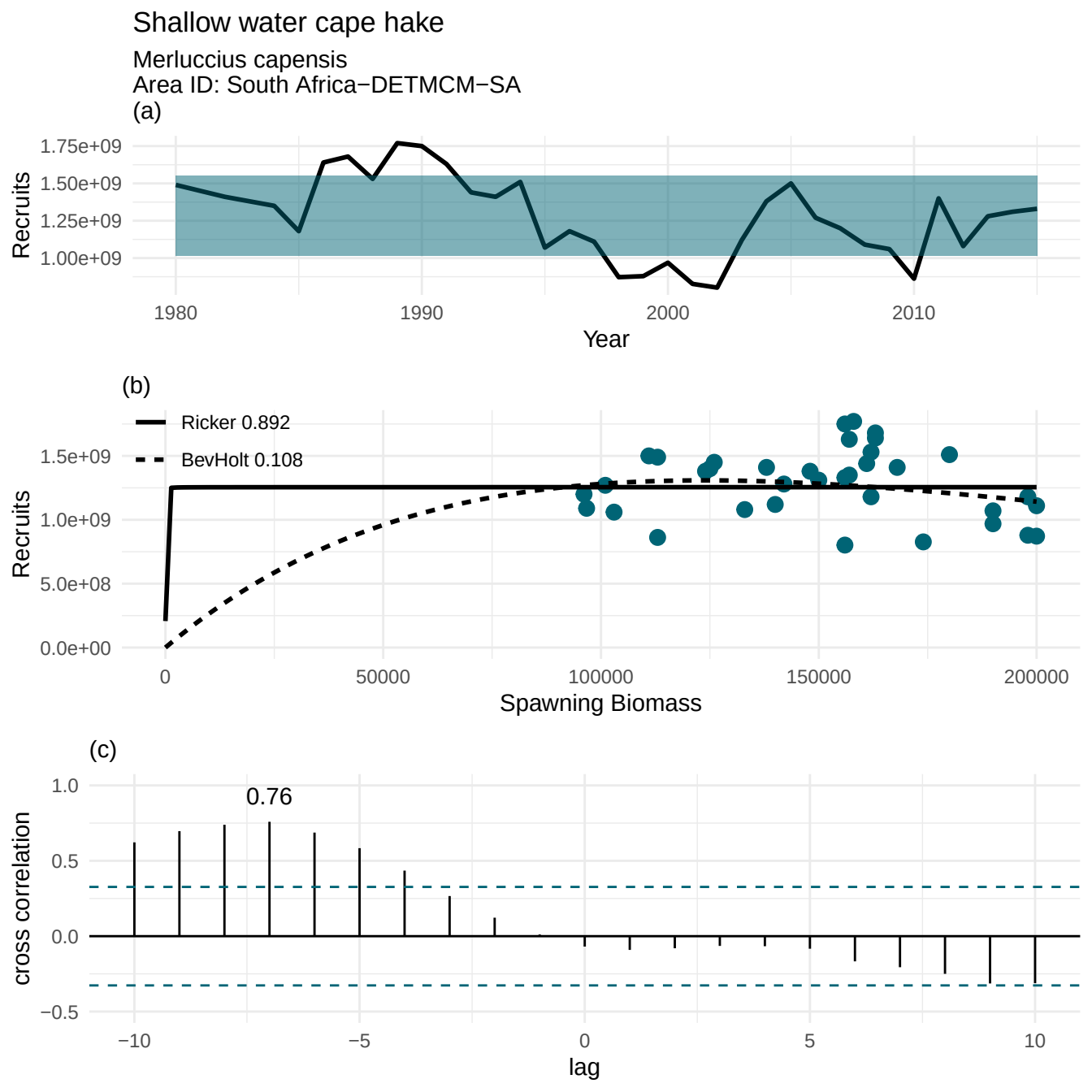

Cabezon
Scorpaenichthys marmoratus
Area ID: USA−NMFS−NCAL
(a)
Recruits
1500
1200
900
600
300
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.519
BevHolt 0.481
Recruits
1500
1000
500
0
0
250
500
750
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

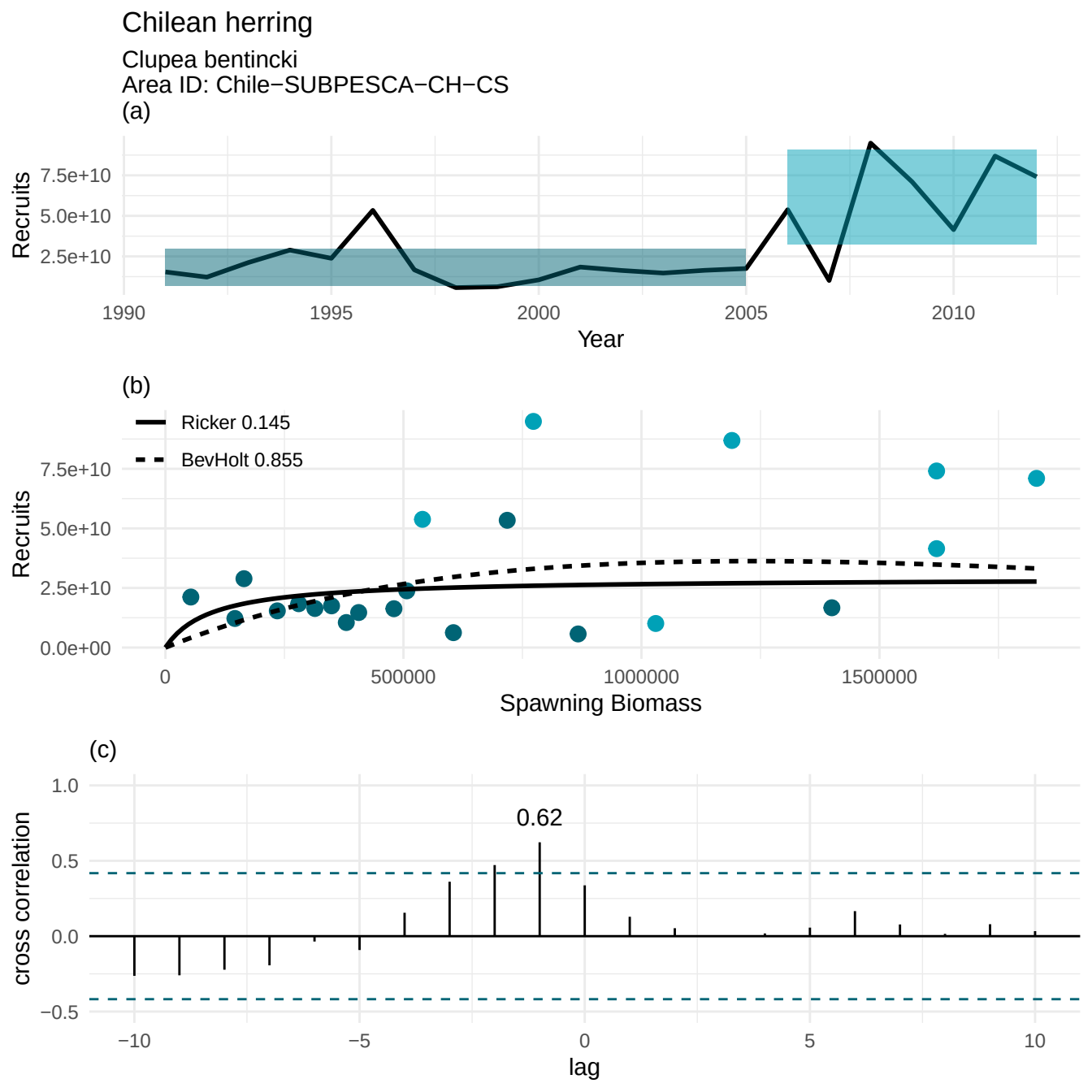

Cabezon
Scorpaenichthys marmoratus
Area ID: USA−NMFS−ORECOAST
(a)
Recruits
3e+05
2e+05
1e+05
1980
1990
2000
2010
Year
(b)
Ricker 0.741
BevHolt 0.259
Recruits
3e+05
2e+05
1e+05
0e+00
0
100
200
300
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

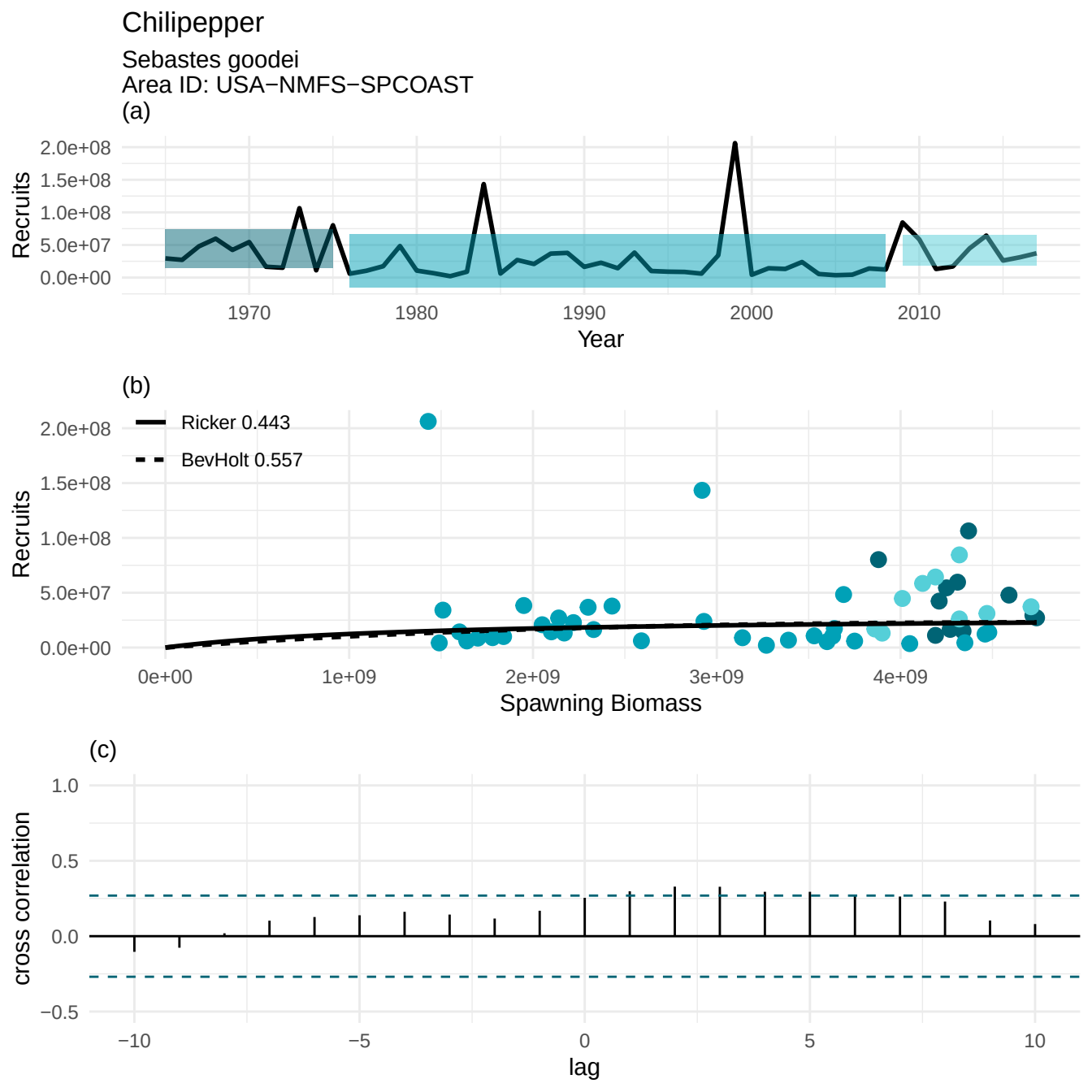

Cabezon
Scorpaenichthys marmoratus
Area ID: USA−NMFS−SCAL
(a)
Recruits
600
400
200
1970
1980
1990
2000
Year
(b)
Ricker 0.263
BevHolt 0.737
Recruits
600
400
200
0
0
50
100
150
200
250
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.53
−10
−5
0
5
10
lag

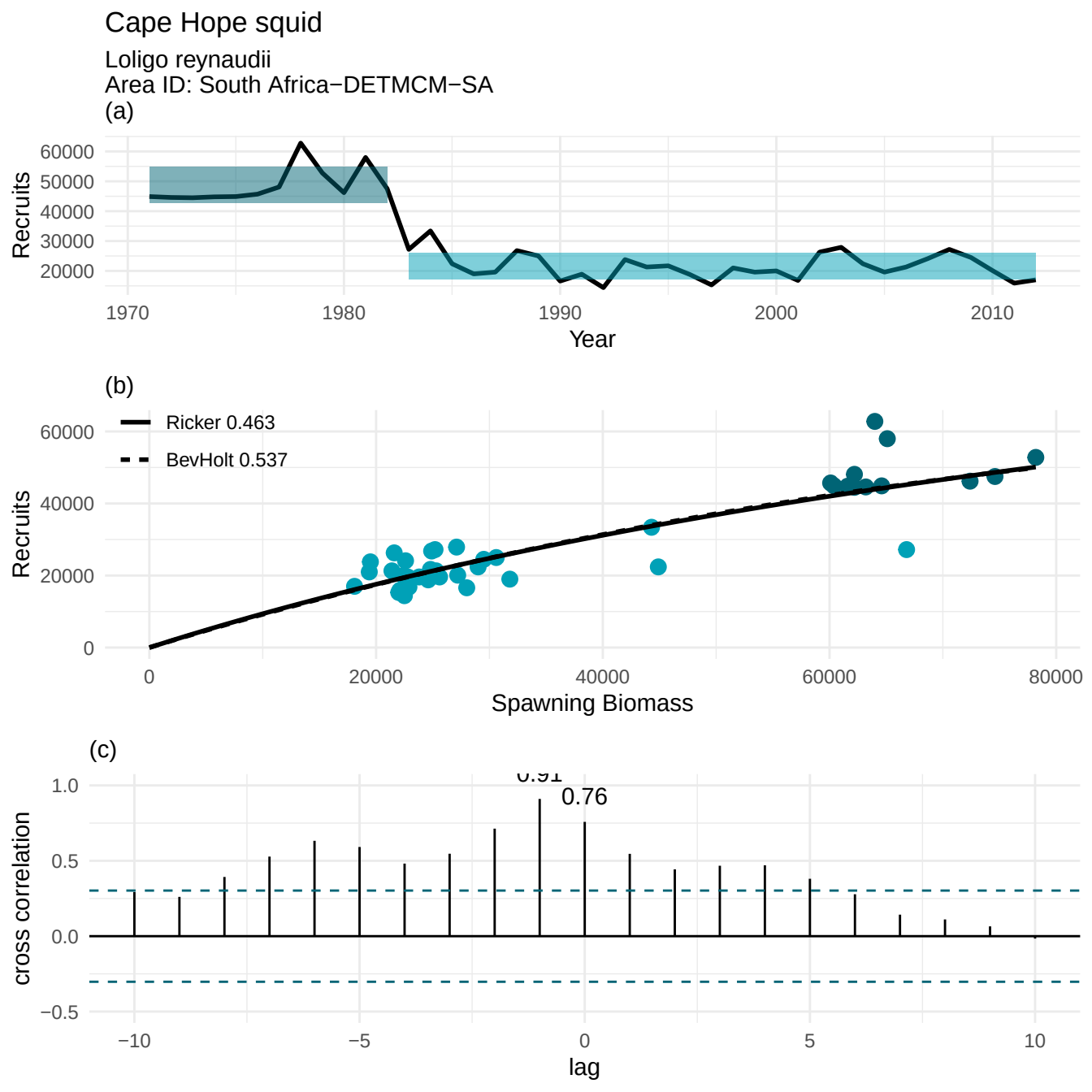

California scorpionfish
Scorpaena guttata
Area ID: USA−NMFS−SCAL
(a)
Recruits
1.0e+07
7.5e+06
5.0e+06
2.5e+06
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.753
BevHolt 0.247
Recruits
1.0e+07
7.5e+06
5.0e+06
2.5e+06
0.0e+00
0
500
1000
1500
Spawning Biomass
(c)
0.71
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

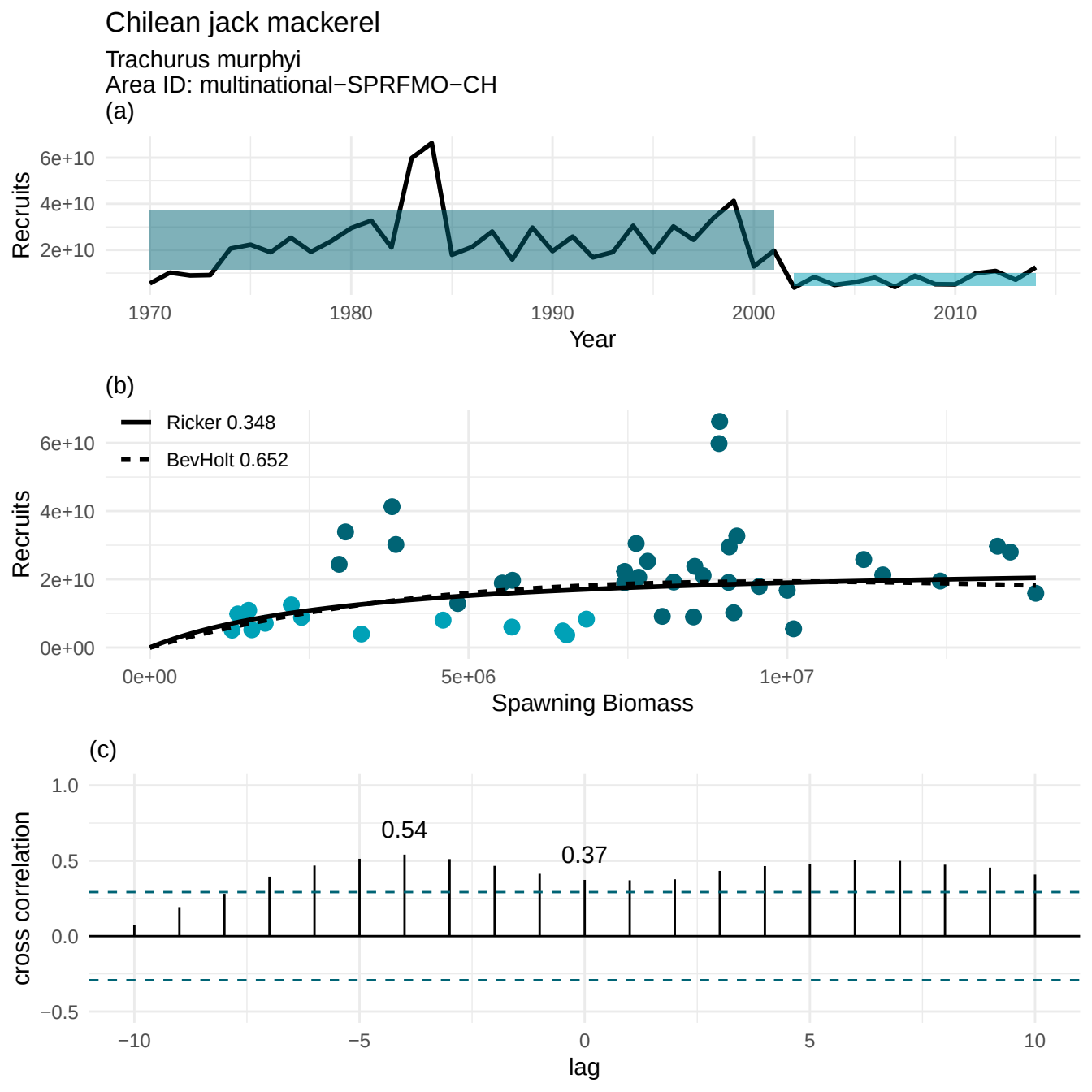

Capelin
Mallotus villosus
Area ID: multinational−ICES−I
(a)
Recruits
6e+11
4e+11
2e+11
0e+00
1990
2000
2010
Year
(b)
Ricker 0.243
BevHolt 0.757
Recruits
6e+11
4e+11
2e+11
0e+00
0e+00
1e+06
2e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.8
0.4
−10
−5
0
5
10
lag

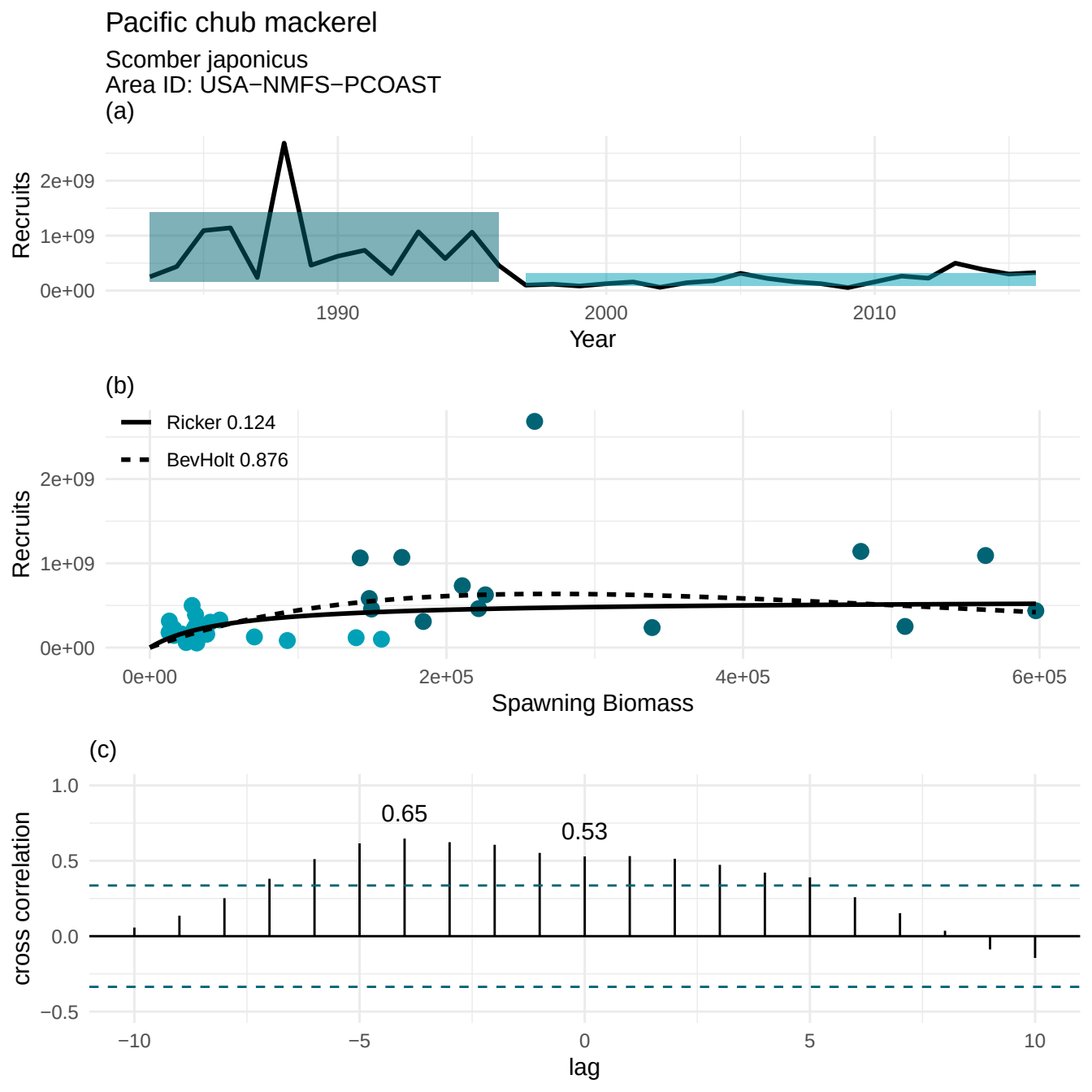

Shallow water cape hake
Merluccius capensis
Area ID: South Africa−DETMCM−SA
(a)
Recruits
1.75e+09
1.50e+09
1.25e+09
1.00e+09
1980
1990
2000
2010
Year
(b)
Ricker 0.892
BevHolt 0.108
Recruits
1.5e+09
1.0e+09
5.0e+08
0.0e+00
0
50000
100000
150000
200000
Spawning Biomass
(c)
0.76
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

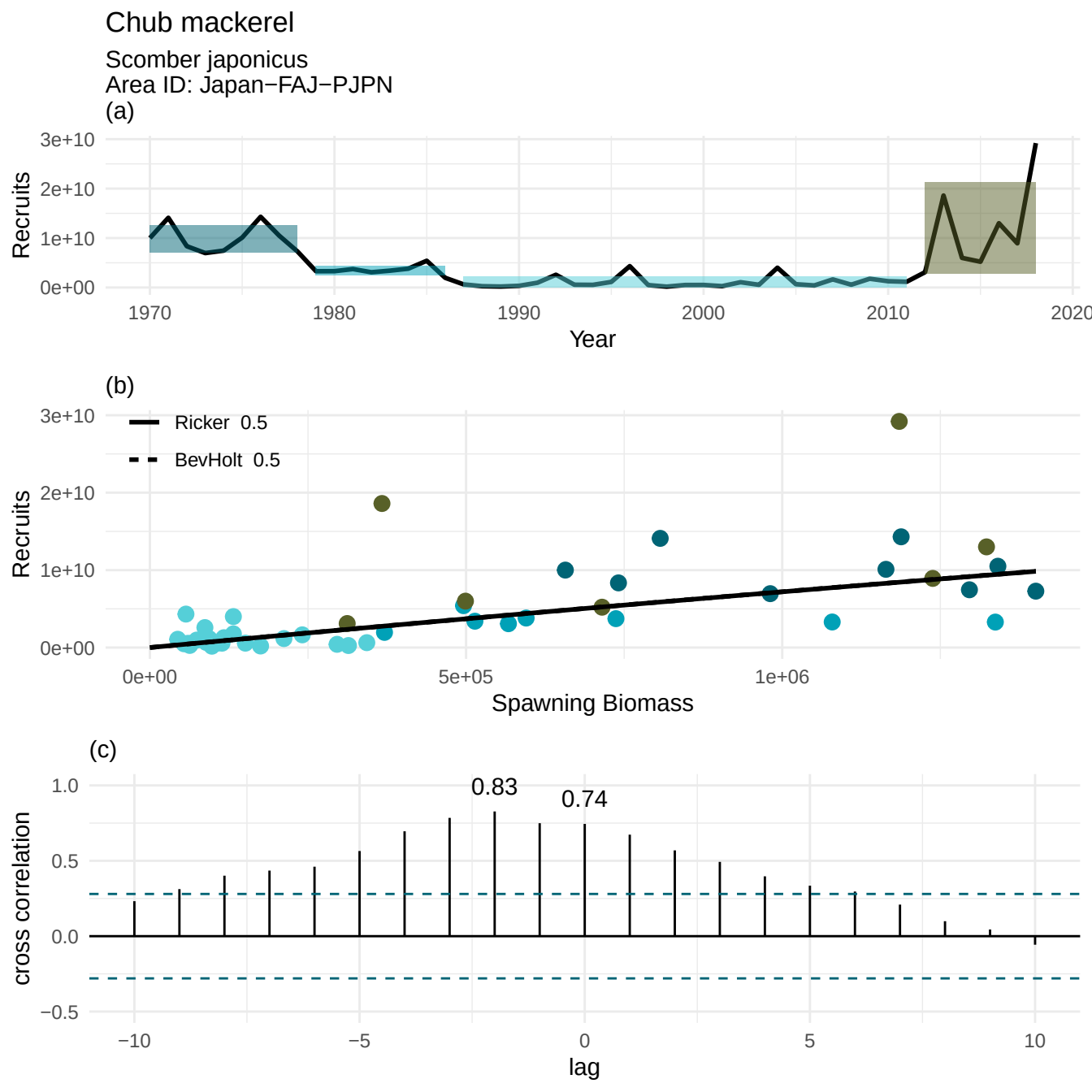

Chilean herring
Clupea bentincki
Area ID: Chile−SUBPESCA−CH−CS
(a)
Recruits
7.5e+10
5.0e+10
2.5e+10
1990
1995
2000
2005
2010
Year
(b)
Ricker 0.145
BevHolt 0.855
Recruits
7.5e+10
5.0e+10
2.5e+10
0.0e+00
0
500000
1000000
1500000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.62
−10
−5
0
5
10
lag

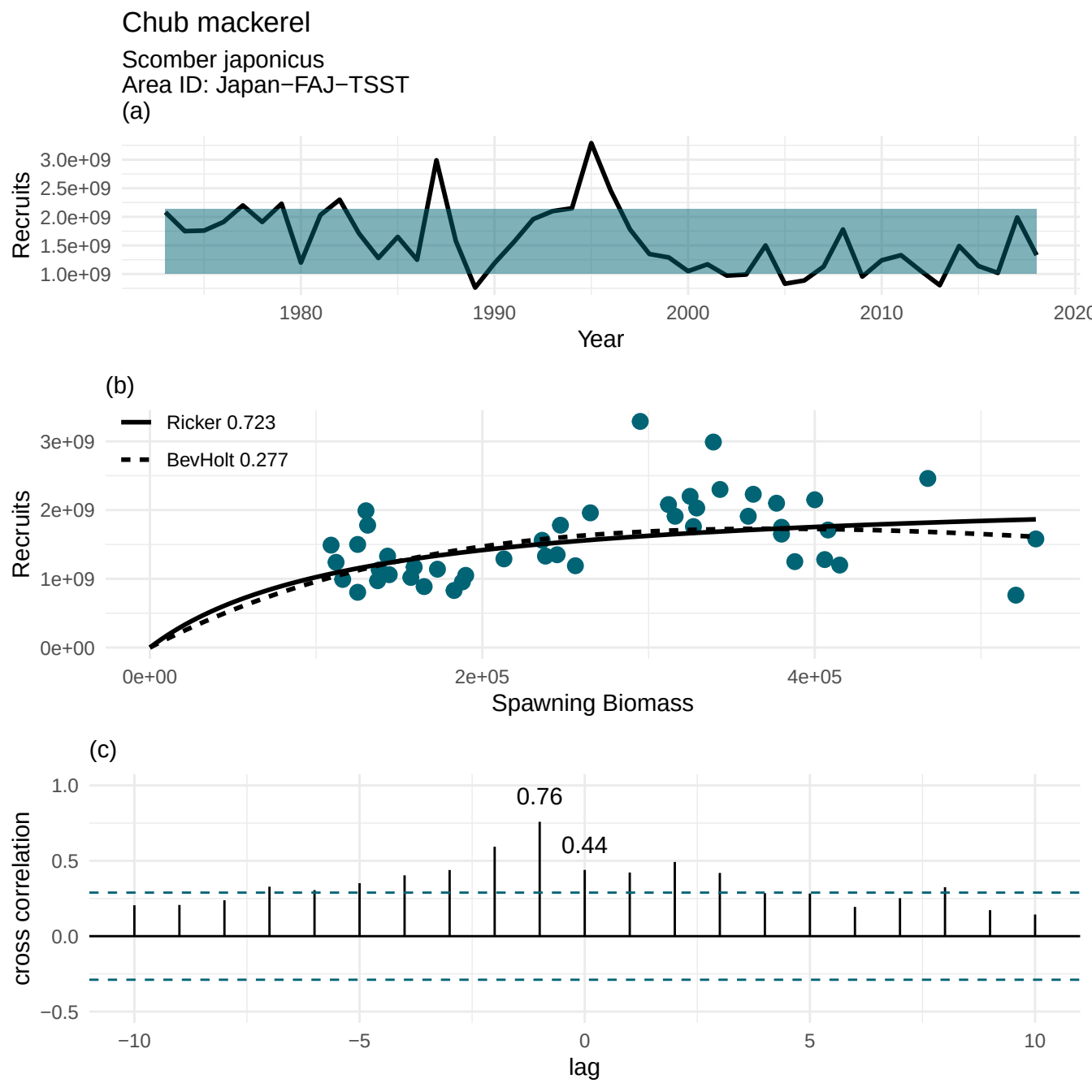

Chilipepper
Sebastes goodei
Area ID: USA−NMFS−SPCOAST
(a)
Recruits
2.0e+08
1.5e+08
1.0e+08
5.0e+07
0.0e+00
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.443
BevHolt 0.557
Recruits
2.0e+08
1.5e+08
1.0e+08
5.0e+07
0.0e+00
0e+00
1e+09
2e+09
3e+09
4e+09
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

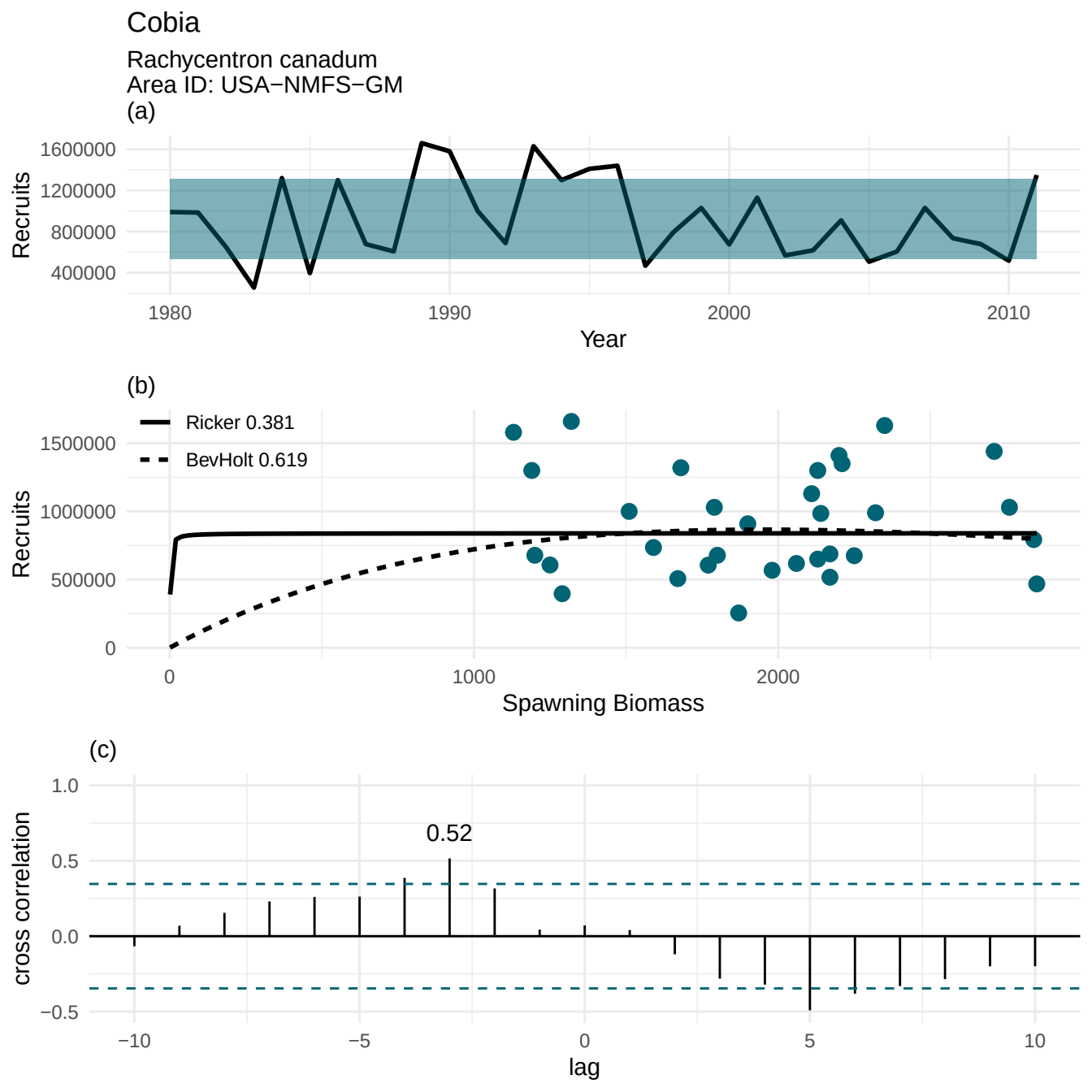

Cape Hope squid
Loligo reynaudii
Area ID: South Africa−DETMCM−SA
(a)
Recruits
60000
50000
40000
30000
20000
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.463
BevHolt 0.537
Recruits
60000
40000
20000
0
0
20000
40000
60000
80000
Spawning Biomass
(c)
0.91
0.76
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

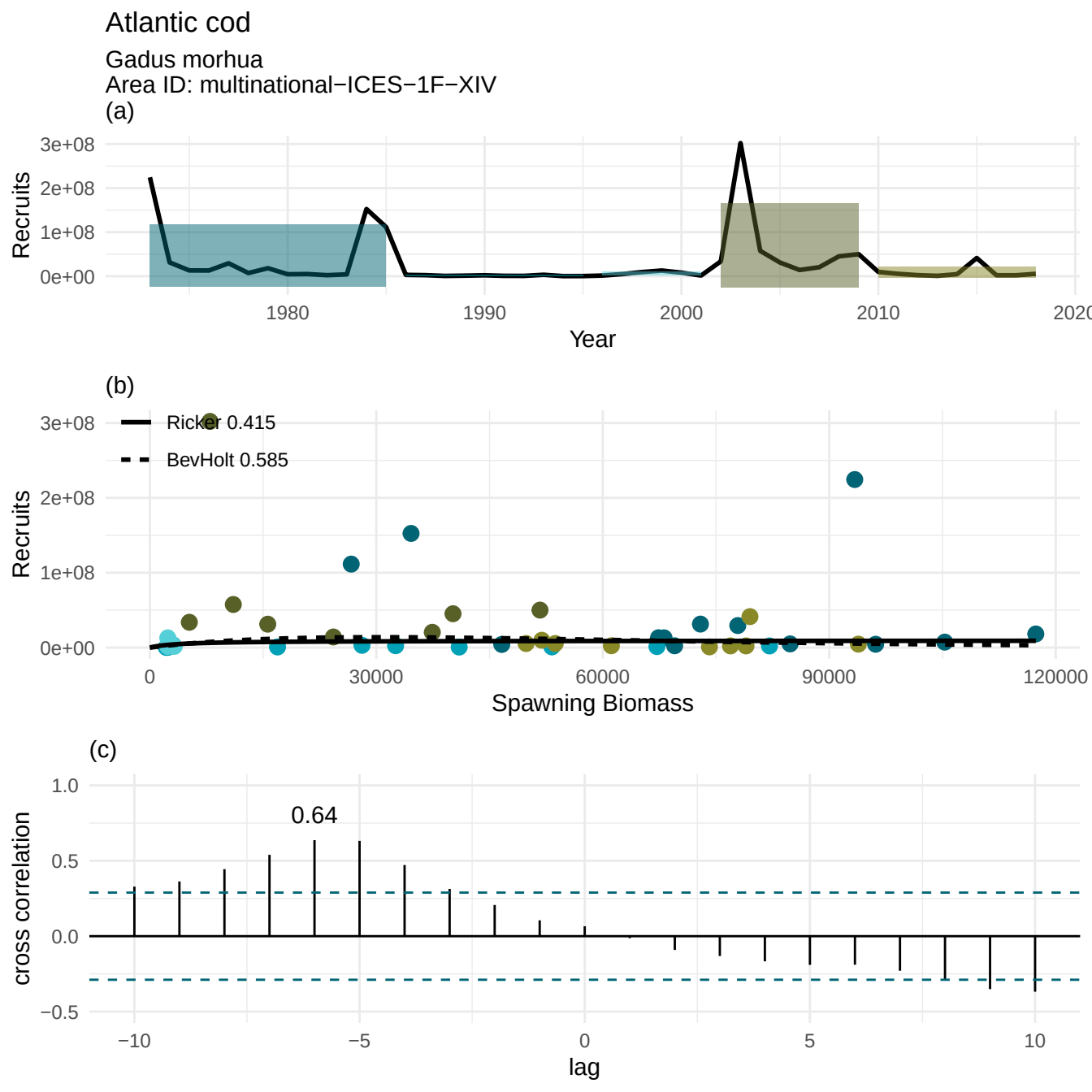

Chilean jack mackerel
Trachurus murphyi
Area ID: multinational−SPRFMO−CH
(a)
Recruits
6e+10
4e+10
2e+10
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.348
BevHolt 0.652
Recruits
6e+10
4e+10
2e+10
0e+00
0e+00
5e+06
1e+07
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.54
0.37
−10
−5
0
5
10
lag

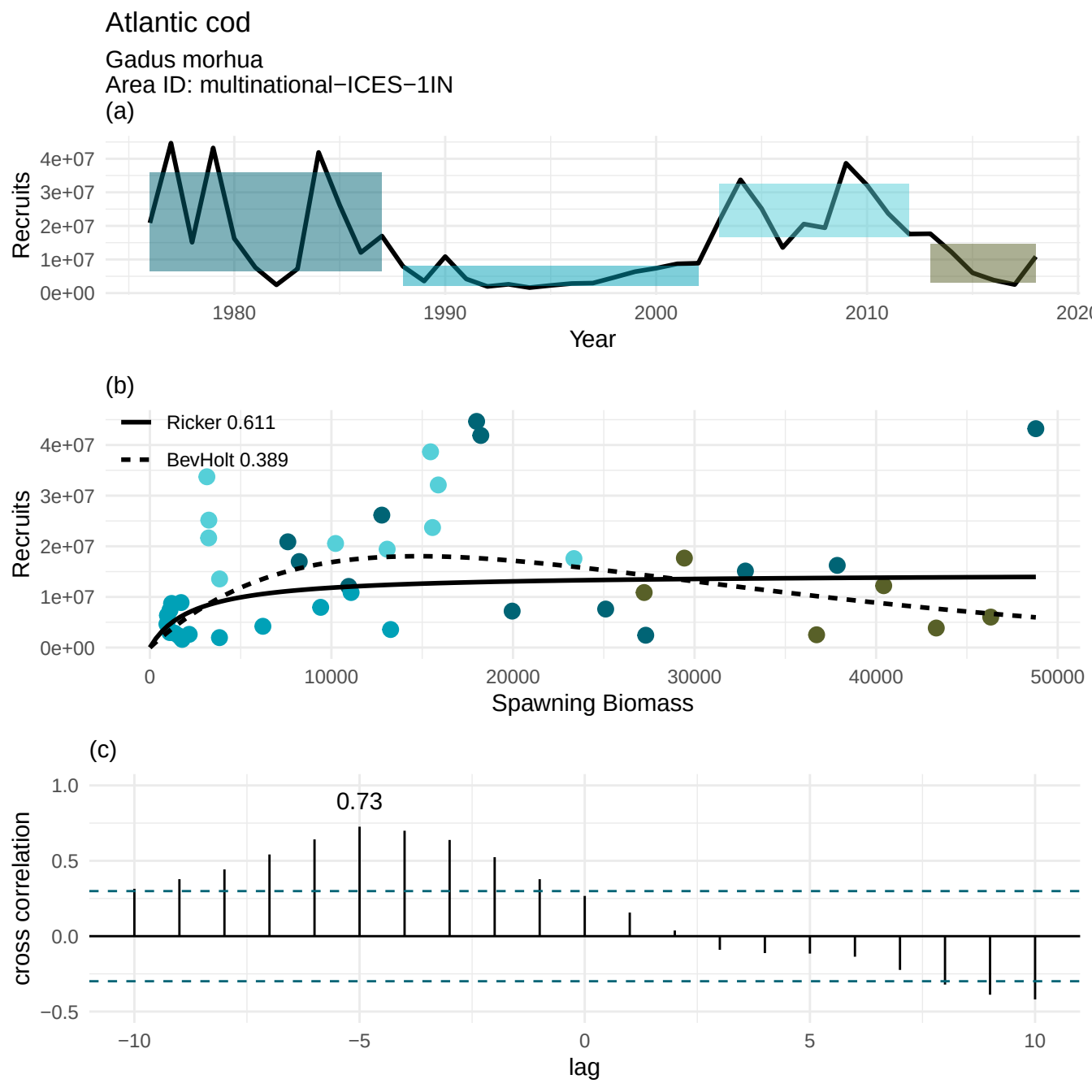

Pacific chub mackerel
Scomber japonicus
Area ID: USA−NMFS−PCOAST
(a)
Recruits
2e+09
1e+09
0e+00
1990
2000
2010
Year
(b)
Ricker 0.124
BevHolt 0.876
Recruits
2e+09
1e+09
0e+00
0e+00
2e+05
4e+05
6e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.65
0.53
−10
−5
0
5
10
lag

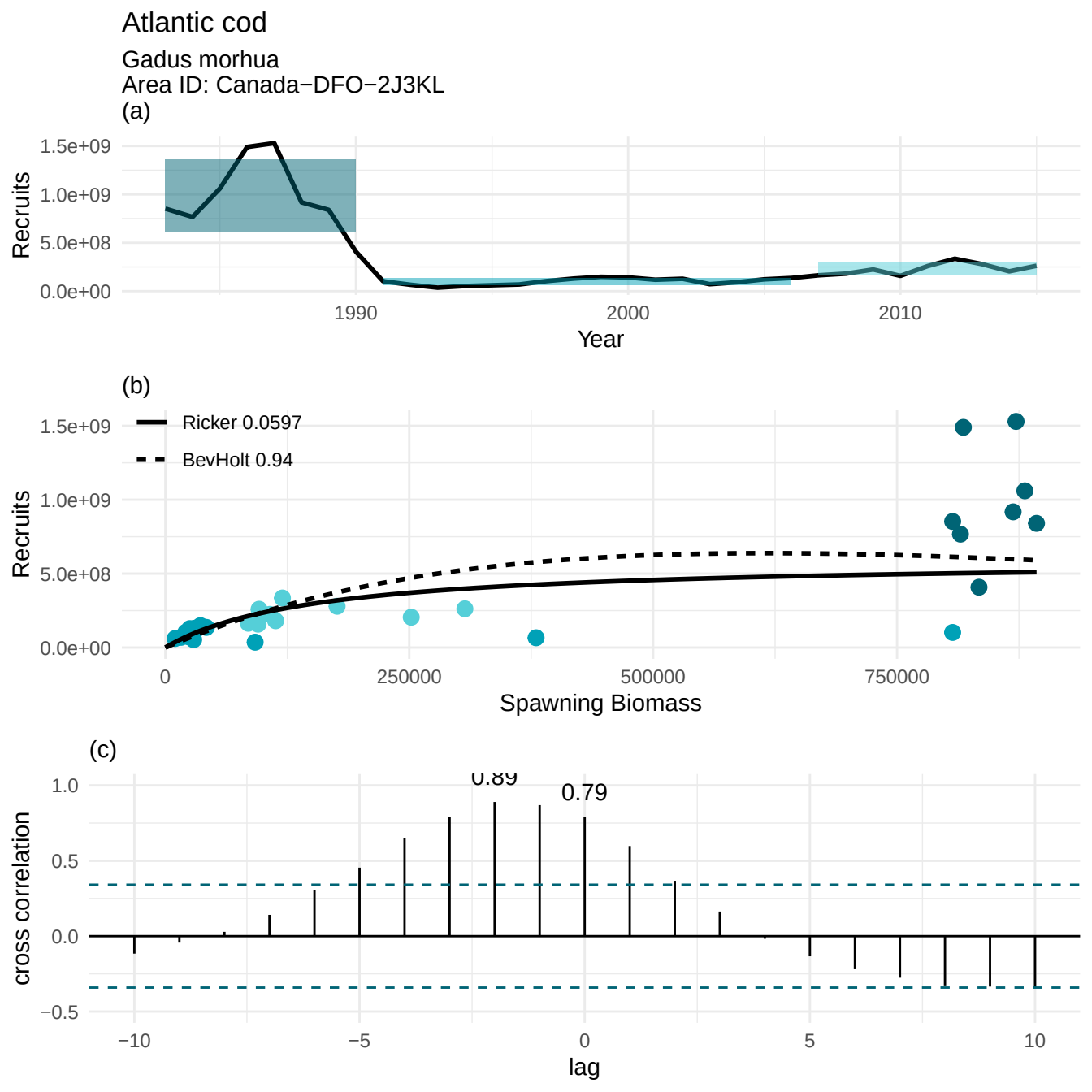

Chub mackerel
Scomber japonicus
Area ID: Japan−FAJ−PJPN
(a)
Recruits
3e+10
2e+10
1e+10
0e+00
1970
1980
1990
2000
2010
2020
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
3e+10
2e+10
1e+10
0e+00
0e+00
5e+05
1e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.83
0.74
−10
−5
0
5
10
lag

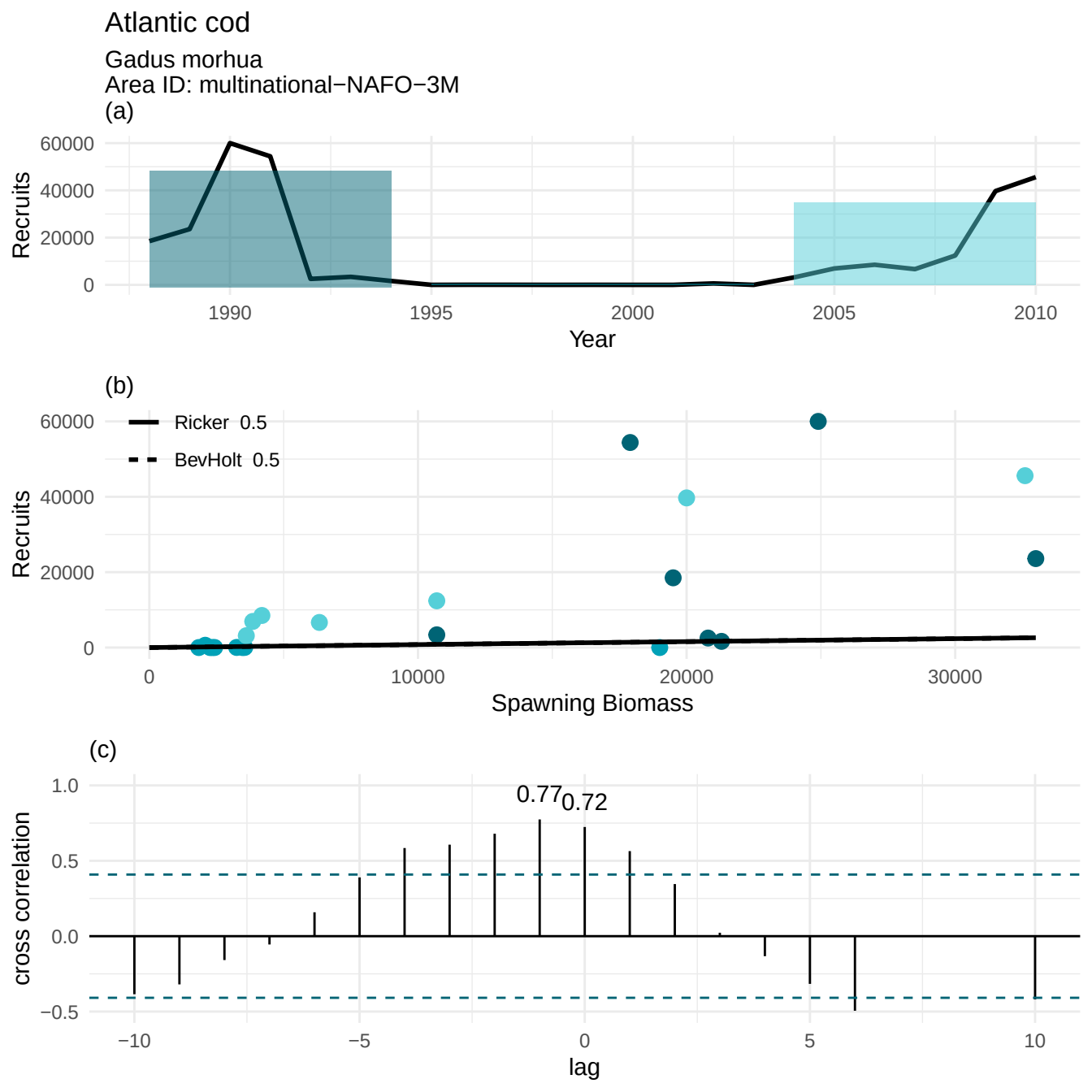

Chub mackerel
Scomber japonicus
Area ID: Japan−FAJ−TSST
(a)
Recruits
3.0e+09
2.5e+09
2.0e+09
1.5e+09
1.0e+09
1980
1990
2000
2010
2020
Year
(b)
Ricker 0.723
BevHolt 0.277
Recruits
3e+09
2e+09
1e+09
0e+00
0e+00
2e+05
4e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.76
0.44
−10
−5
0
5
10
lag

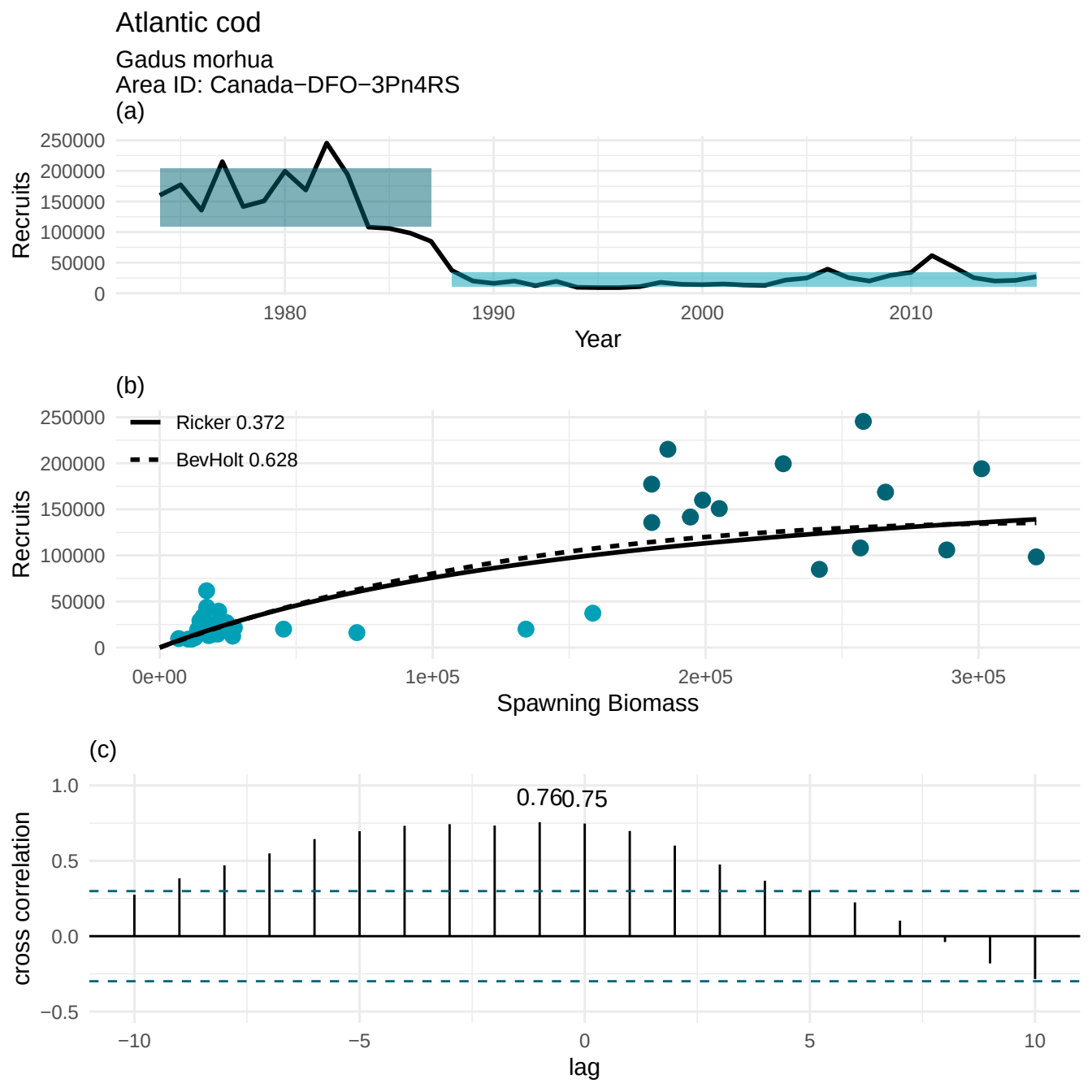

Cobia
Rachycentron canadum
Area ID: USA−NMFS−GM
(a)
Recruits
1600000
1200000
800000
400000
1980
1990
2000
2010
Year
(b)
Ricker 0.381
BevHolt 0.619
Recruits
1500000
1000000
500000
0
0
1000
2000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.52
−10
−5
0
5
10
lag

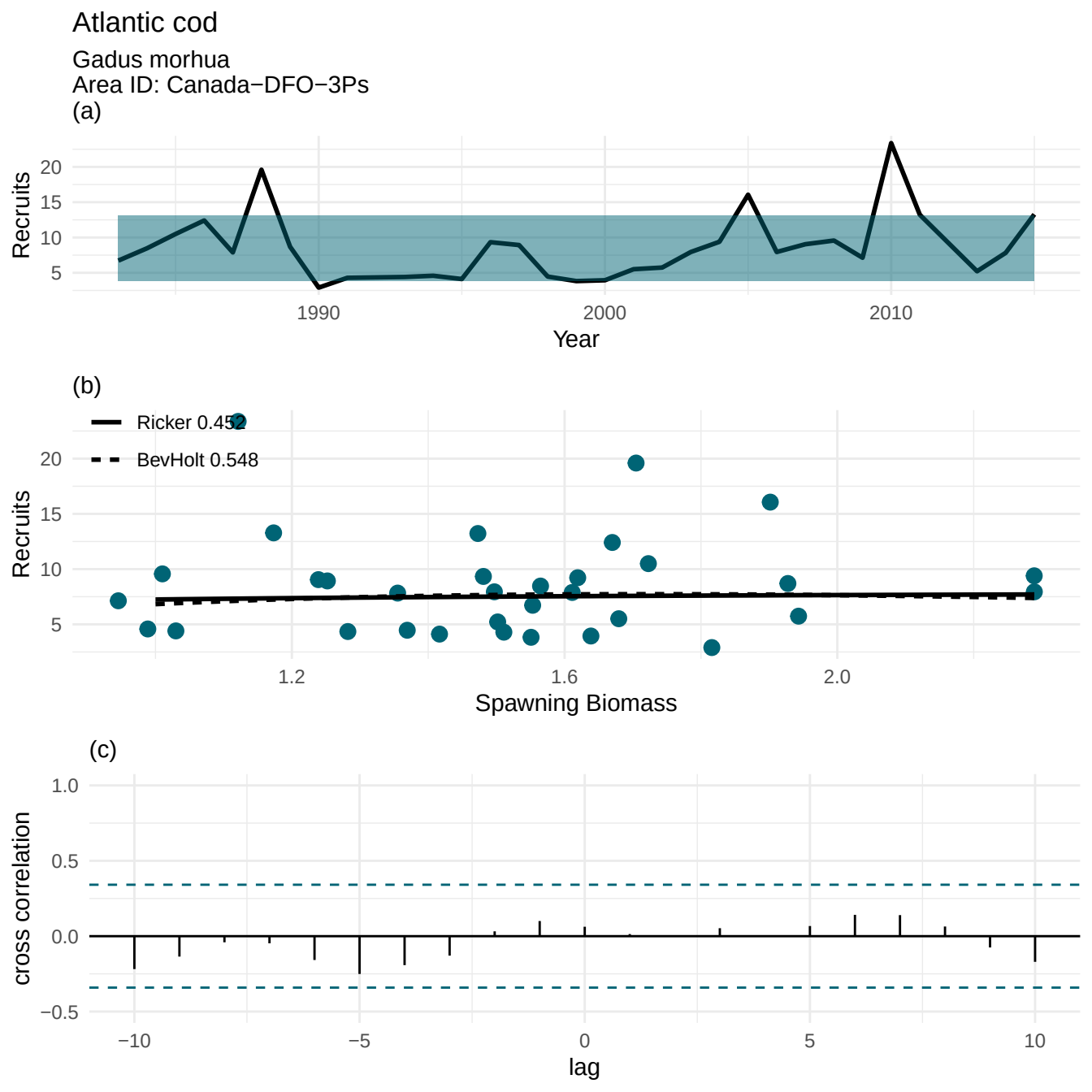

Atlantic cod
Gadus morhua
Area ID: multinational−ICES−1F−XIV
(a)
Recruits
3e+08
2e+08
1e+08
0e+00
1980
1990
2000
2010
2020
Year
(b)
Ricker 0.415
BevHolt 0.585
Recruits
3e+08
2e+08
1e+08
0e+00
0
30000
60000
90000
120000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.64
−10
−5
0
5
10
lag

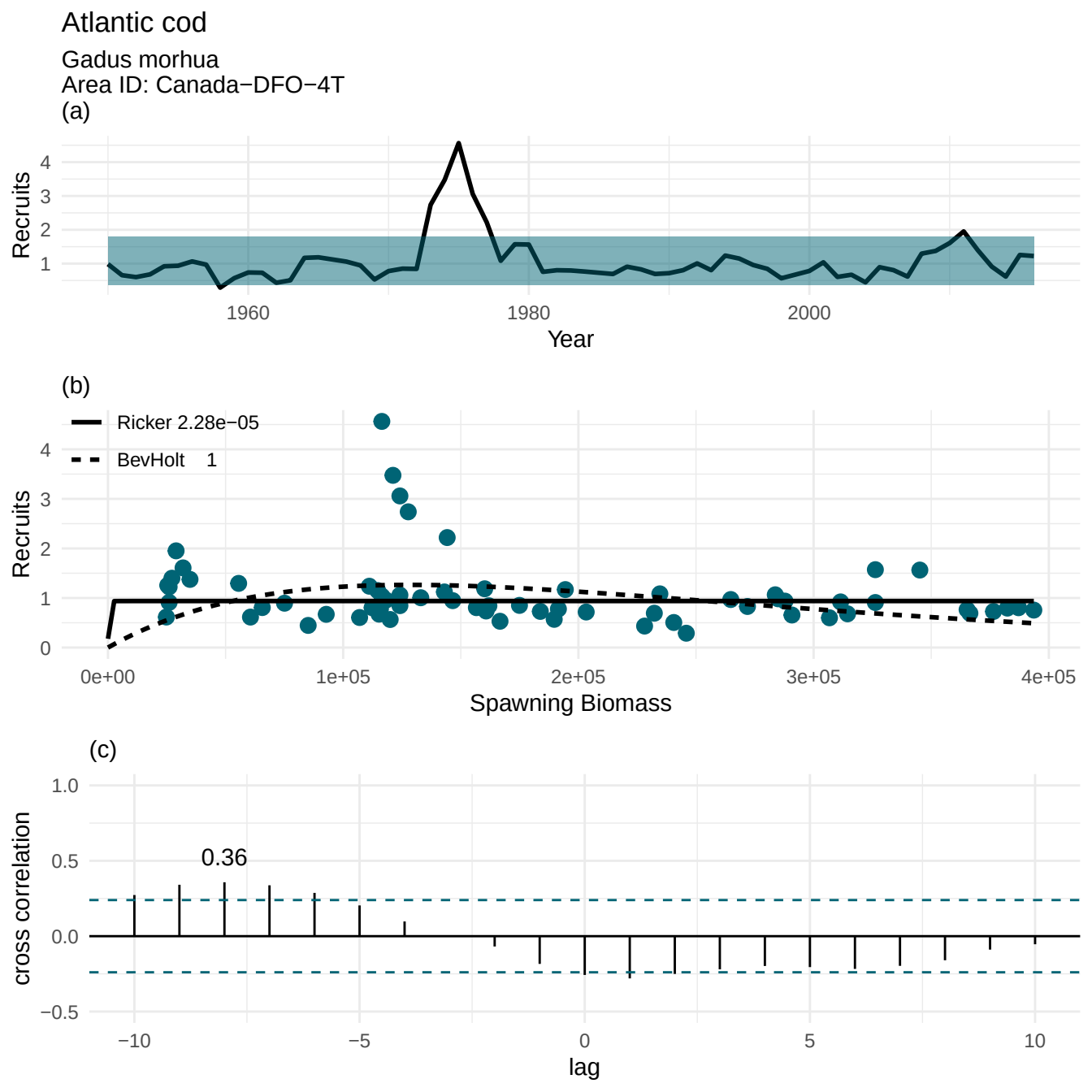

Atlantic cod
Gadus morhua
Area ID: multinational−ICES−1IN
(a)
Recruits
4e+07
3e+07
2e+07
1e+07
0e+00
1980
1990
2000
2010
Year
(b)
Ricker 0.611
BevHolt 0.389
Recruits
Spawning Biomass
0
10000
20000
30000
40000
50000
(c)
cross correlation
0.73
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

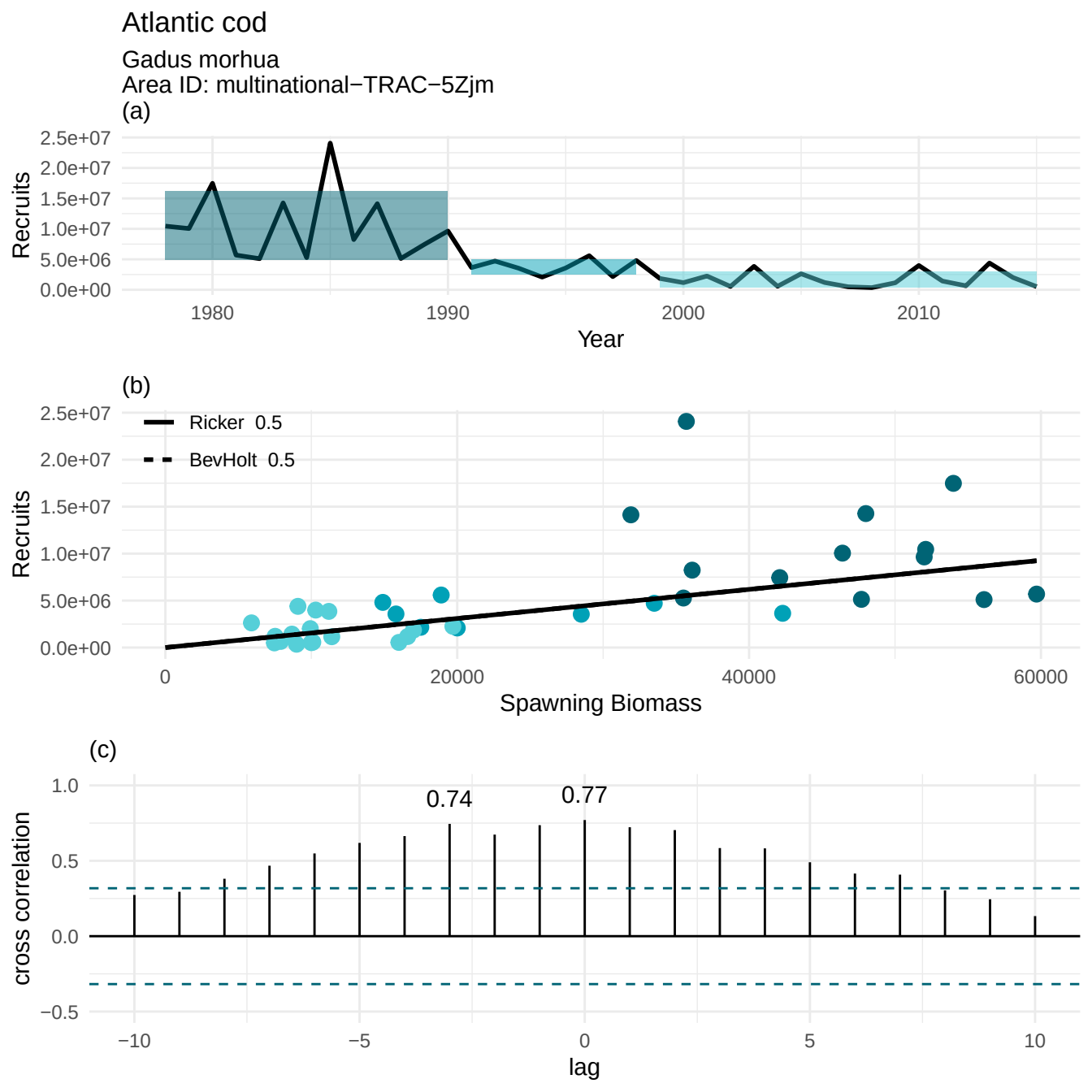

Atlantic cod
Gadus morhua
Area ID: Canada−DFO−2J3KL
(a)
Recruits
1.5e+09
1.0e+09
5.0e+08
0.0e+00
1990
2000
2010
Year
(b)
Ricker 0.0597
BevHolt 0.94
Recruits
1.5e+09
1.0e+09
5.0e+08
0.0e+00
0
250000
500000
750000
Spawning Biomass
(c)
0.89
0.79
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

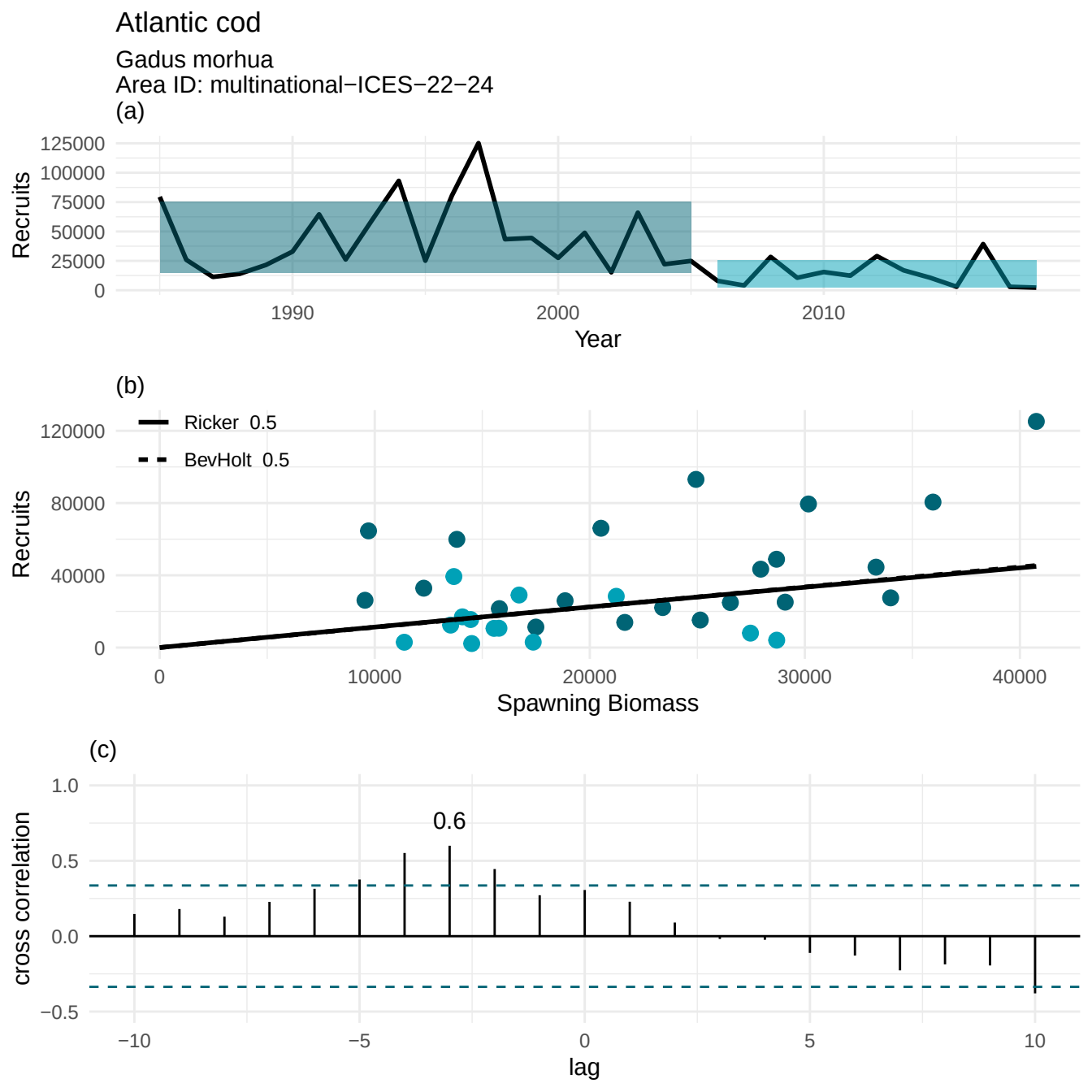

Atlantic cod
Gadus morhua
Area ID: multinational−NAFO−3M
(a)
Recruits
60000
40000
20000
0
1990
1995
2000
2005
2010
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
60000
40000
20000
0
0
10000
20000
30000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.77
0.72
−10
−5
0
5
10
lag

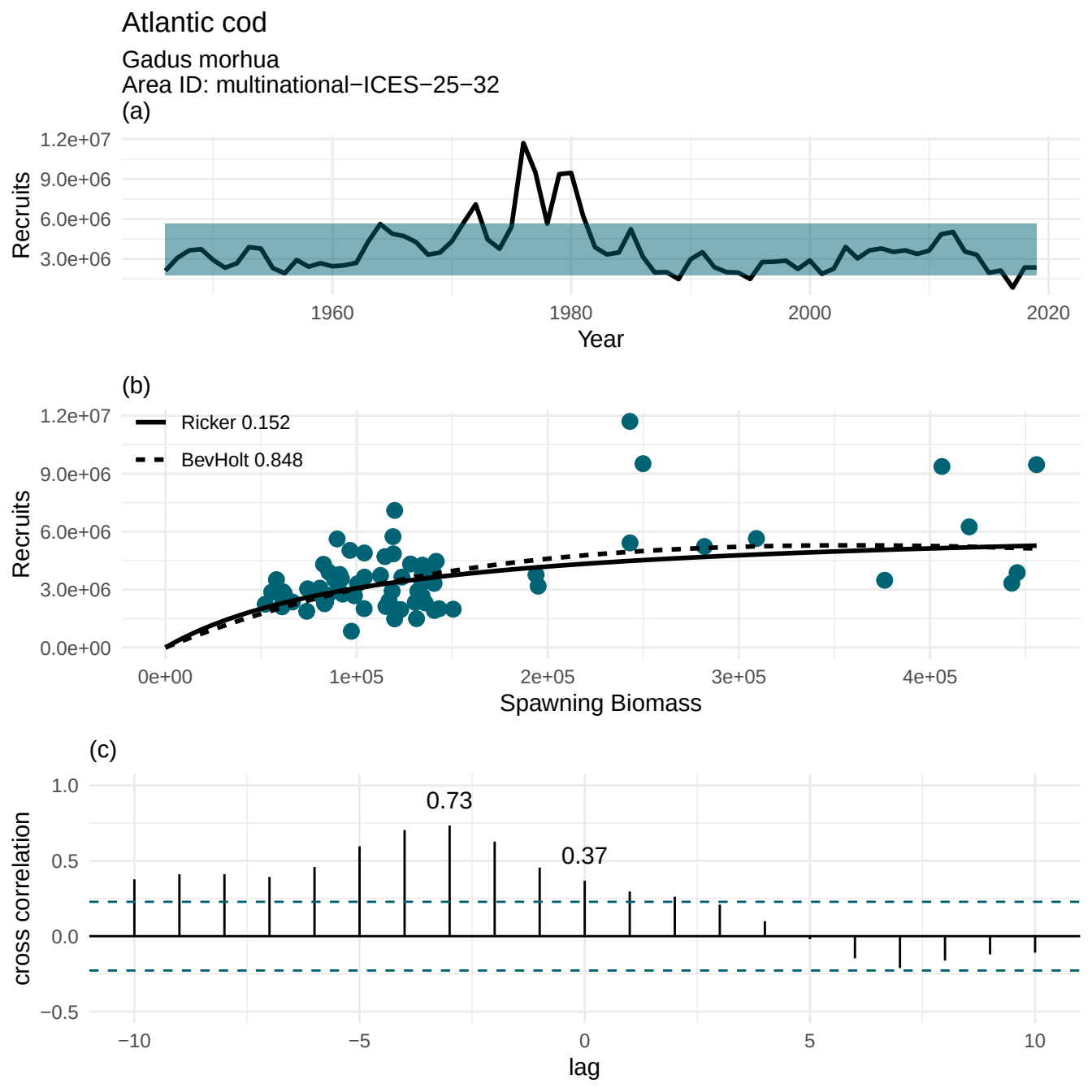

Atlantic cod
Gadus morhua
Area ID: Canada−DFO−3Pn4RS
(a)
Recruits
250000
200000
150000
100000
50000
0
1980
1990
2000
2010
Year
(b)
Ricker 0.372
BevHolt 0.628
Recruits
0e+00
1e+05
2e+05
3e+05
Spawning Biomass
(c)
0.760.75
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

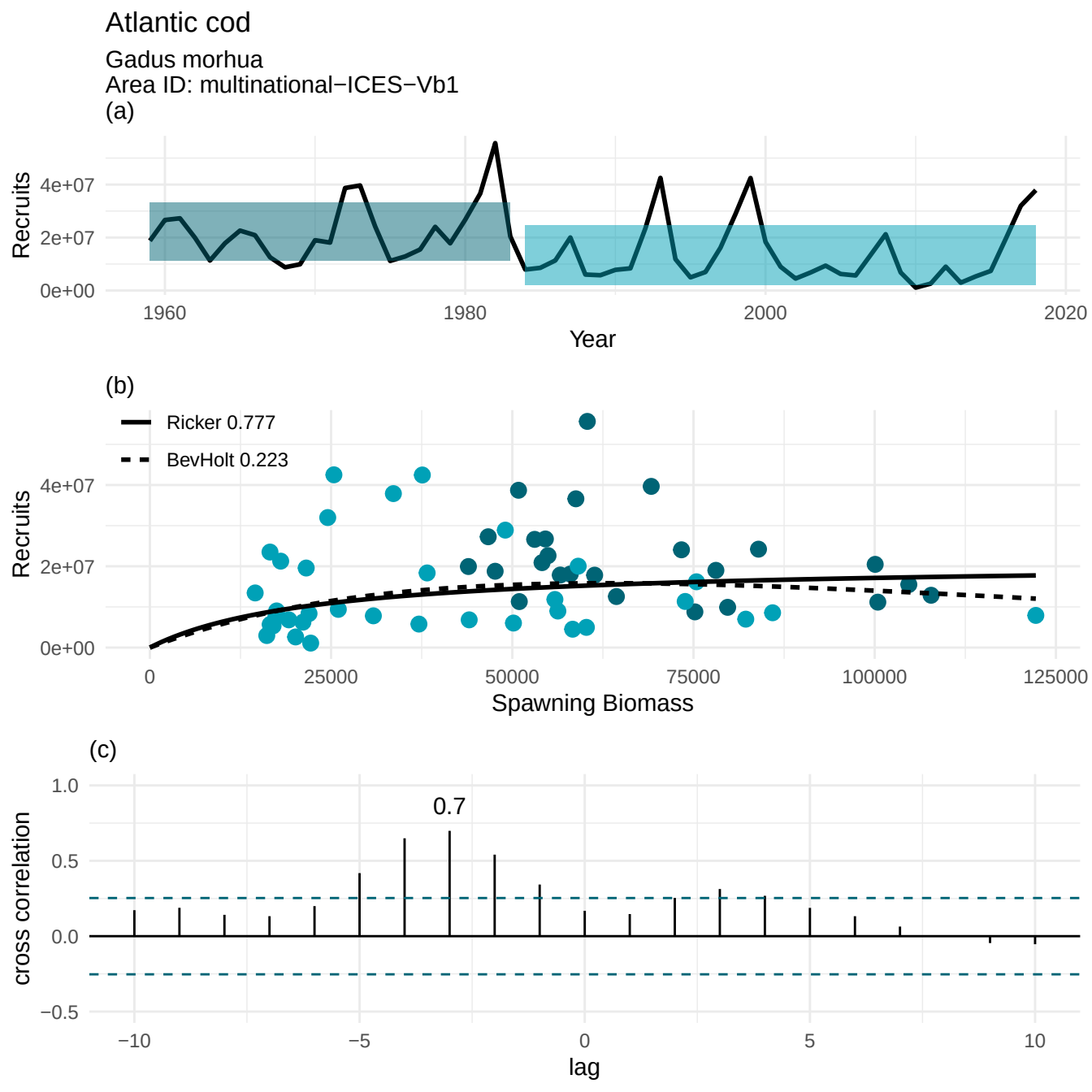

Atlantic cod
Gadus morhua
Area ID: Canada−DFO−3Ps
(a)
Recruits
20
15
10
5
1990
2000
2010
Year
(b)
Ricker 0.452
BevHolt 0.548
Recruits
20
15
10
5
1.2
1.6
2.0
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

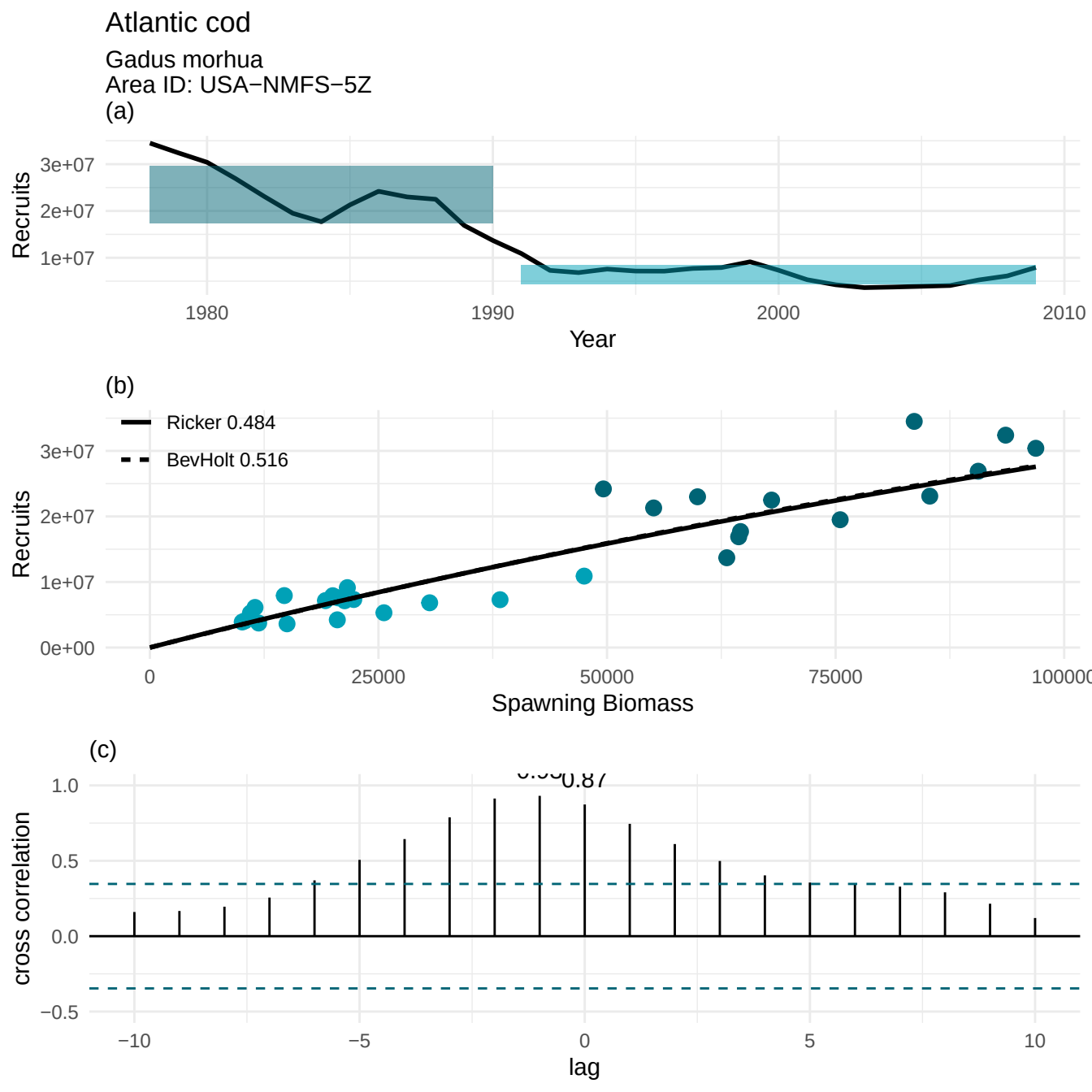

Atlantic cod
Gadus morhua
Area ID: Canada−DFO−4T
(a)
Recruits
4
3
2
1
1960
1980
2000
Year
(b)
Ricker 2.28e−05
BevHolt 1
Recruits
4
3
2
1
0
0e+00
1e+05
2e+05
3e+05
4e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.36
−10
−5
0
5
10
lag

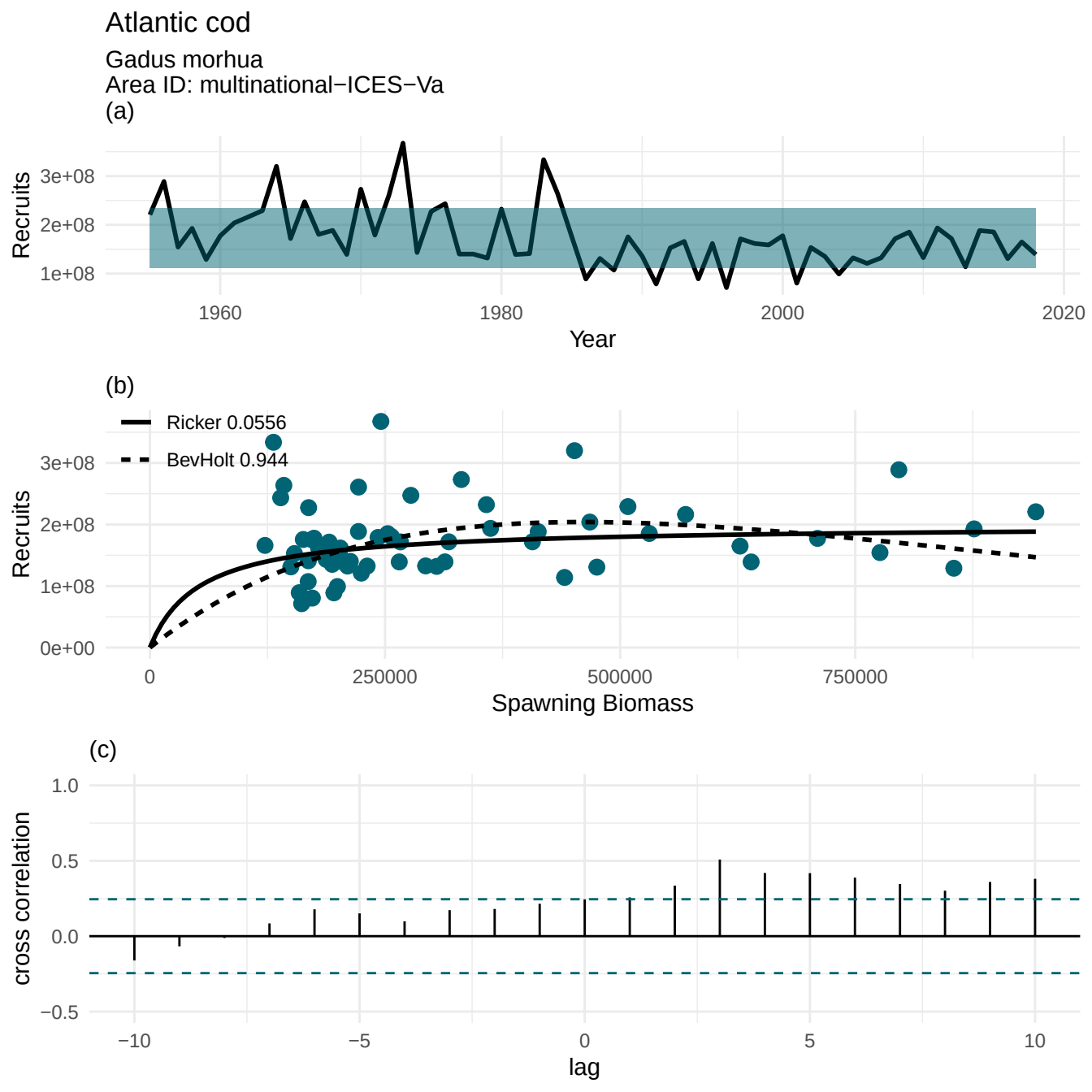

Atlantic cod
Gadus morhua
Area ID: multinational−TRAC−5Zjm
(a)
Recruits
2.5e+07
2.0e+07
1.5e+07
1.0e+07
5.0e+06
0.0e+00
1980
1990
2000
2010
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
2.5e+07
2.0e+07
1.5e+07
1.0e+07
5.0e+06
0.0e+00
0
20000
40000
60000
Spawning Biomass
(c)
0.74
0.77
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

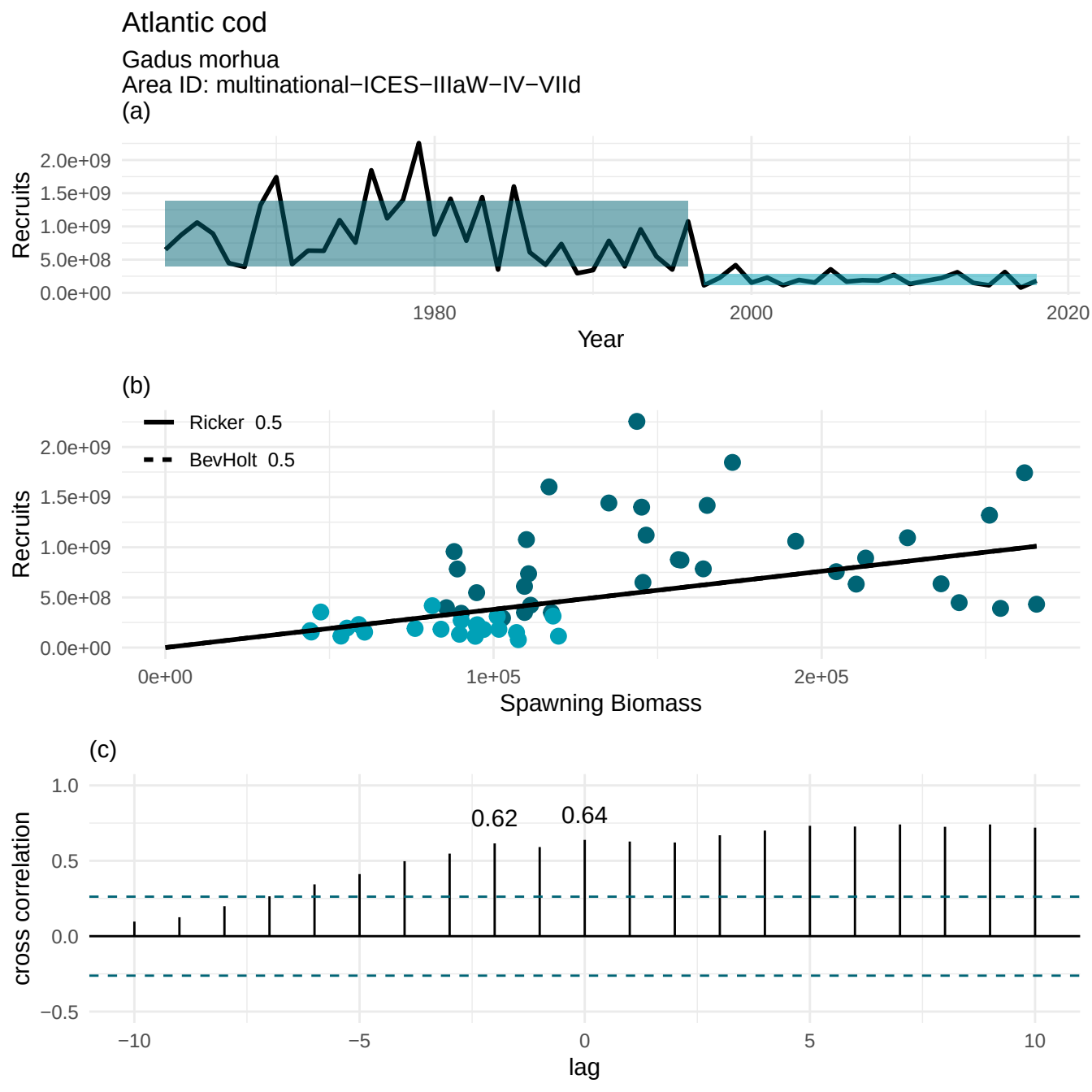

Atlantic cod
Gadus morhua
Area ID: multinational−ICES−22−24
(a)
Recruits
125000
100000
75000
50000
25000
0
1990
2000
2010
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
120000
80000
40000
0
0
10000
20000
30000
40000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.6
−10
−5
0
5
10
lag

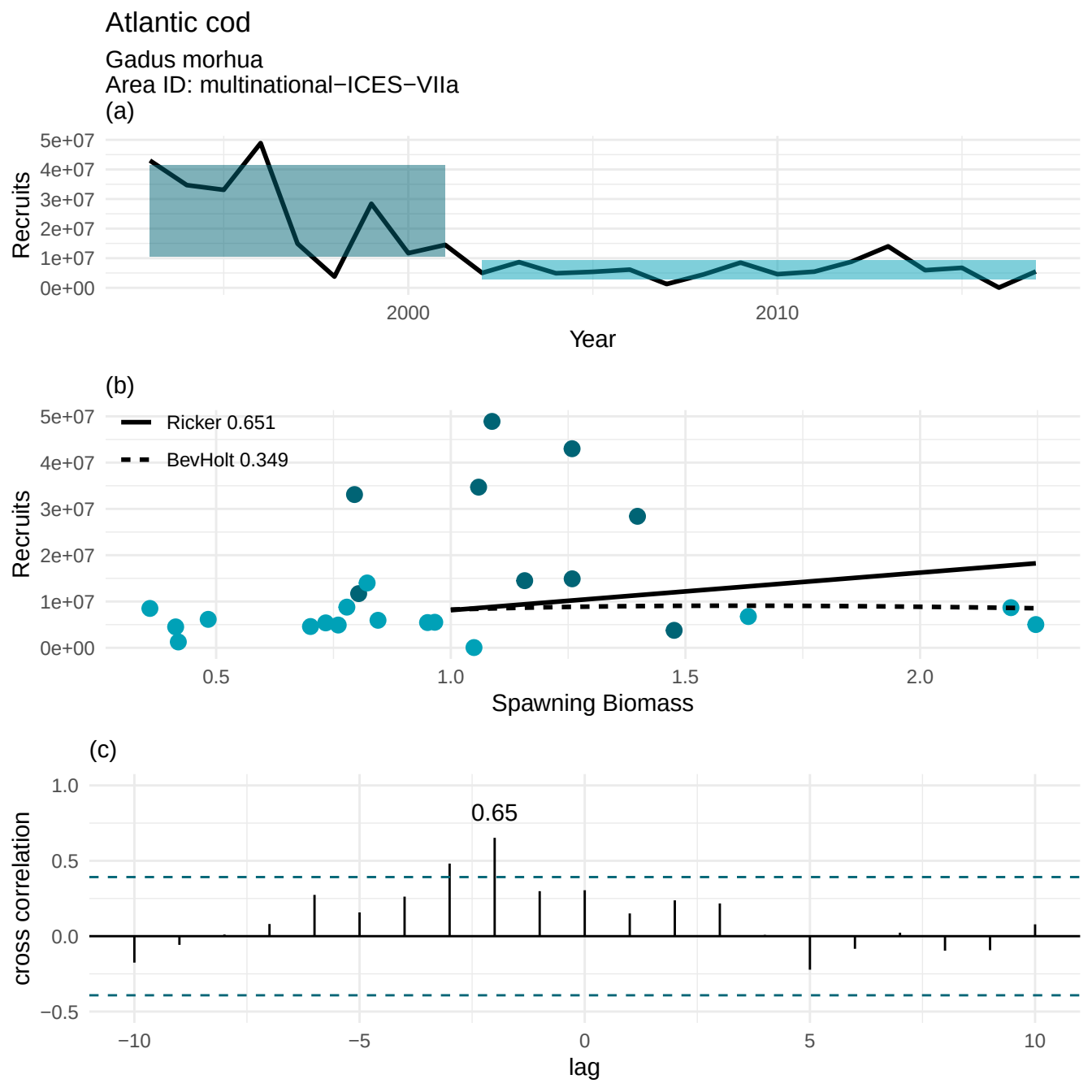

Atlantic cod
Gadus morhua
Area ID: multinational−ICES−25−32
(a)
Recruits
1.2e+07
9.0e+06
6.0e+06
3.0e+06
1960
1980
2000
2020
Year
(b)
Ricker 0.152
BevHolt 0.848
Recruits
1.2e+07
9.0e+06
6.0e+06
3.0e+06
0.0e+00
0e+00
1e+05
2e+05
3e+05
4e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.73
0.37
−10
−5
0
5
10
lag

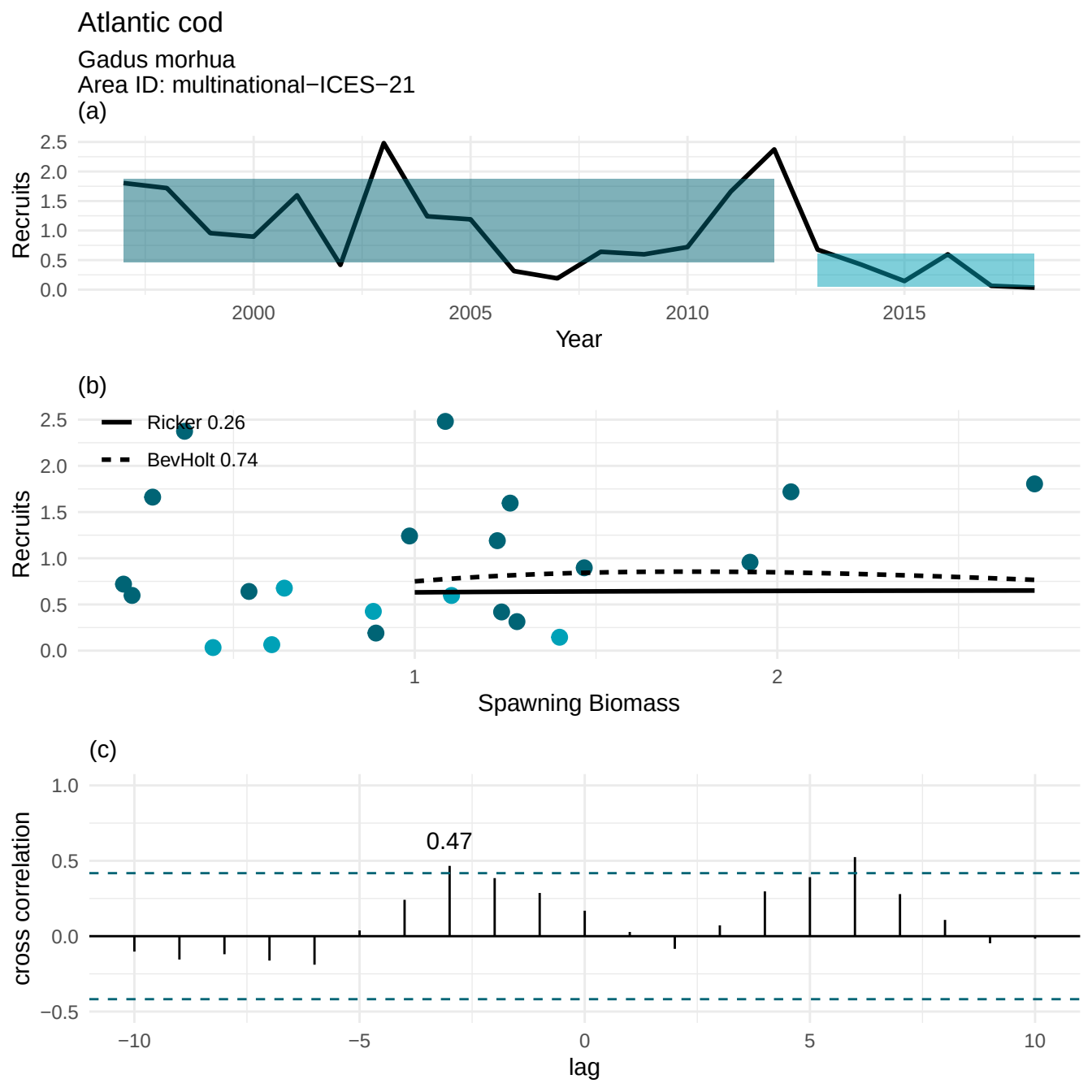

Atlantic cod
Gadus morhua
Area ID: multinational−ICES−Vb1
(a)
Recruits
4e+07
2e+07
0e+00
1960
1980
2000
2020
Year
(b)
Ricker 0.777
BevHolt 0.223
Recruits
4e+07
2e+07
0e+00
0
25000
50000
75000
100000
125000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.7
−10
−5
0
5
10
lag

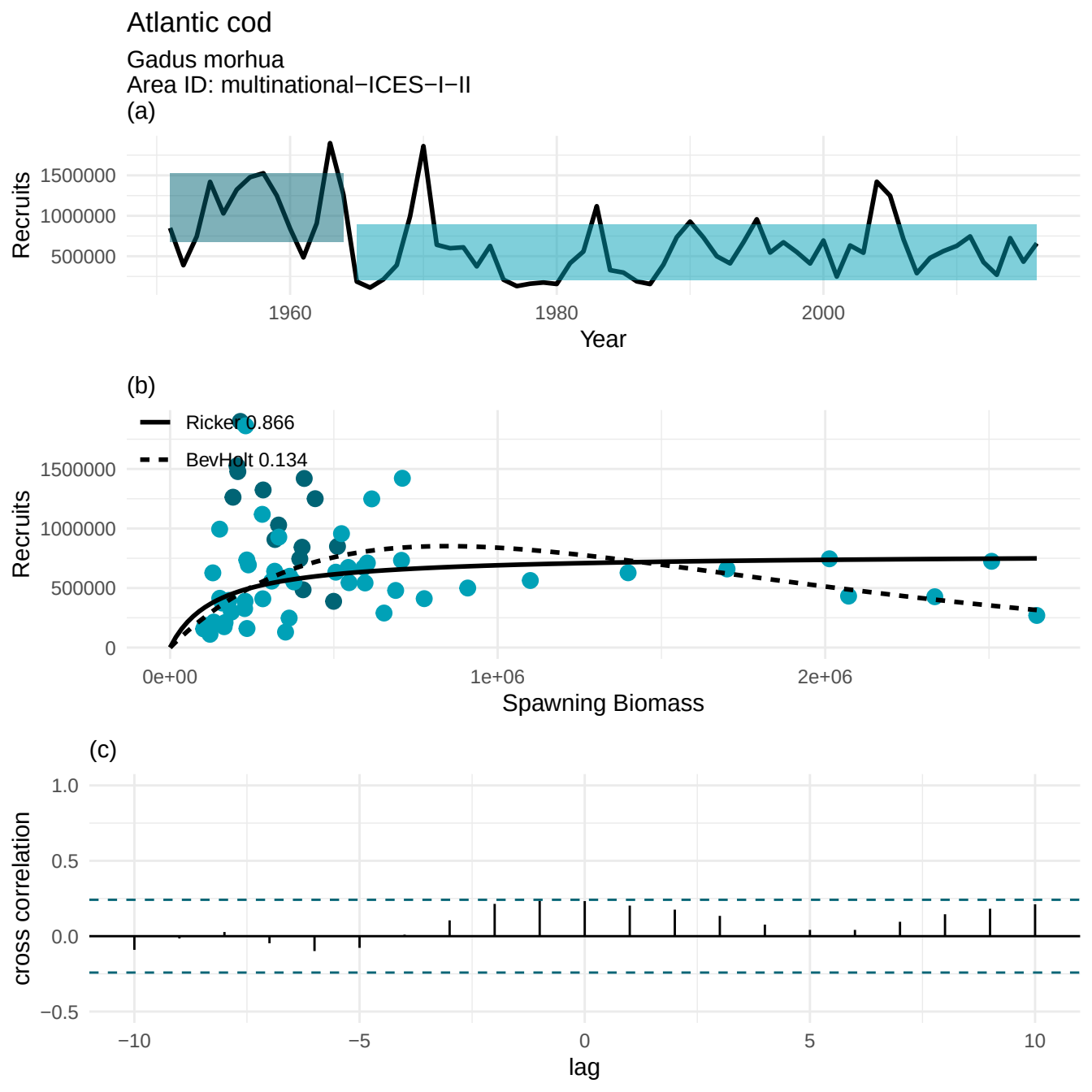

Atlantic cod
Gadus morhua
Area ID: USA−NMFS−5Z
(a)
Recruits
3e+07
2e+07
1e+07
1980
1990
2000
2010
Year
(b)
Ricker 0.484
BevHolt 0.516
Recruits
3e+07
2e+07
1e+07
0e+00
0
25000
50000
75000
100000
Spawning Biomass
(c)
0.87
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

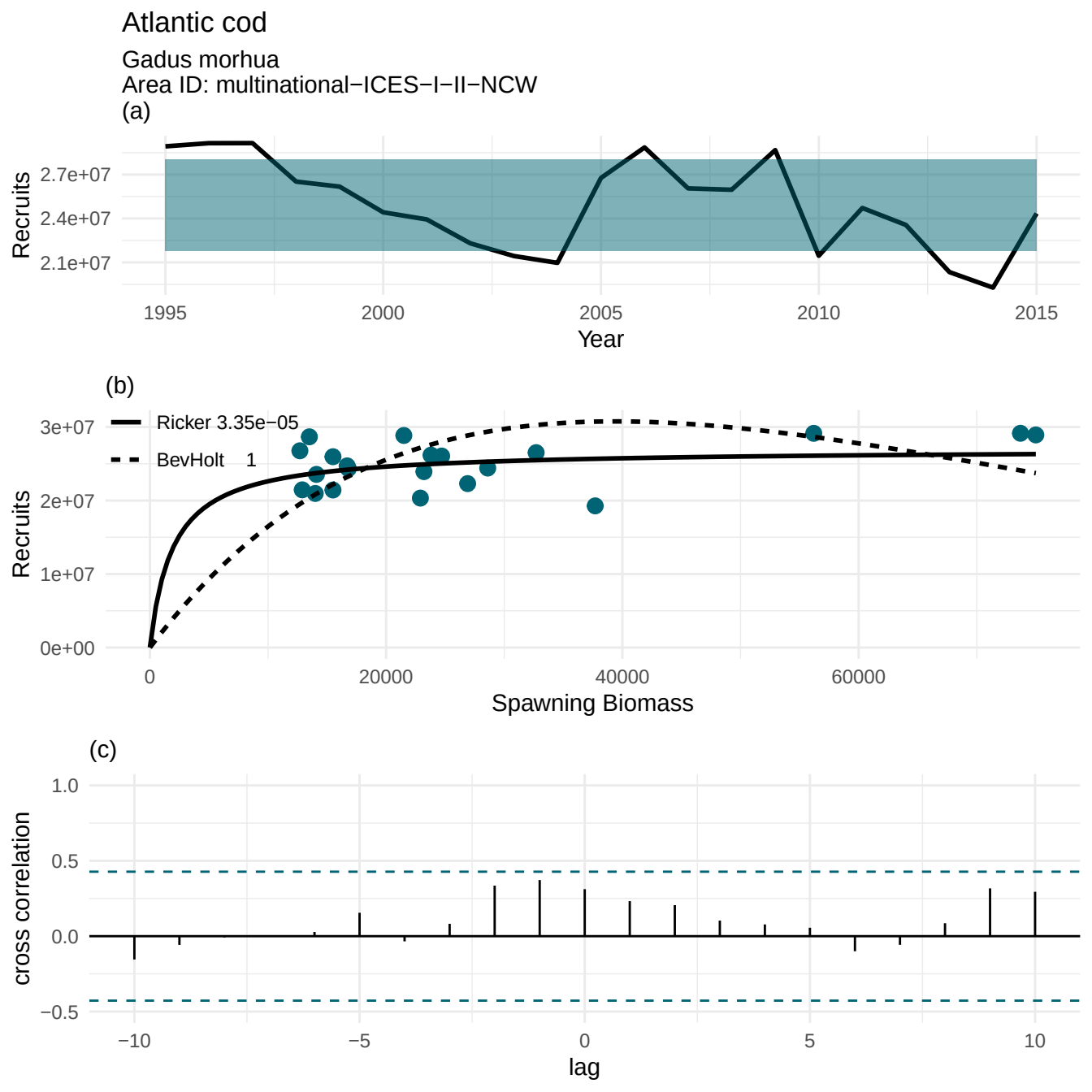

Atlantic cod
Gadus morhua
Area ID: multinational−ICES−Va
(a)
Recruits
3e+08
2e+08
1e+08
1960
1980
2000
2020
Year
(b)
Ricker 0.0556
BevHolt 0.944
Recruits
3e+08
2e+08
1e+08
0e+00
0
250000
500000
750000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

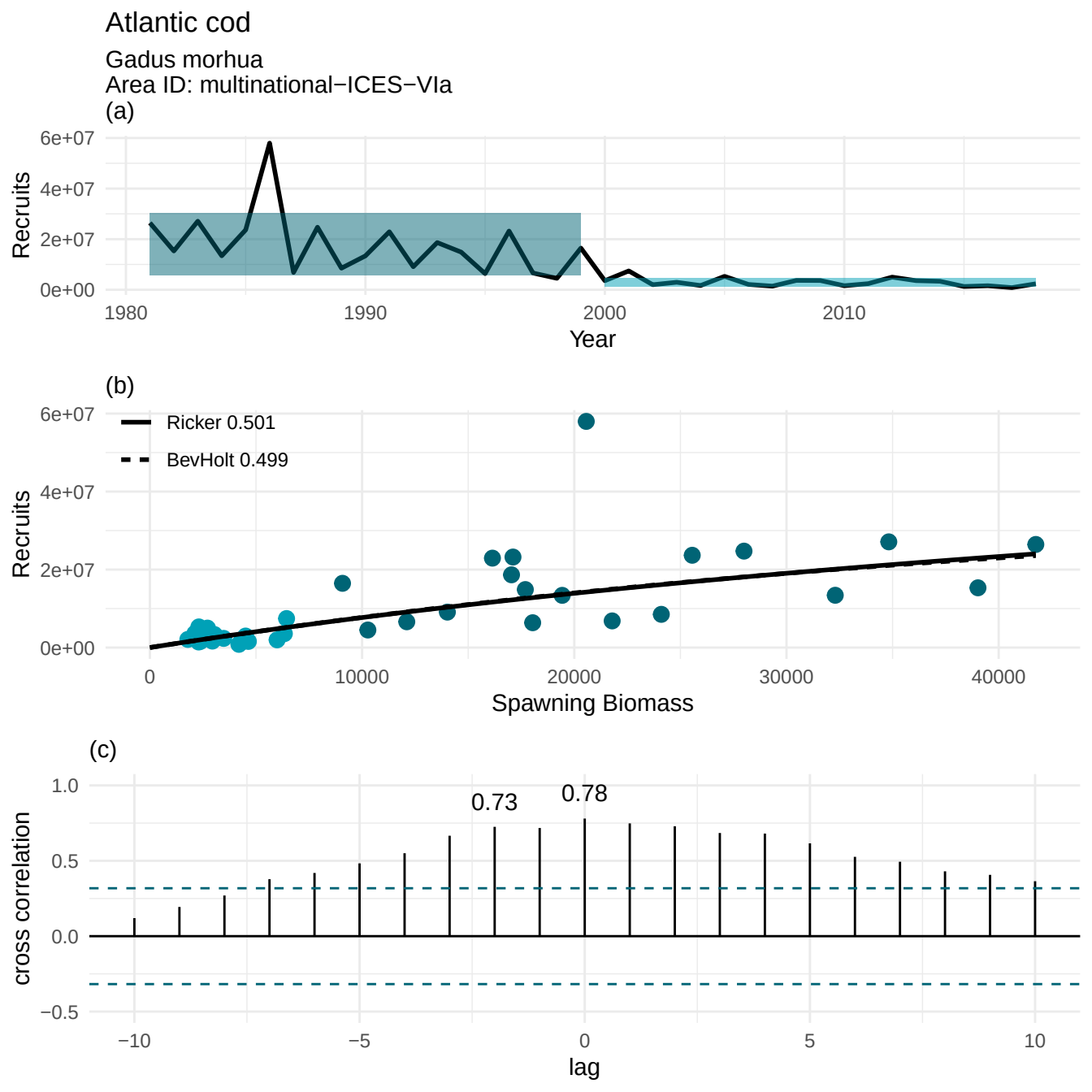

Atlantic cod
Gadus morhua
Area ID: multinational−ICES−IIIaW−IV−VIId
(a)
Recruits
2.0e+09
1.5e+09
1.0e+09
5.0e+08
0.0e+00
1980
2000
2020
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
2.0e+09
1.5e+09
1.0e+09
5.0e+08
0.0e+00
0e+00
1e+05
2e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.62
0.64
−10
−5
0
5
10
lag

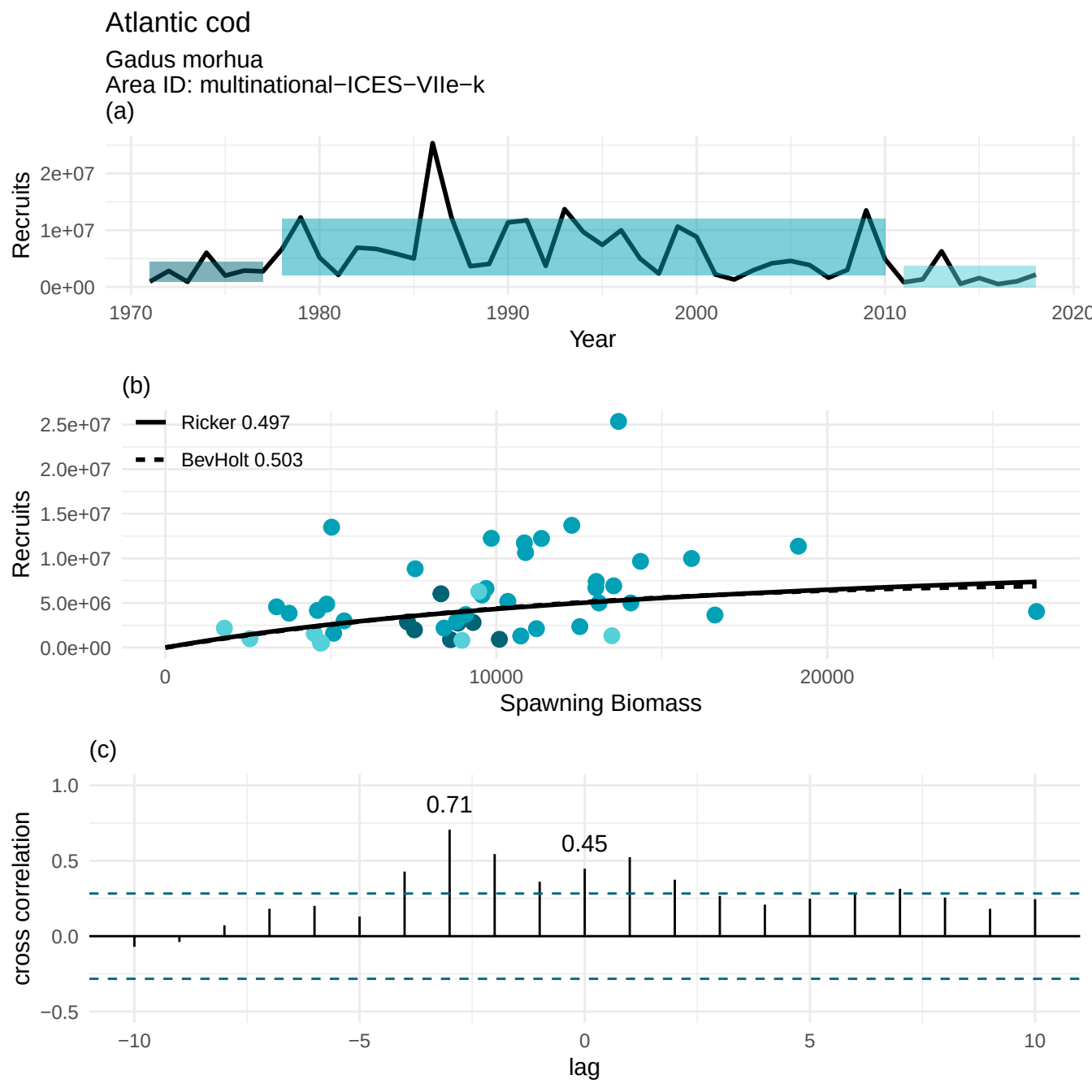

Atlantic cod
Gadus morhua
Area ID: multinational−ICES−VIIa
(a)
Recruits
5e+07
4e+07
3e+07
2e+07
1e+07
0e+00
2000
2010
Year
(b)
Ricker 0.651
BevHolt 0.349
Recruits
5e+07
4e+07
3e+07
2e+07
1e+07
0e+00
0.5
1.0
1.5
2.0
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.65
−10
−5
0
5
10
lag

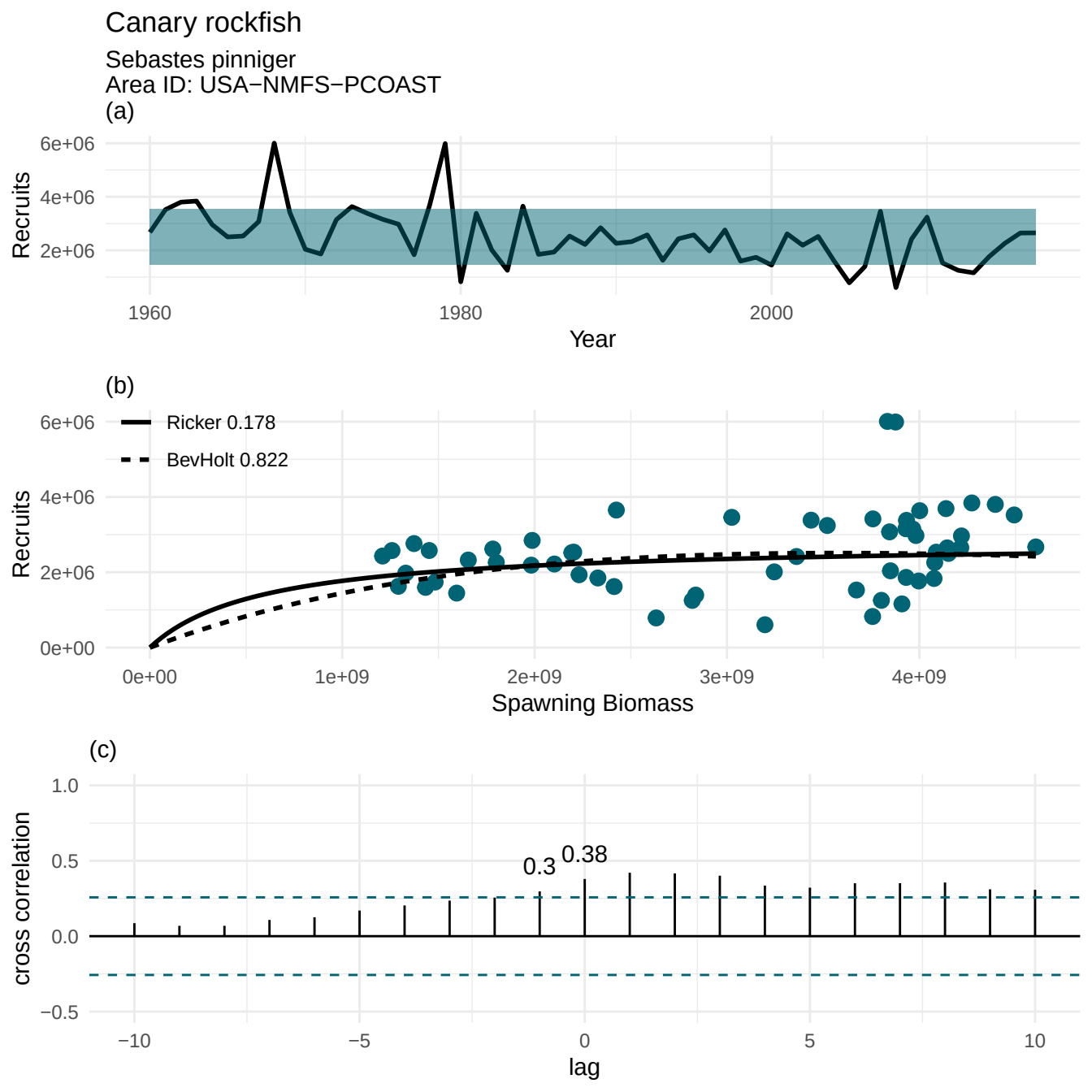

Atlantic cod
Gadus morhua
Area ID: multinational−ICES−21
(a)
Recruits
2.5
2.0
1.5
1.0
0.5
0.0
2000
2005
2010
2015
Year
(b)
Ricker 0.26
BevHolt 0.74
Recruits
1
2
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.47
−10
−5
0
5
10
lag

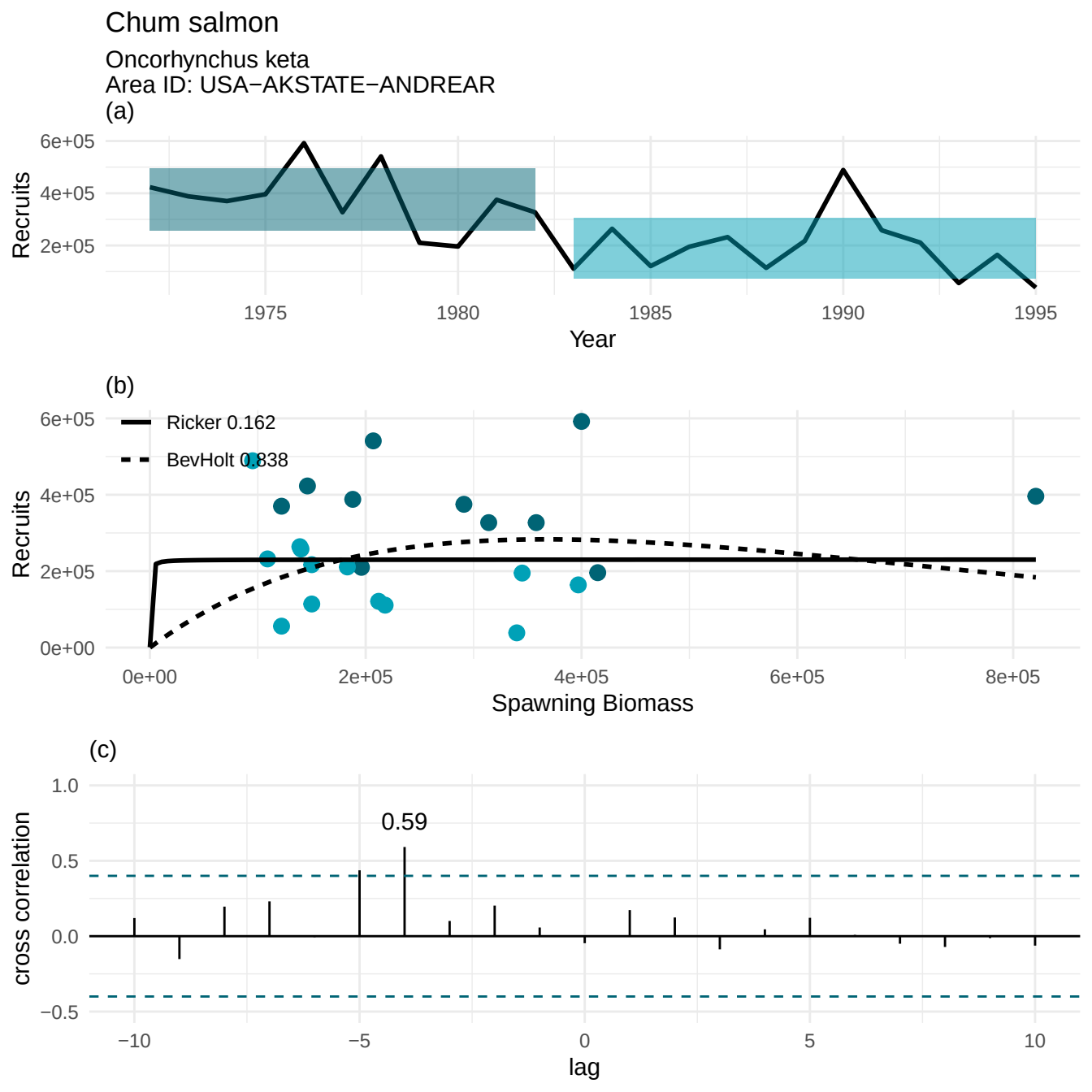

Atlantic cod
Gadus morhua
Area ID: multinational−ICES−I−II
(a)
Recruits
1500000
1000000
500000
1960
1980
2000
Year
(b)
Ricker 0.866
BevHolt 0.134
Recruits
1500000
1000000
500000
0
0e+00
1e+06
2e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

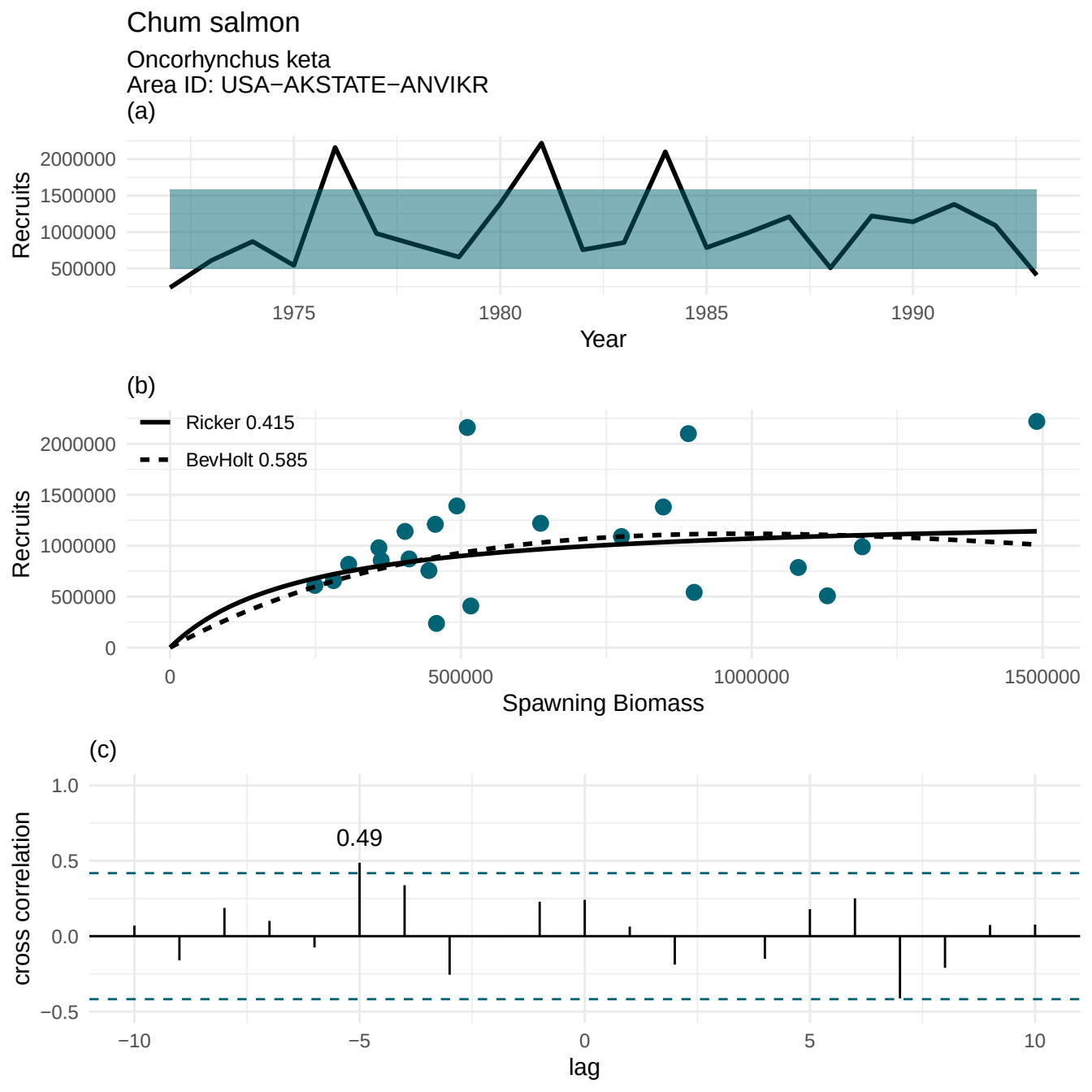

Atlantic cod
Gadus morhua
Area ID: multinational−ICES−I−II−NCW
(a)
Recruits
2.7e+07
2.4e+07
2.1e+07
1995
2000
2005
2010
2015
Year
(b)
Ricker 3.35e−05
BevHolt 1
Recruits
3e+07
2e+07
1e+07
0e+00
0
20000
40000
60000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

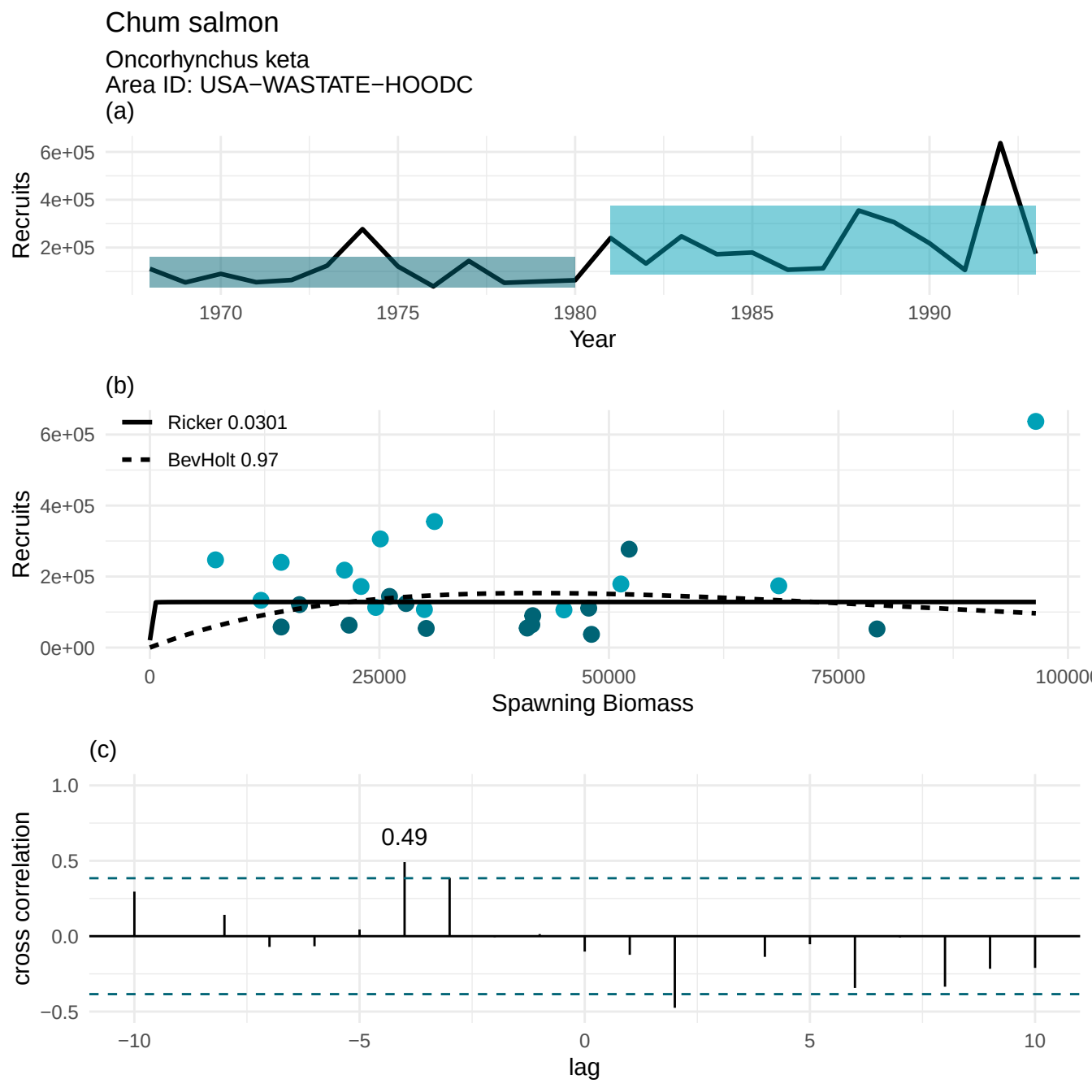

Atlantic cod
Gadus morhua
Area ID: multinational−ICES−VIa
(a)
Recruits
6e+07
4e+07
2e+07
0e+00
1980
1990
2000
2010
Year
(b)
Ricker 0.501
BevHolt 0.499
Recruits
6e+07
4e+07
2e+07
0e+00
0
10000
20000
30000
40000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.73
0.78
−10
−5
0
5
10
lag

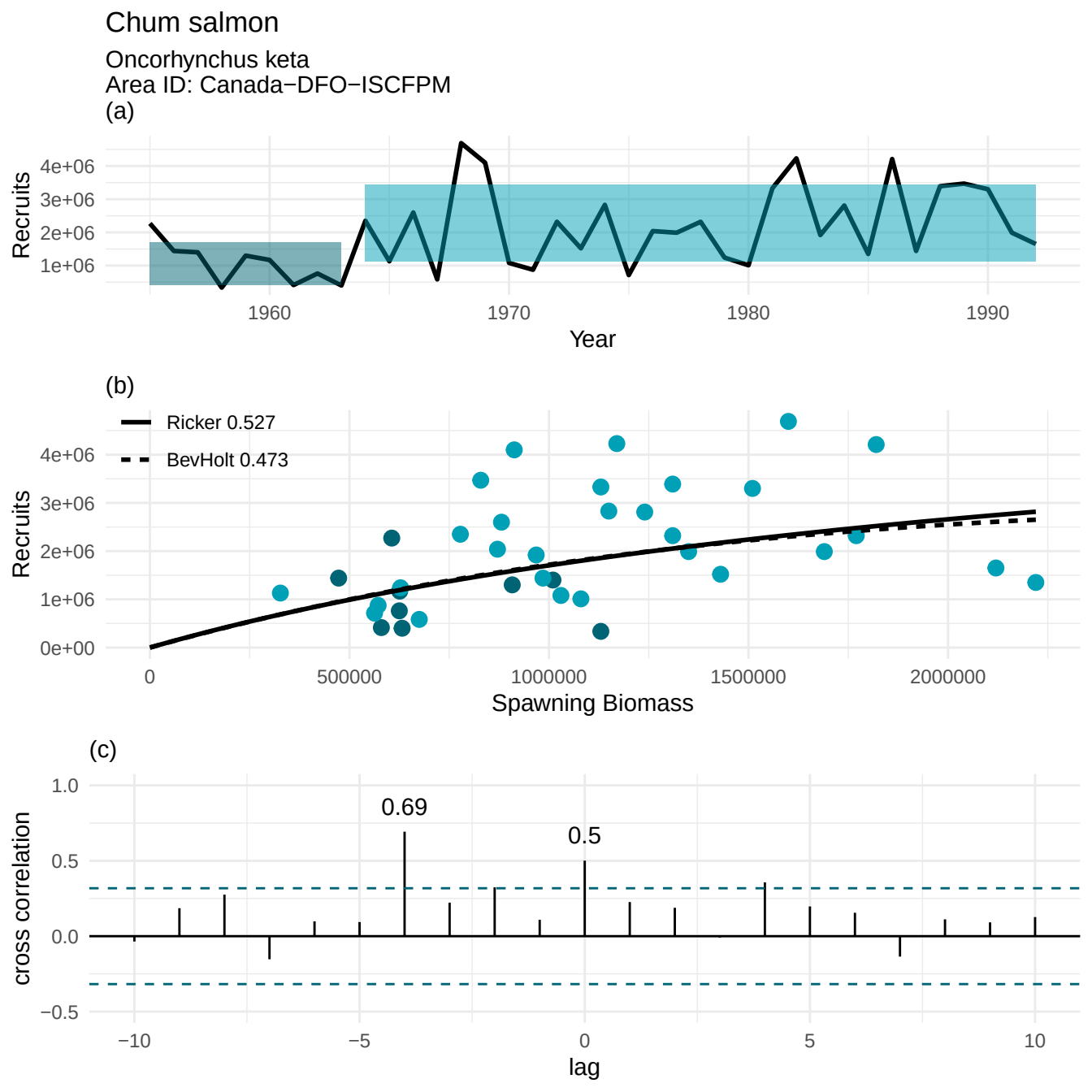

Atlantic cod
Gadus morhua
Area ID: multinational−ICES−VIIe−k
(a)
Recruits
2e+07
1e+07
0e+00
1970
1980
1990
2000
2010
2020
Year
(b)
Ricker 0.497
BevHolt 0.503
Recruits
2.5e+07
2.0e+07
1.5e+07
1.0e+07
5.0e+06
0.0e+00
0
10000
20000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.71
0.45
−10
−5
0
5
10
lag

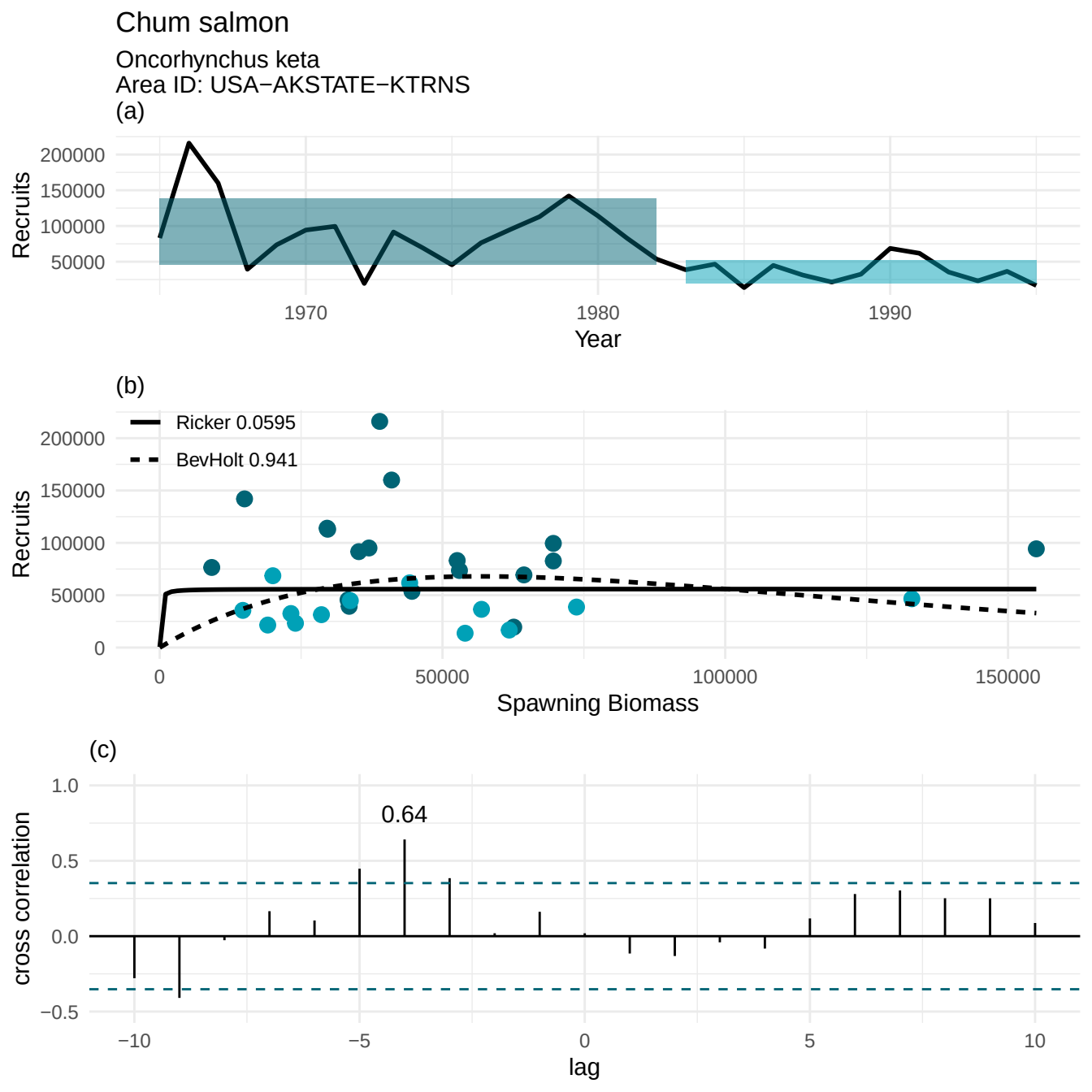

Canary rockfish
Sebastes pinniger
Area ID: USA−NMFS−PCOAST
(a)
Recruits
6e+06
4e+06
2e+06
1960
1980
2000
Year
(b)
Ricker 0.178
BevHolt 0.822
Recruits
6e+06
4e+06
2e+06
0e+00
0e+00
1e+09
2e+09
3e+09
4e+09
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.3
0.38
−10
−5
0
5
10
lag

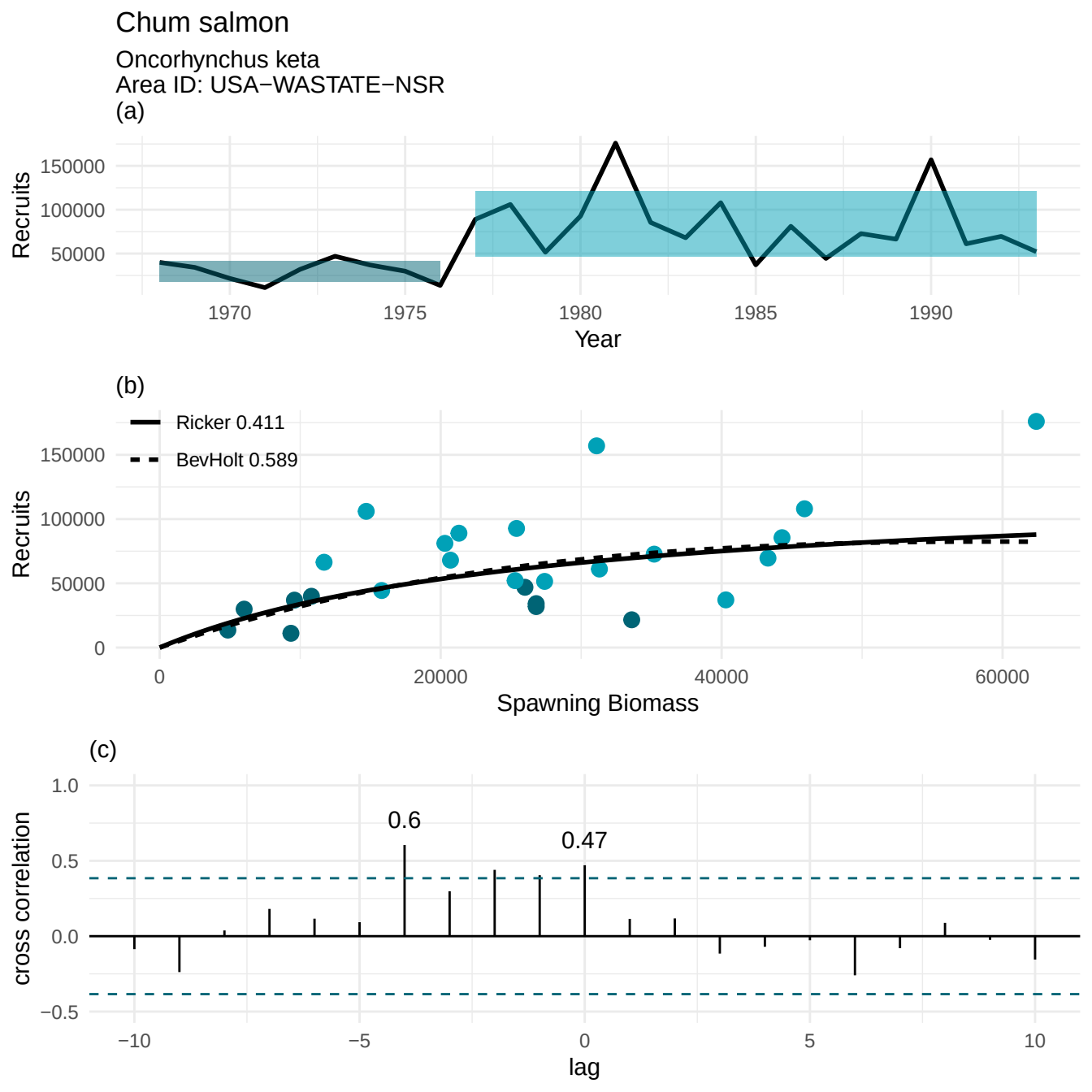

Chum salmon
Oncorhynchus keta
Area ID: USA−AKSTATE−ANDREAR
(a)
Recruits
6e+05
4e+05
2e+05
1975
1980
1985
1990
1995
Year
(b)
Ricker 0.162
BevHolt 0.838
Recruits
6e+05
4e+05
2e+05
0e+00
0e+00
2e+05
4e+05
6e+05
8e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.59
−10
−5
0
5
10
lag

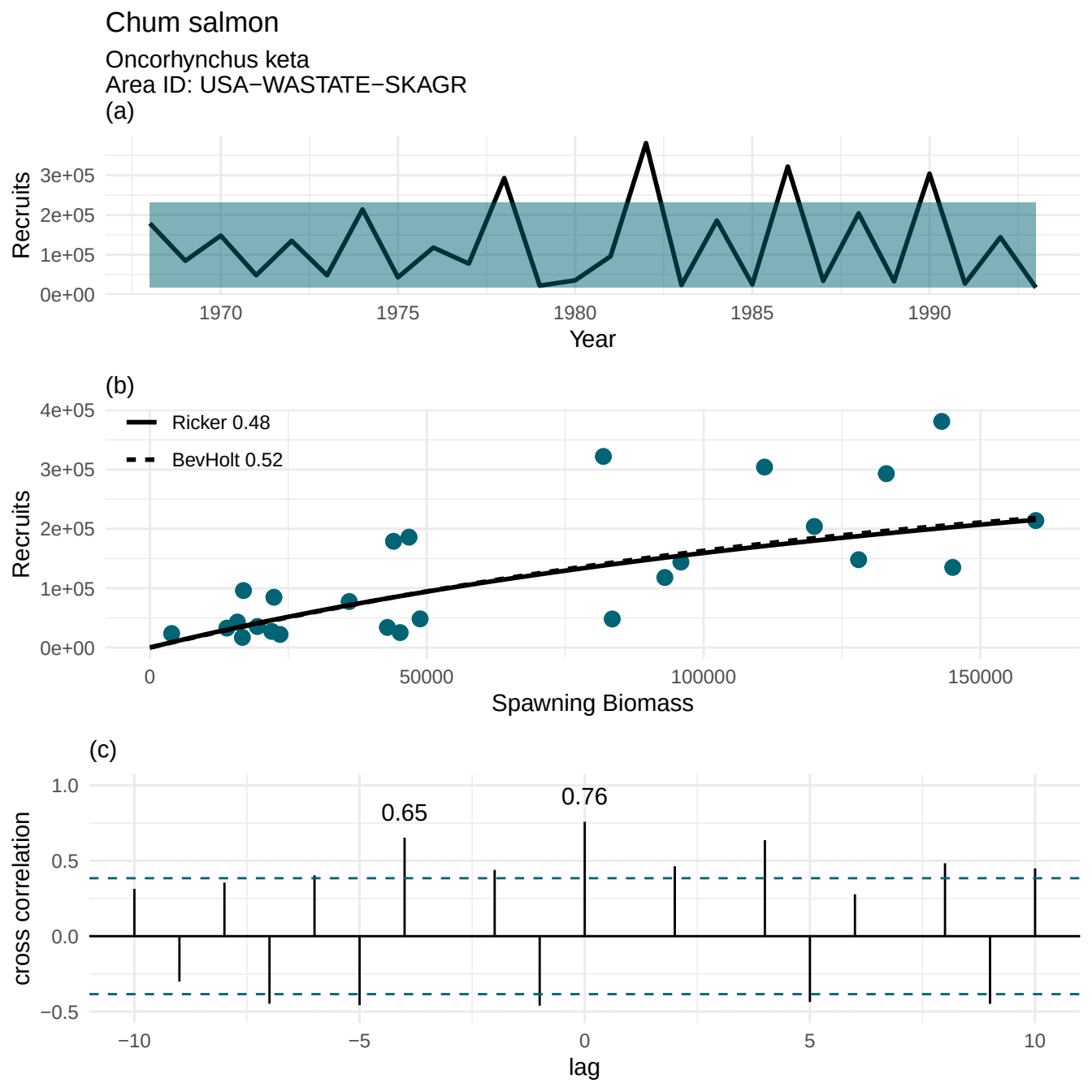

Chum salmon
Oncorhynchus keta
Area ID: USA−AKSTATE−ANVIKR
(a)
Recruits
2000000
1500000
1000000
500000
1975
1980
1985
1990
Year
(b)
Ricker 0.415
BevHolt 0.585
Recruits
2000000
1500000
1000000
500000
0
0
500000
1000000
1500000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.49
−10
−5
0
5
10
lag

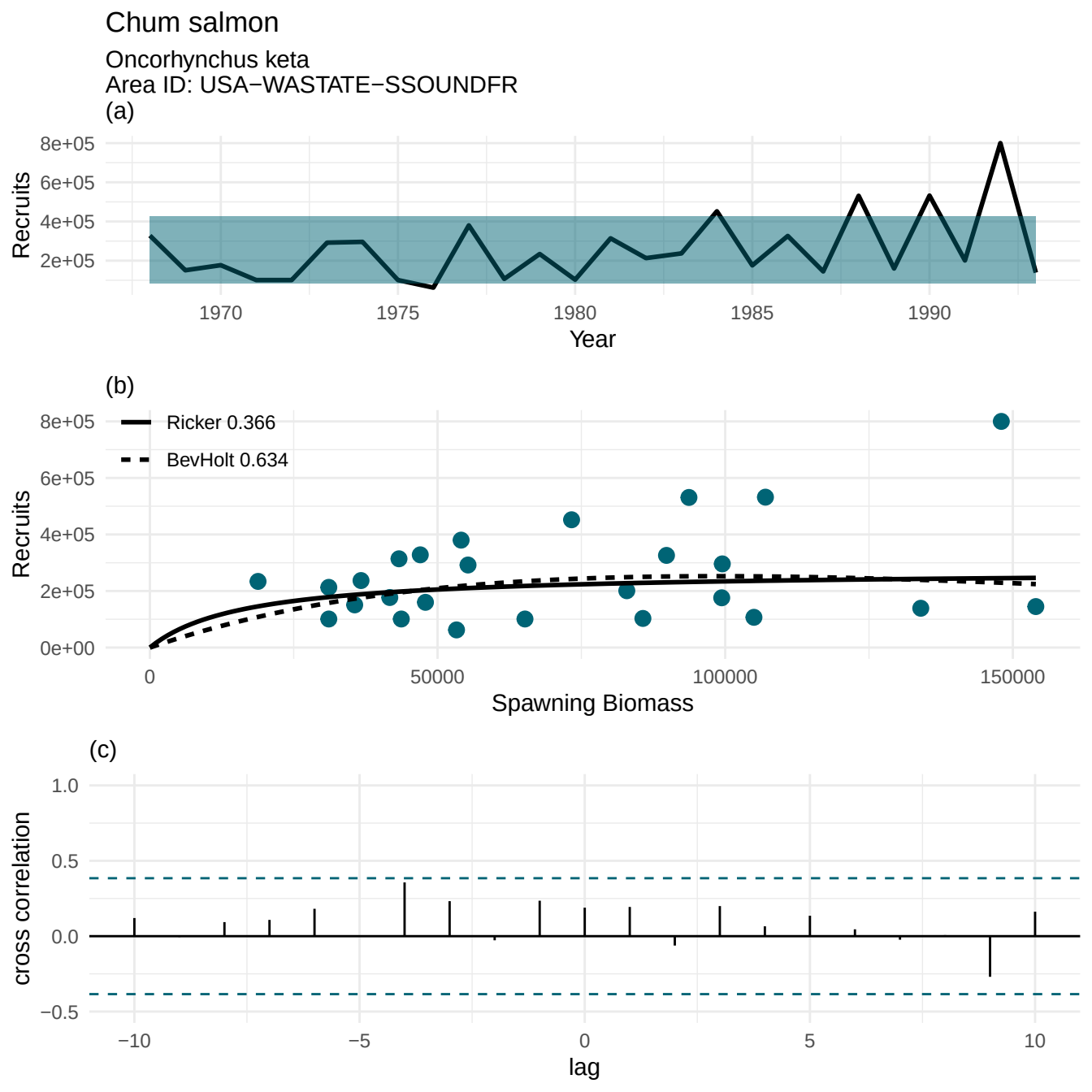

Chum salmon
Oncorhynchus keta
Area ID: USA−WASTATE−HOODC
(a)
Recruits
6e+05
4e+05
2e+05
1970
1975
1980
1985
1990
Year
(b)
Ricker 0.0301
BevHolt 0.97
Recruits
6e+05
4e+05
2e+05
0e+00
0
25000
50000
75000
100000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.49
−10
−5
0
5
10
lag

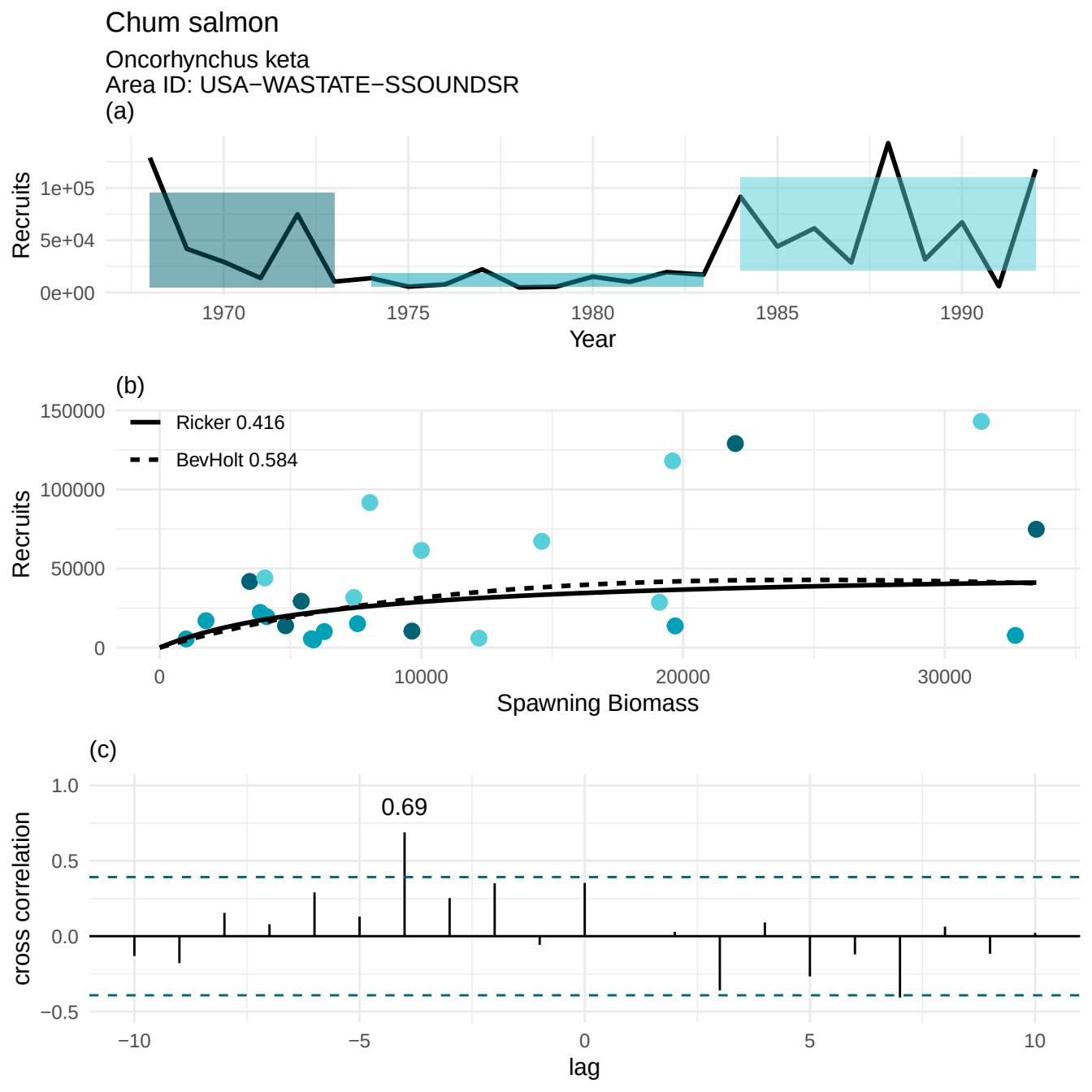

Chum salmon
Oncorhynchus keta
Area ID: Canada−DFO−ISCFPM
(a)
Recruits
4e+06
3e+06
2e+06
1e+06
1960
1970
1980
1990
Year
(b)
Ricker 0.527
BevHolt 0.473
Recruits
4e+06
3e+06
2e+06
1e+06
0e+00
0
500000
1000000
1500000
2000000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.69
0.5
−10
−5
0
5
10
lag

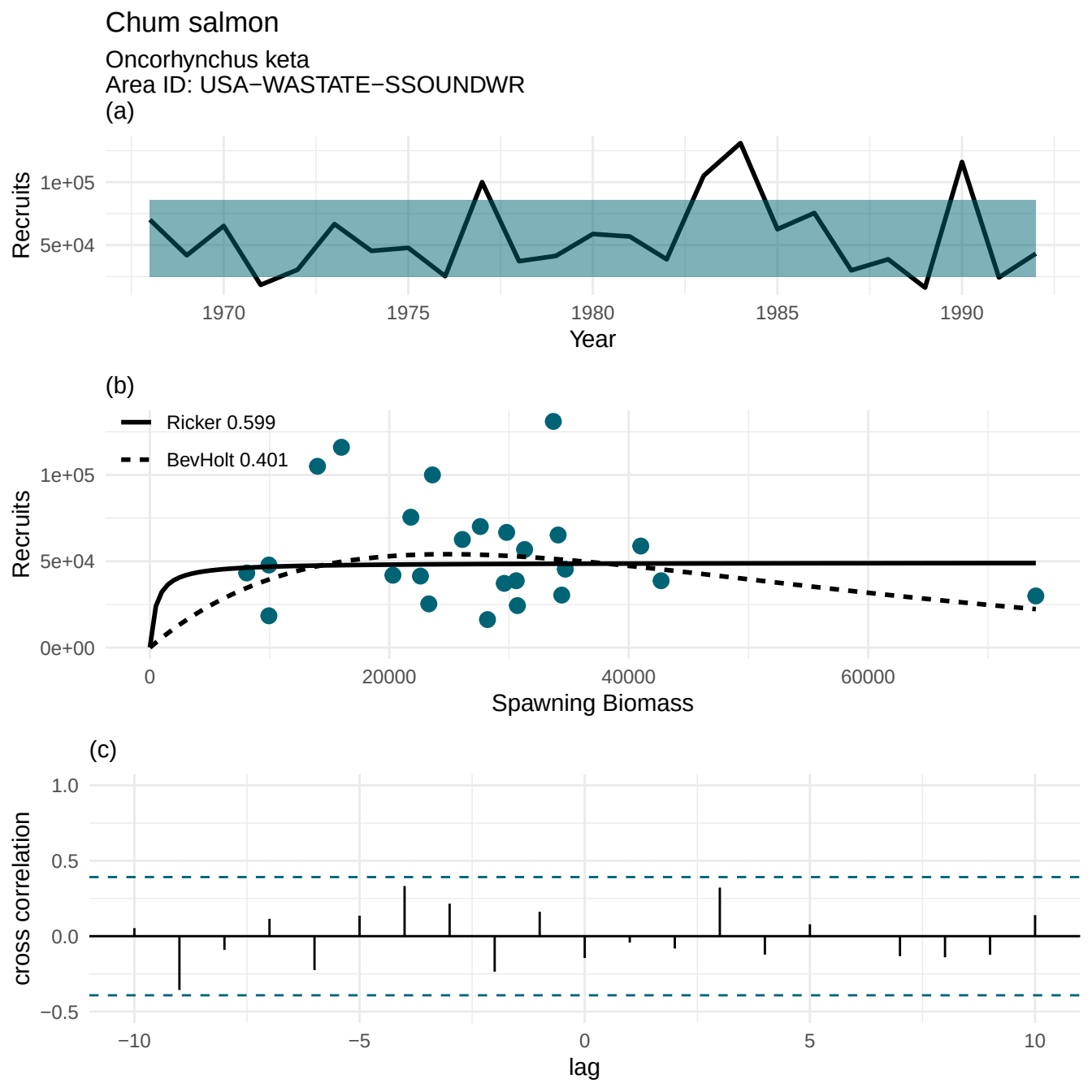

Chum salmon
Oncorhynchus keta
Area ID: USA−AKSTATE−KTRNS
(a)
Recruits
200000
150000
100000
50000
1970
1980
1990
Year
(b)
Ricker 0.0595
BevHolt 0.941
Recruits
200000
150000
100000
50000
0
0
50000
100000
150000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.64
−10
−5
0
5
10
lag

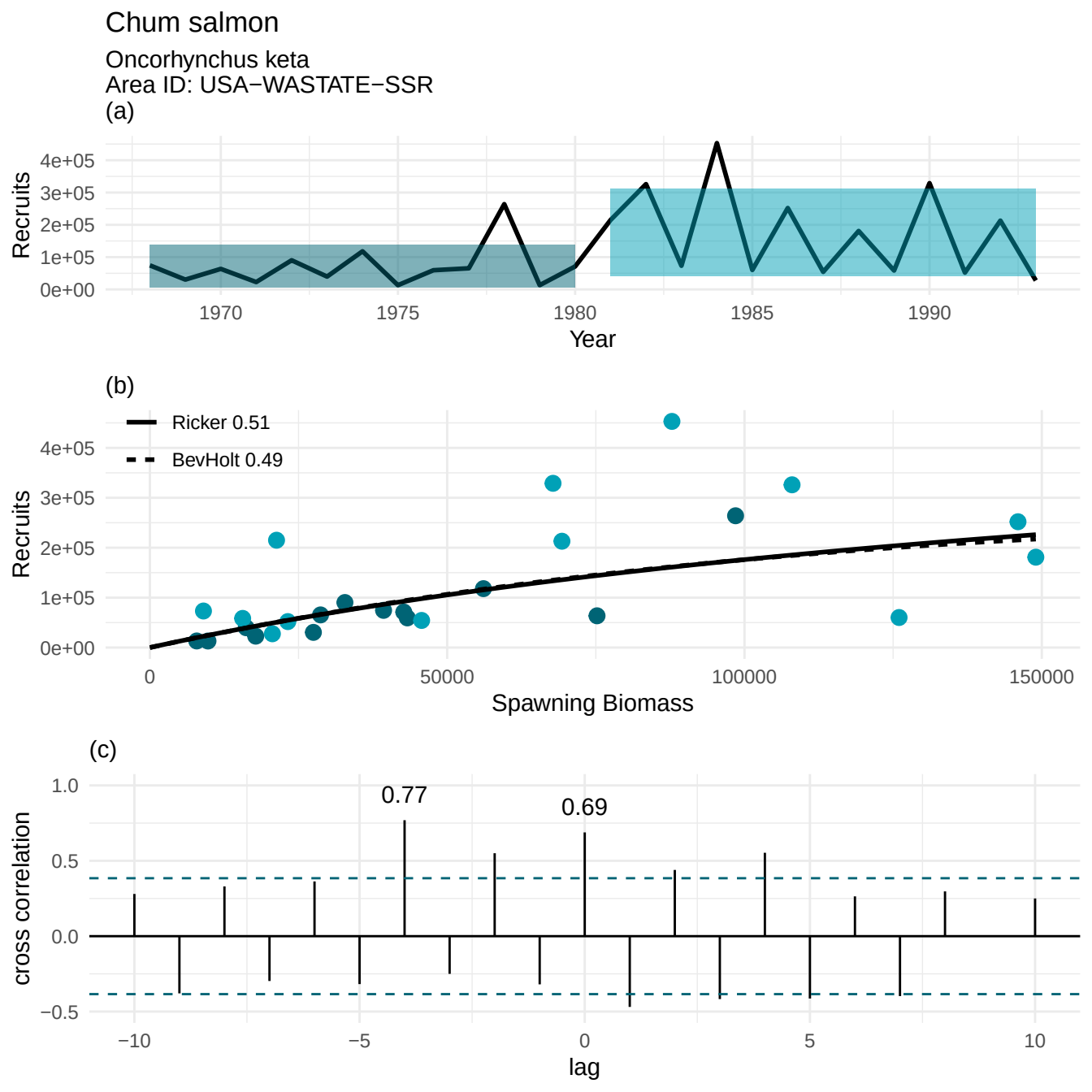

Chum salmon
Oncorhynchus keta
Area ID: USA−WASTATE−NSR
(a)
Recruits
150000
100000
50000
1970
1975
1980
1985
1990
Year
(b)
Ricker 0.411
BevHolt 0.589
Recruits
150000
100000
50000
0
0
20000
40000
60000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.6
0.47
−10
−5
0
5
10
lag

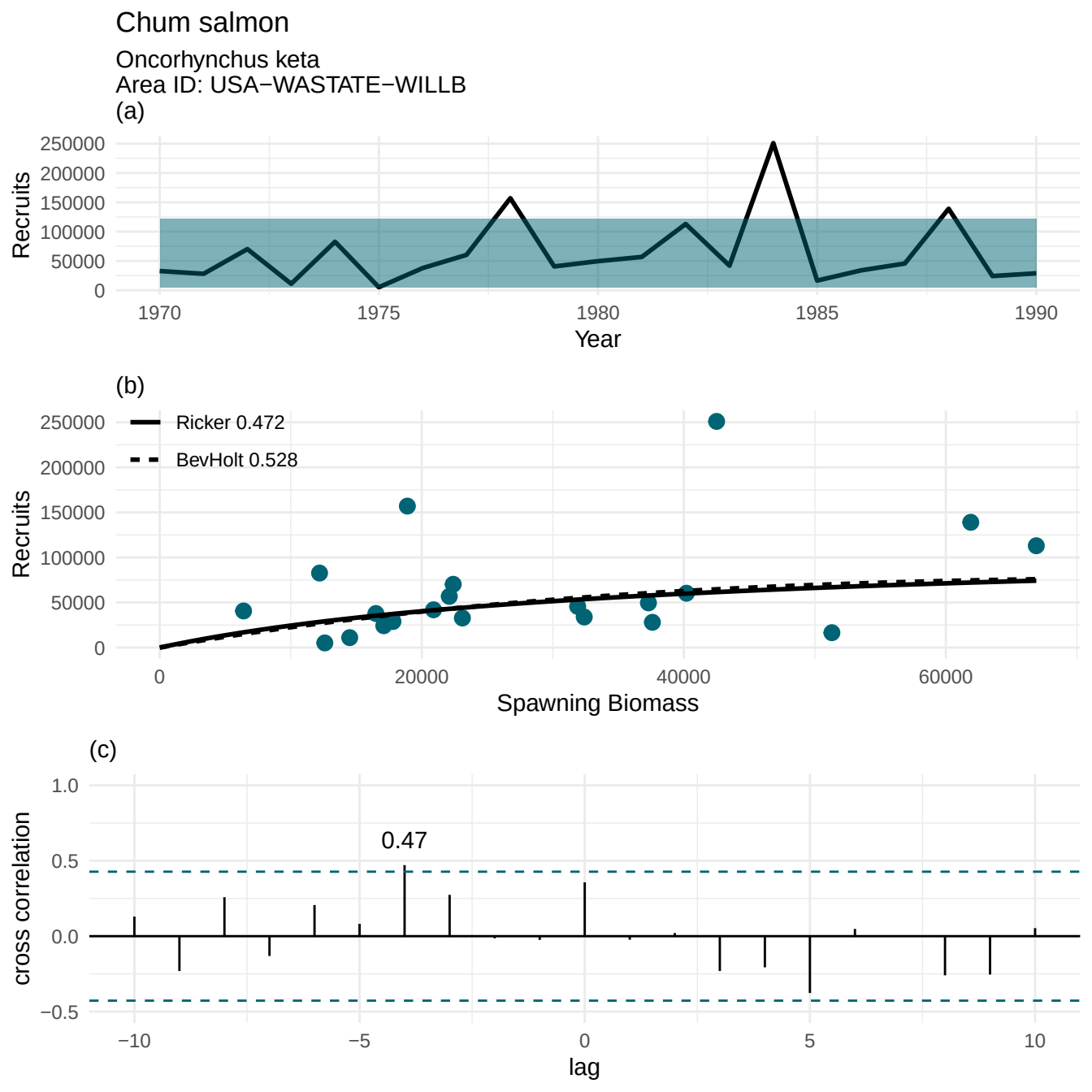

Chum salmon
Oncorhynchus keta
Area ID: USA−WASTATE−SKAGR
(a)
Recruits
3e+05
2e+05
1e+05
0e+00
1970
1975
1980
1985
1990
Year
(b)
Ricker 0.48
BevHolt 0.52
Recruits
4e+05
3e+05
2e+05
1e+05
0e+00
0
50000
100000
150000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.65
0.76
−10
−5
0
5
10
lag

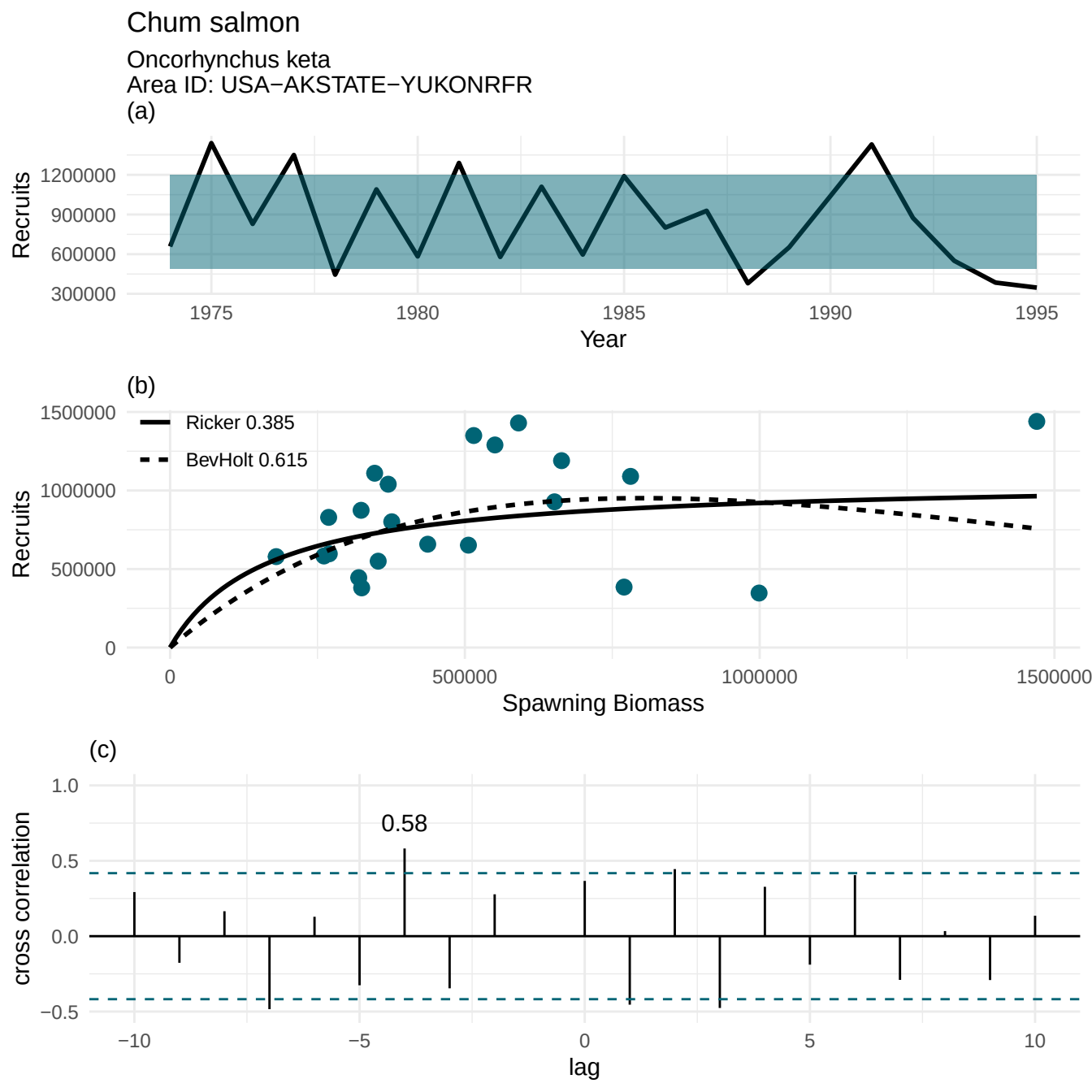

Chum salmon
Oncorhynchus keta
Area ID: USA−WASTATE−SSOUNDFR
(a)
Recruits
8e+05
6e+05
4e+05
2e+05
1970
1975
1980
1985
1990
Year
(b)
Ricker 0.366
BevHolt 0.634
Recruits
8e+05
6e+05
4e+05
2e+05
0e+00
0
50000
100000
150000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

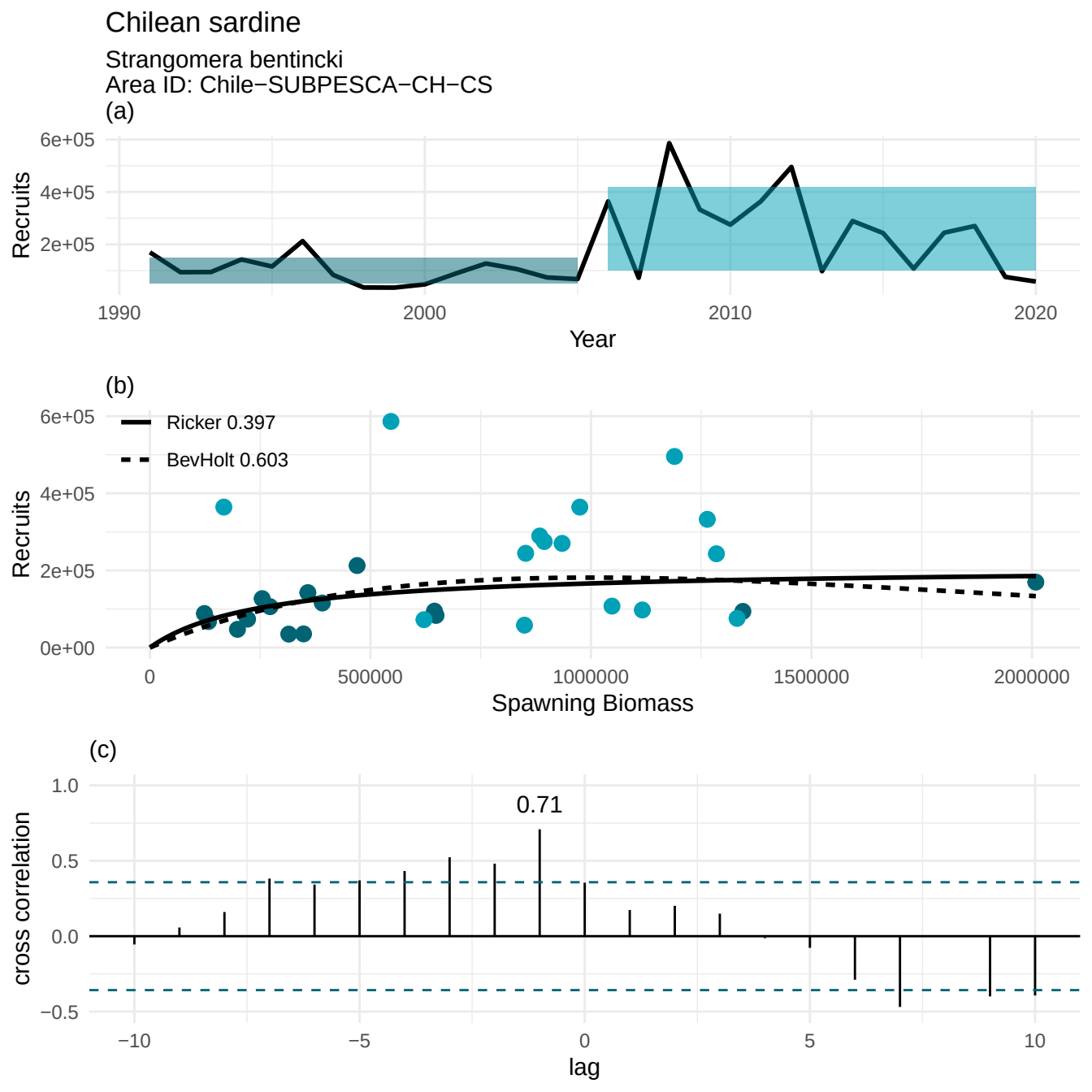

Chum salmon
Oncorhynchus keta
Area ID: USA−WASTATE−SSOUNDSR
(a)
Recruits
1e+05
5e+04
0e+00
1970
1975
1980
1985
1990
Year
(b)
Ricker 0.416
BevHolt 0.584
Recruits
150000
100000
50000
0
0
10000
20000
30000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.69
−10
−5
0
5
10
lag

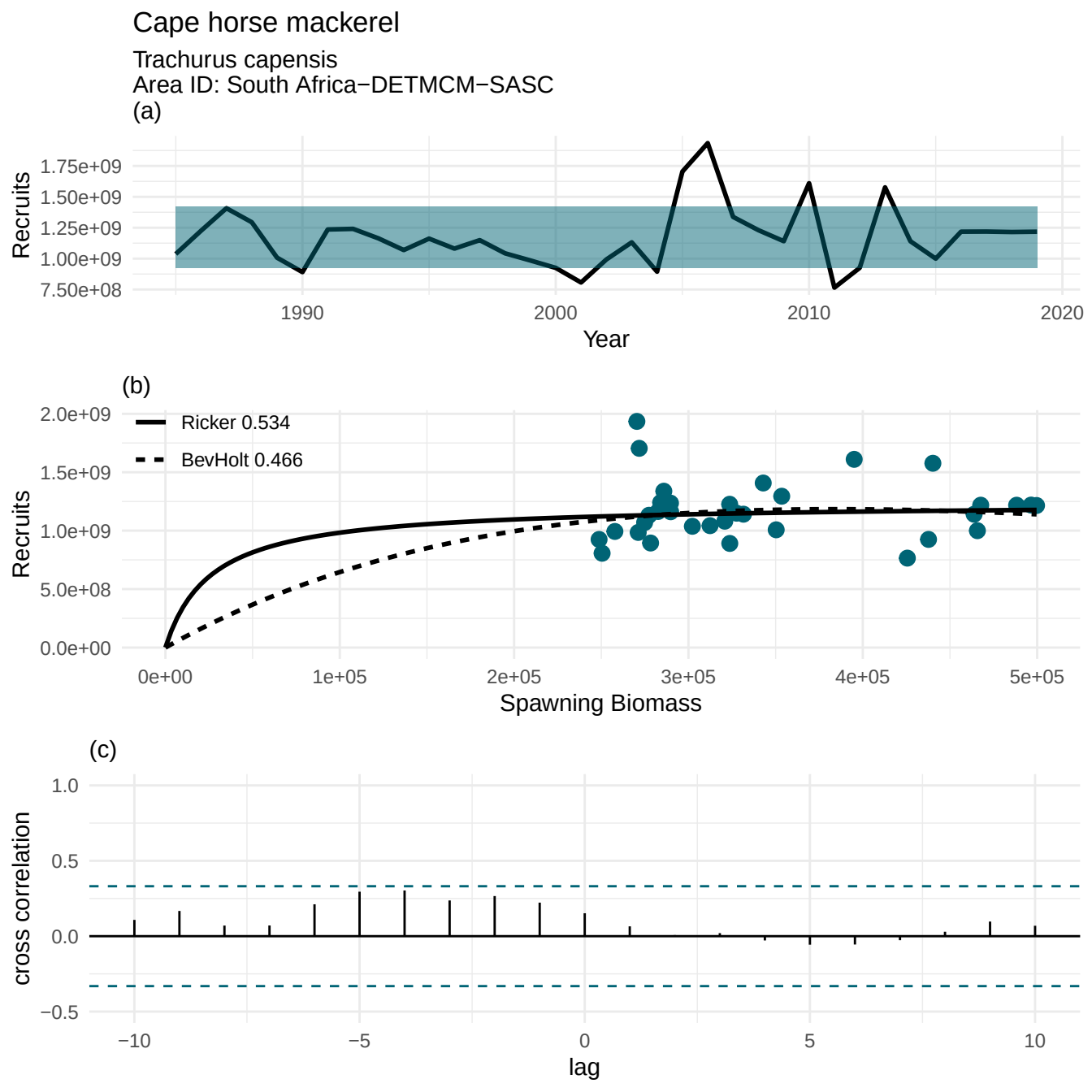

Chum salmon
Oncorhynchus keta
Area ID: USA−WASTATE−SSOUNDWR
(a)
Recruits
1e+05
5e+04
1970
1975
1980
1985
1990
Year
(b)
Ricker 0.599
BevHolt 0.401
Recruits
1e+05
5e+04
0e+00
0
20000
40000
60000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

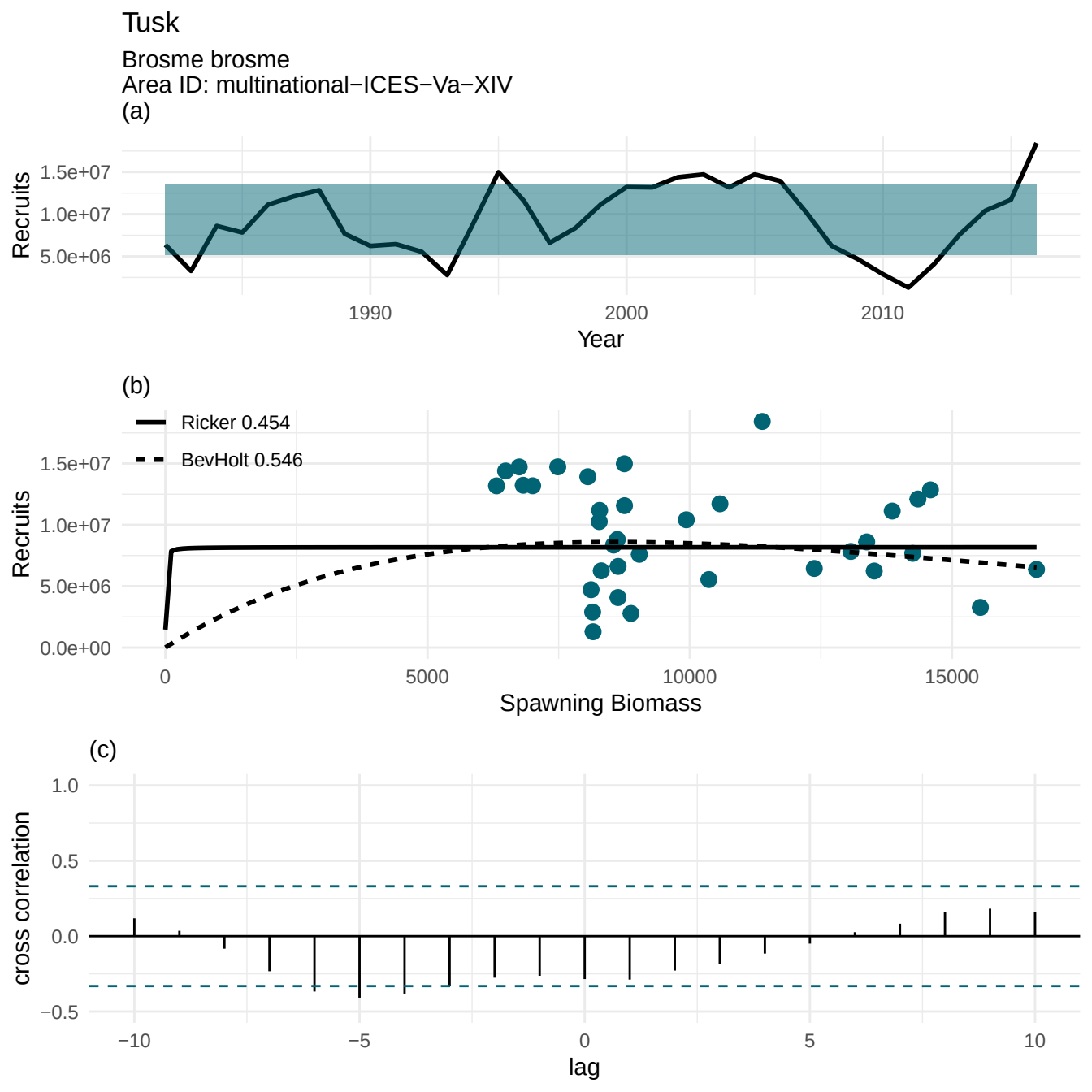

Chum salmon
Oncorhynchus keta
Area ID: USA−WASTATE−SSR
(a)
Recruits
4e+05
3e+05
2e+05
1e+05
0e+00
1970
1975
1980
1985
1990
Year
(b)
Ricker 0.51
BevHolt 0.49
Recruits
4e+05
3e+05
2e+05
1e+05
0e+00
0
50000
100000
150000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.77
0.69
−10
−5
0
5
10
lag

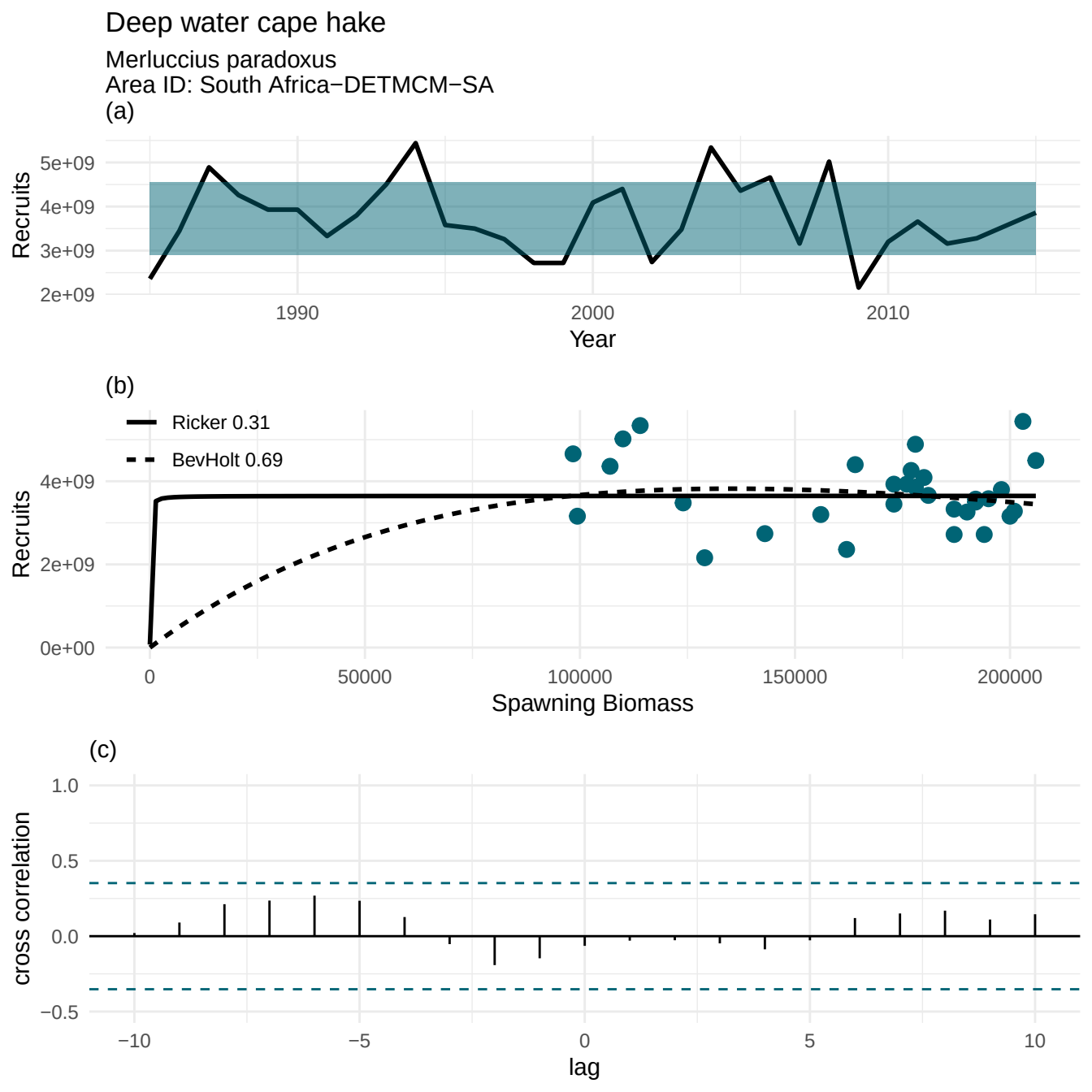

Chum salmon
Oncorhynchus keta
Area ID: USA−WASTATE−WILLB
(a)
Recruits
250000
200000
150000
100000
50000
0
1970
1975
1980
1985
1990
Year
(b)
Ricker 0.472
BevHolt 0.528
Recruits
250000
200000
150000
100000
50000
0
0
20000
40000
60000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.47
−10
−5
0
5
10
lag

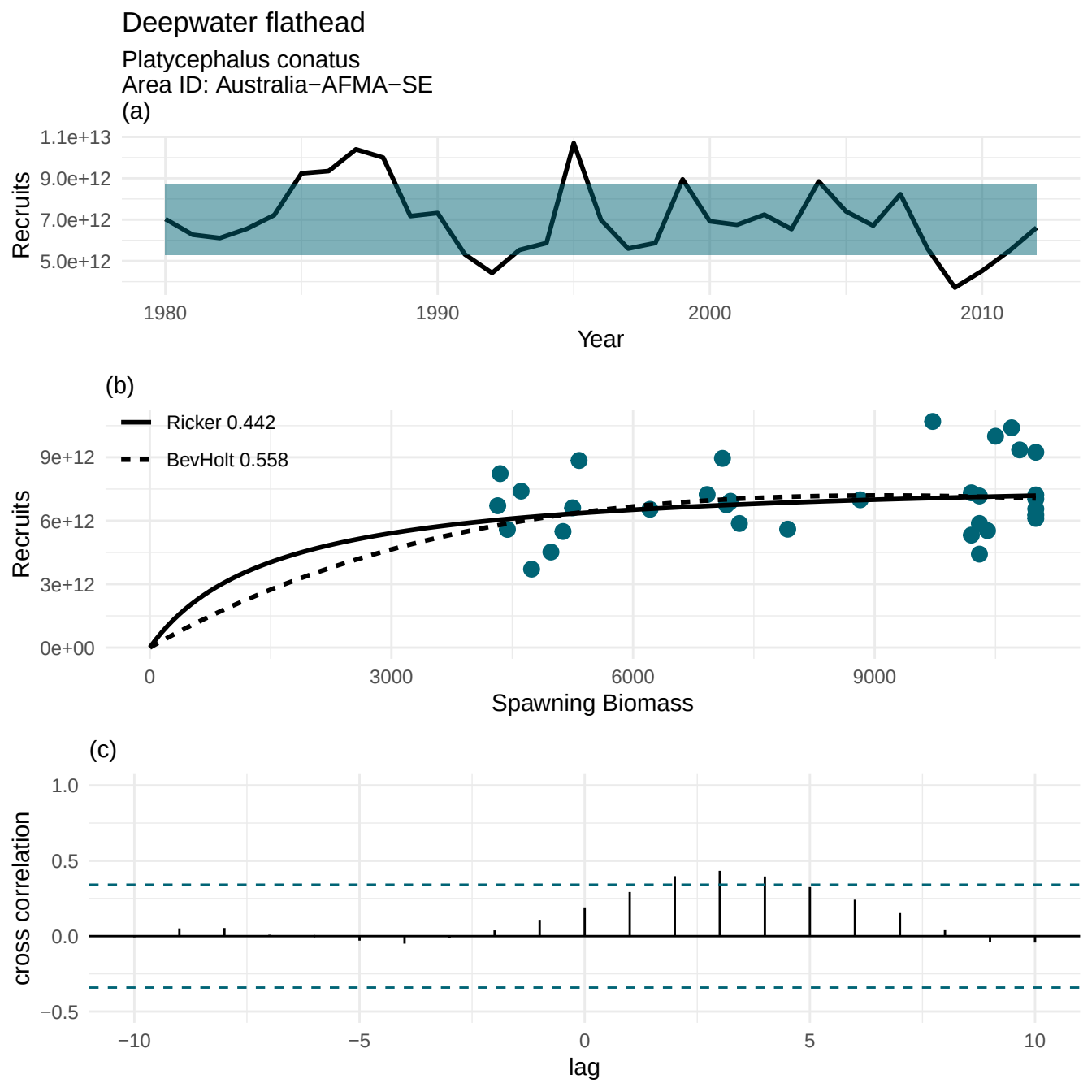

Chum salmon
Oncorhynchus keta
Area ID: USA−AKSTATE−YUKONRFR
(a)
Recruits
1200000
900000
600000
300000
1975
1980
1985
1990
1995
Year
(b)
Ricker 0.385
BevHolt 0.615
Recruits
1500000
1000000
500000
0
0
500000
1000000
1500000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.58
−10
−5
0
5
10
lag

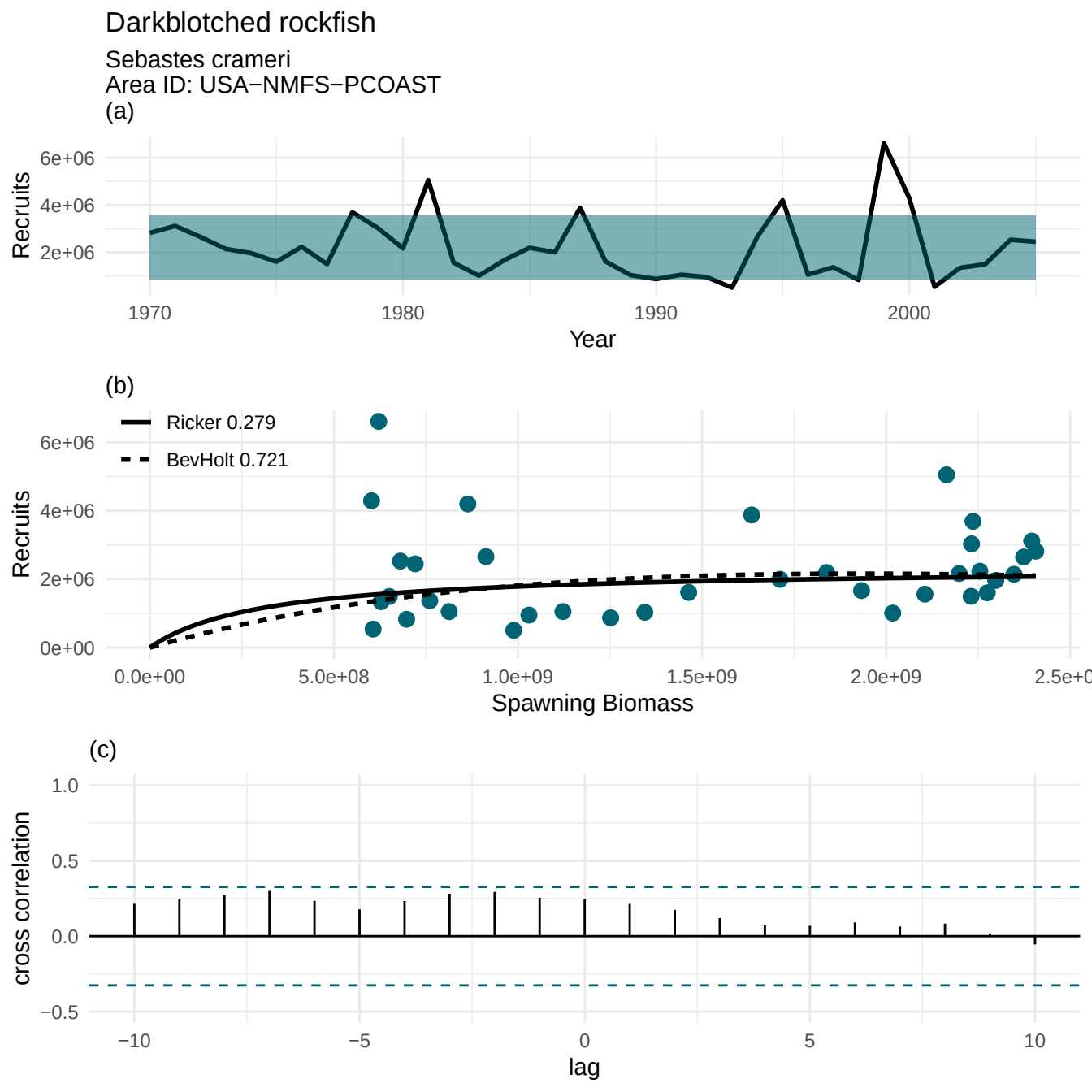

Chilean sardine
Strangomera bentincki
Area ID: Chile−SUBPESCA−CH−CS
(a)
Recruits
6e+05
4e+05
2e+05
1990
2000
2010
2020
Year
(b)
Ricker 0.397
BevHolt 0.603
Recruits
6e+05
4e+05
2e+05
0e+00
0
500000
1000000
1500000
2000000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.71
−10
−5
0
5
10
lag

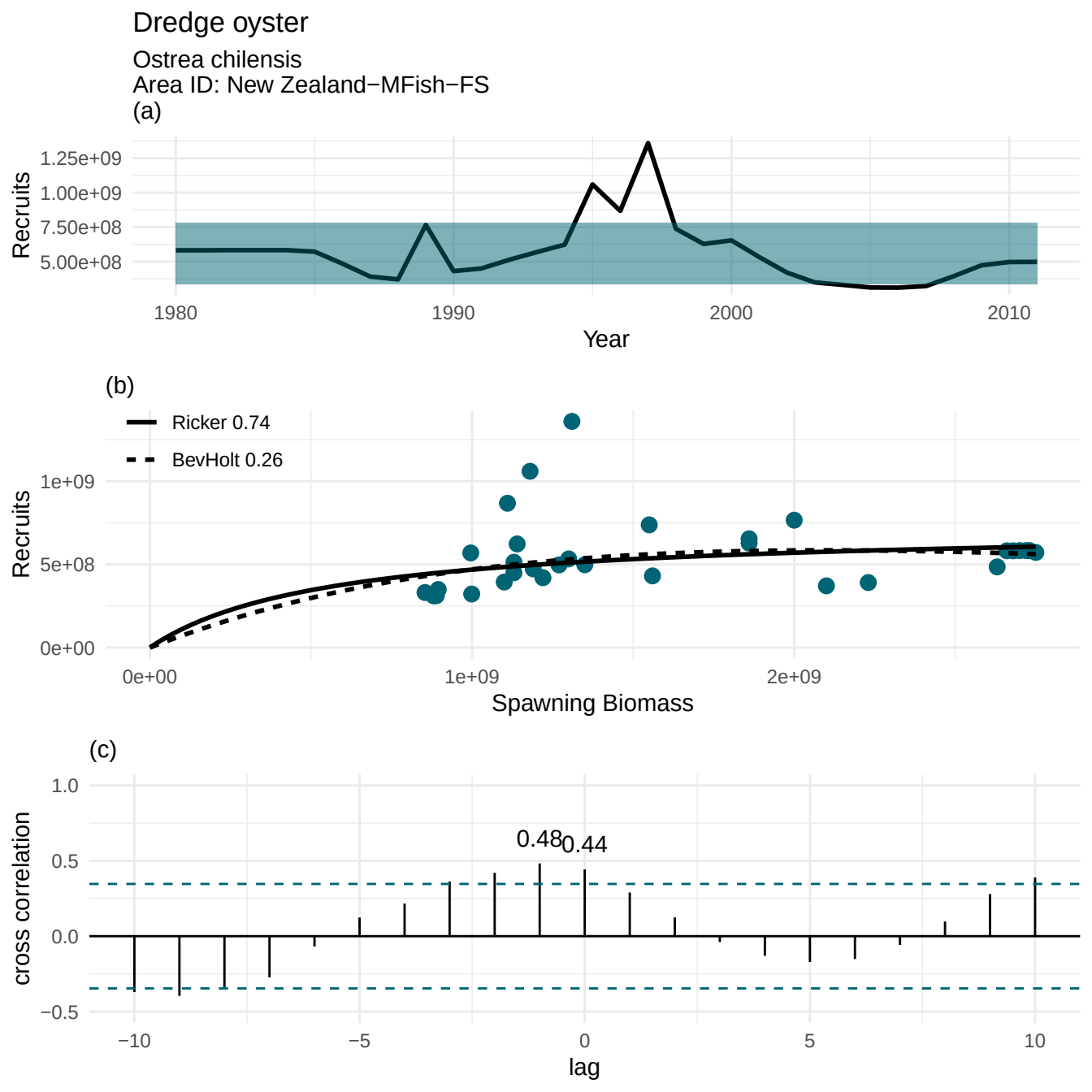

Cape horse mackerel
Trachurus capensis
Area ID: South Africa−DETMCM−SASC
(a)
Recruits
1.75e+09
1.50e+09
1.25e+09
1.00e+09
7.50e+08
1990
2000
2010
2020
Year
(b)
Ricker 0.534
BevHolt 0.466
Recruits
2.0e+09
1.5e+09
1.0e+09
5.0e+08
0.0e+00
0e+00
1e+05
2e+05
3e+05
4e+05
5e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

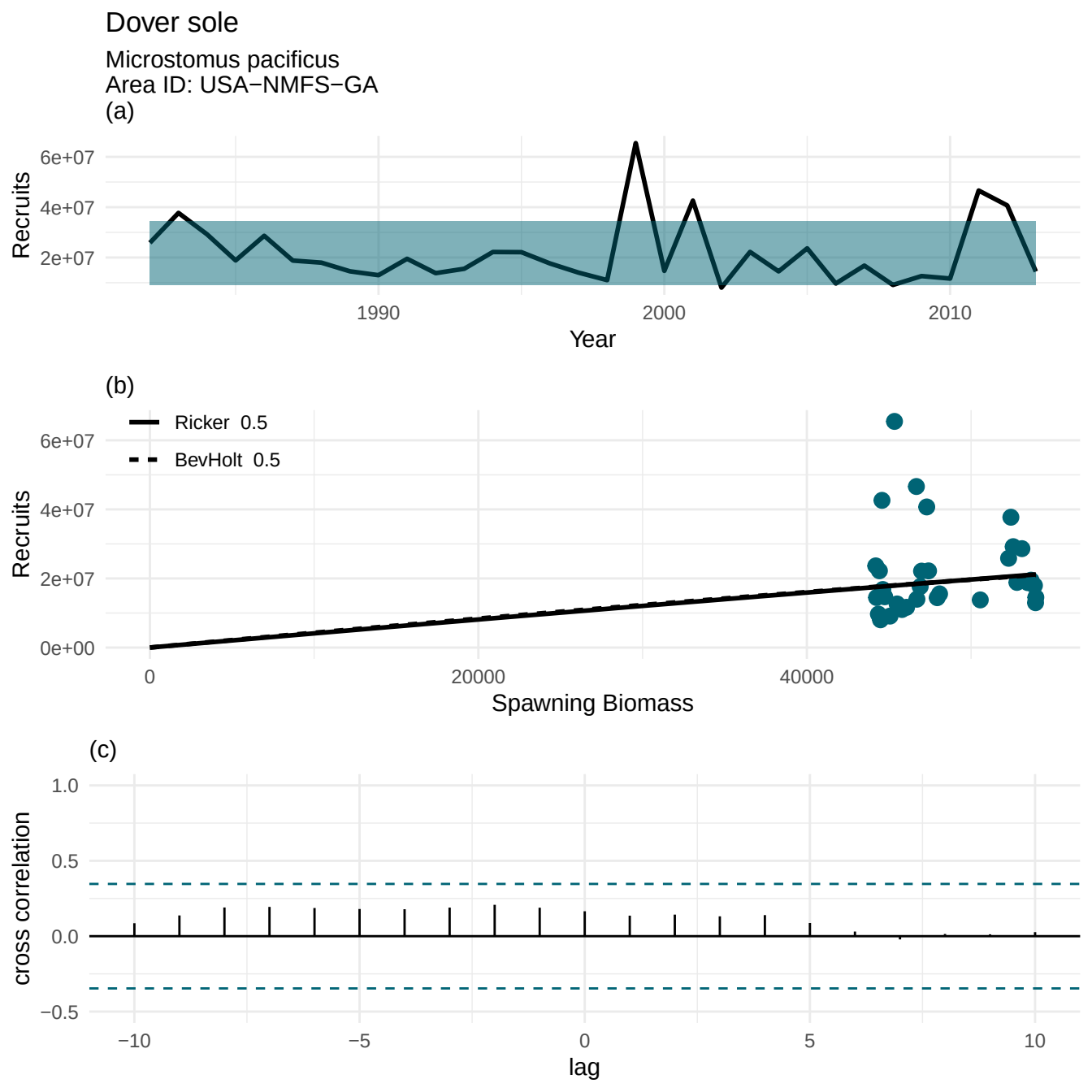

Tusk
Brosme brosme
Area ID: multinational−ICES−Va−XIV
(a)
Recruits
1.5e+07
1.0e+07
5.0e+06
1990
2000
2010
Year
(b)
Ricker 0.454
BevHolt 0.546
Recruits
1.5e+07
1.0e+07
5.0e+06
0.0e+00
0
5000
10000
15000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

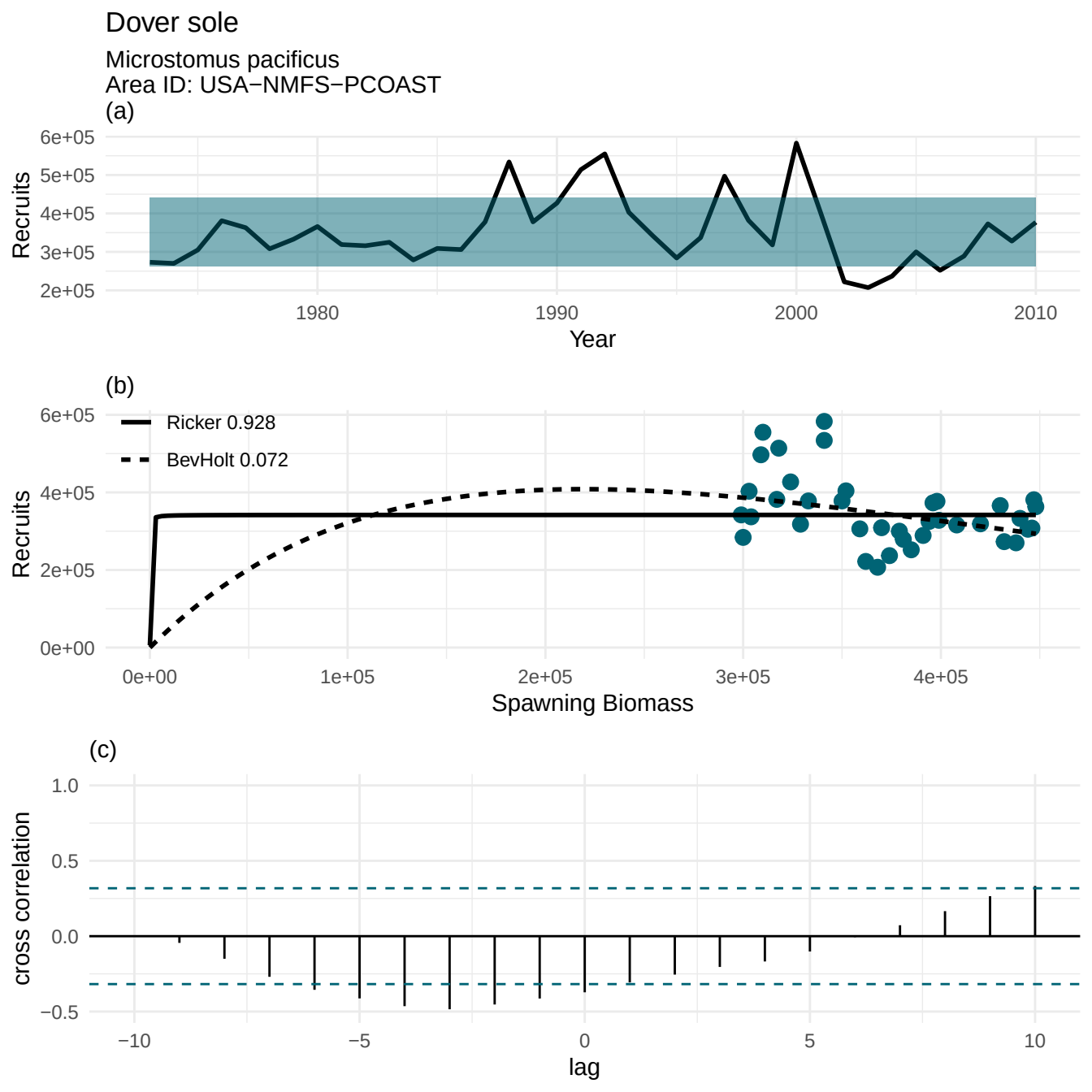

Deep water cape hake
Merluccius paradoxus
Area ID: South Africa−DETMCM−SA
(a)
Recruits
5e+09
4e+09
3e+09
2e+09
1990
2000
2010
Year
(b)
Ricker 0.31
BevHolt 0.69
Recruits
4e+09
2e+09
0e+00
0
50000
100000
150000
200000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

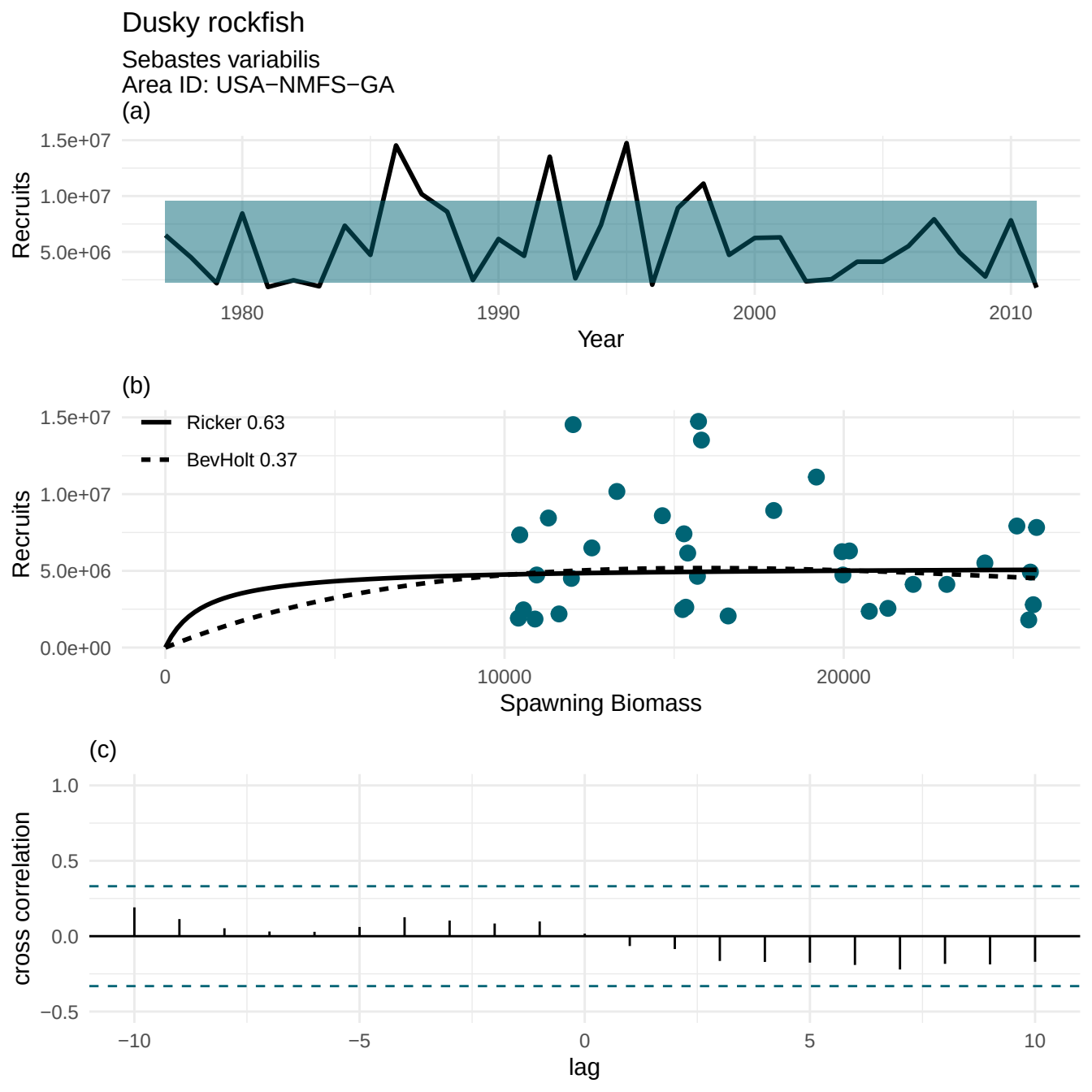

Deepwater flathead
Platycephalus conatus
Area ID: Australia−AFMA−SE
(a)
Recruits
1.1e+13
9.0e+12
7.0e+12
5.0e+12
1980
1990
2000
2010
Year
(b)
Ricker 0.442
BevHolt 0.558
Recruits
9e+12
6e+12
3e+12
0e+00
0
3000
6000
9000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

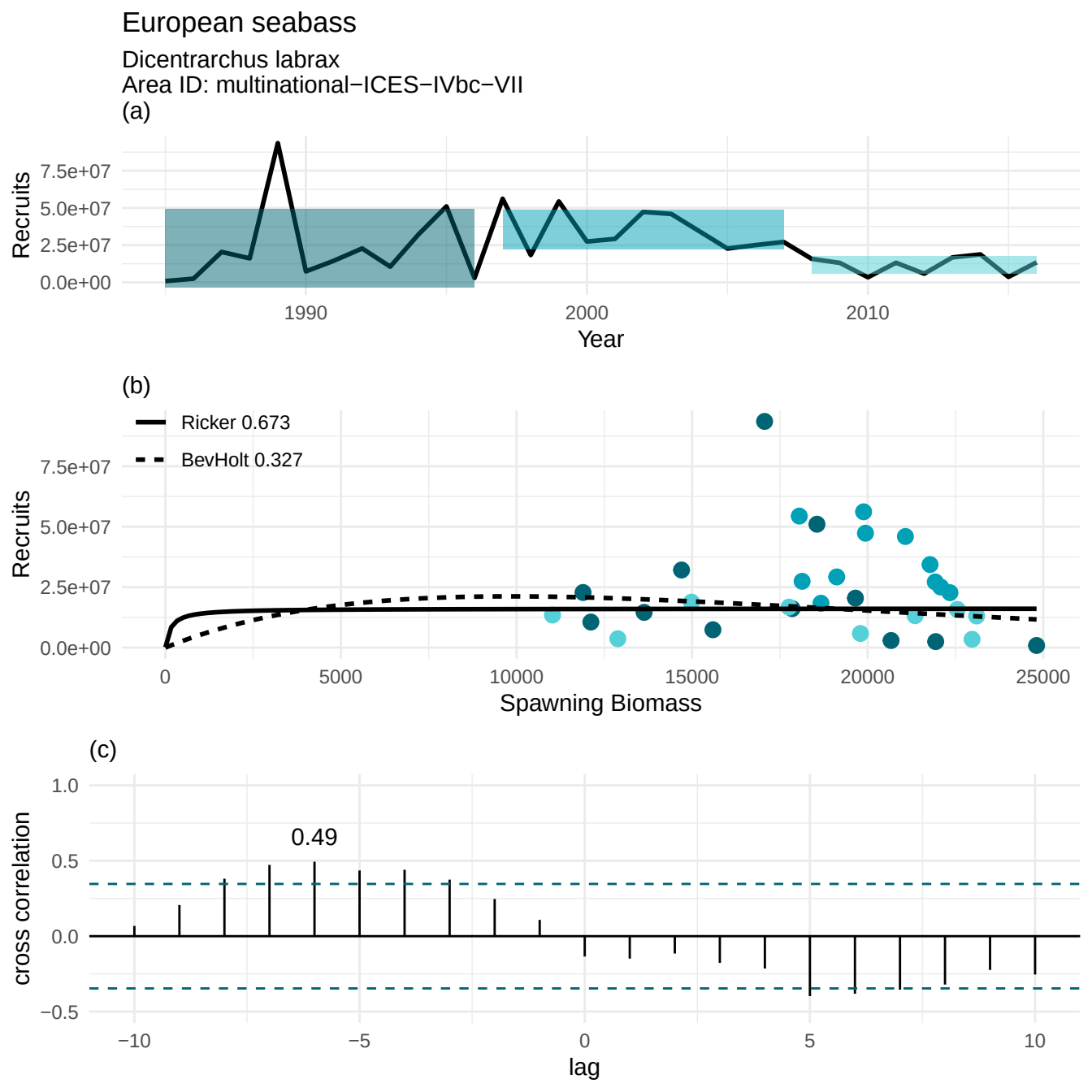

Darkblotched rockfish
Sebastes crameri
Area ID: USA−NMFS−PCOAST
(a)
Recruits
6e+06
4e+06
2e+06
1970
1980
1990
2000
Year
(b)
Ricker 0.279
BevHolt 0.721
Recruits
6e+06
4e+06
2e+06
0e+00
0.0e+00
5.0e+08
1.0e+09
1.5e+09
2.0e+09
2.5e+0
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

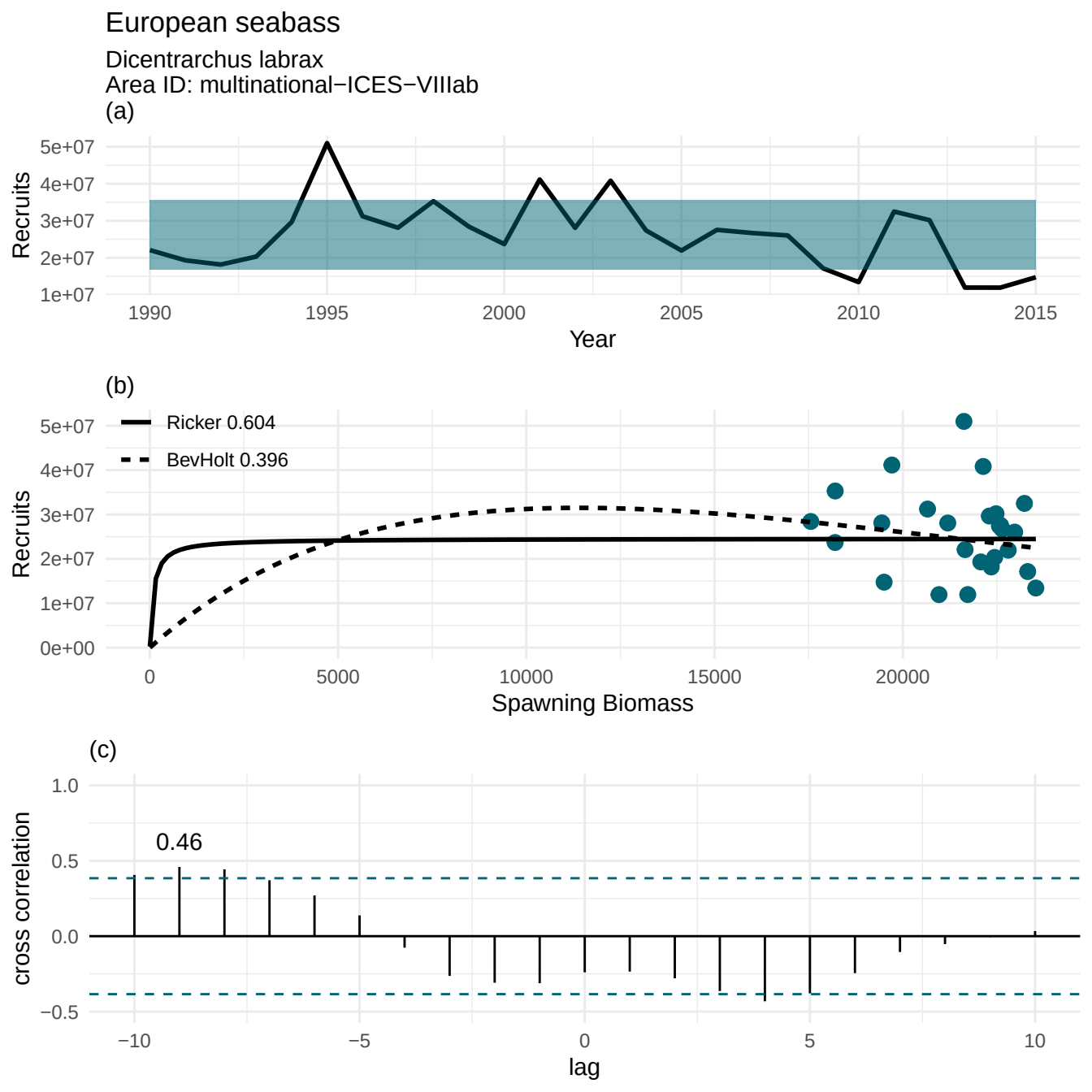

Dredge oyster
Ostrea chilensis
Area ID: New Zealand−MFish−FS
(a)
Recruits
1.25e+09
1.00e+09
7.50e+08
5.00e+08
1980
1990
2000
2010
Year
(b)
Ricker 0.74
BevHolt 0.26
Recruits
1e+09
5e+08
0e+00
0e+00
1e+09
2e+09
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.48
0.44
−10
−5
0
5
10
lag

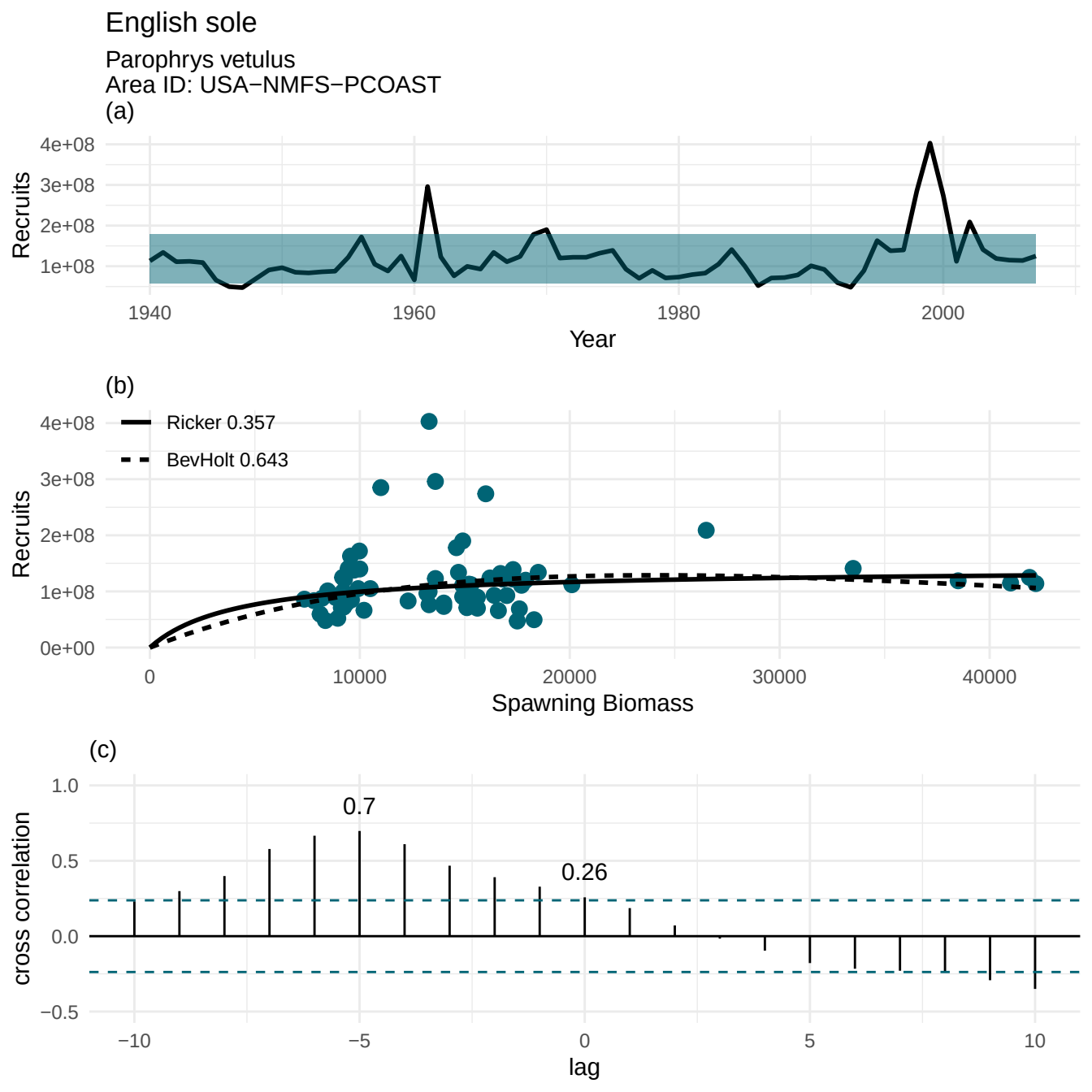

Dover sole
Microstomus pacificus
Area ID: USA−NMFS−GA
(a)
Recruits
6e+07
4e+07
2e+07
1990
2000
2010
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
6e+07
4e+07
2e+07
0e+00
0
20000
40000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

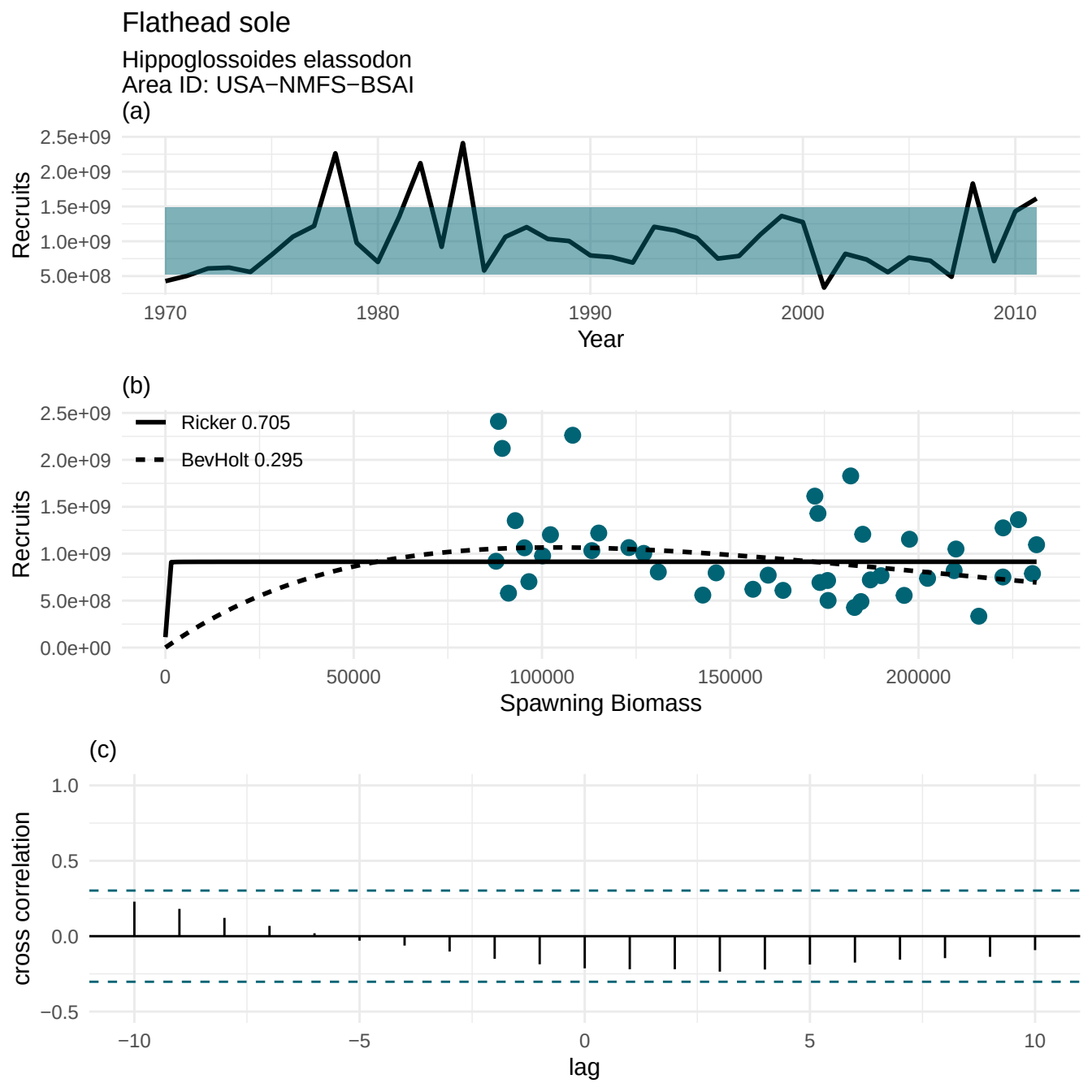

Dover sole
Microstomus pacificus
Area ID: USA−NMFS−PCOAST
(a)
Recruits
6e+05
5e+05
4e+05
3e+05
2e+05
1980
1990
2000
2010
Year
(b)
Ricker 0.928
BevHolt 0.072
Recruits
6e+05
4e+05
2e+05
0e+00
0e+00
1e+05
2e+05
3e+05
4e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

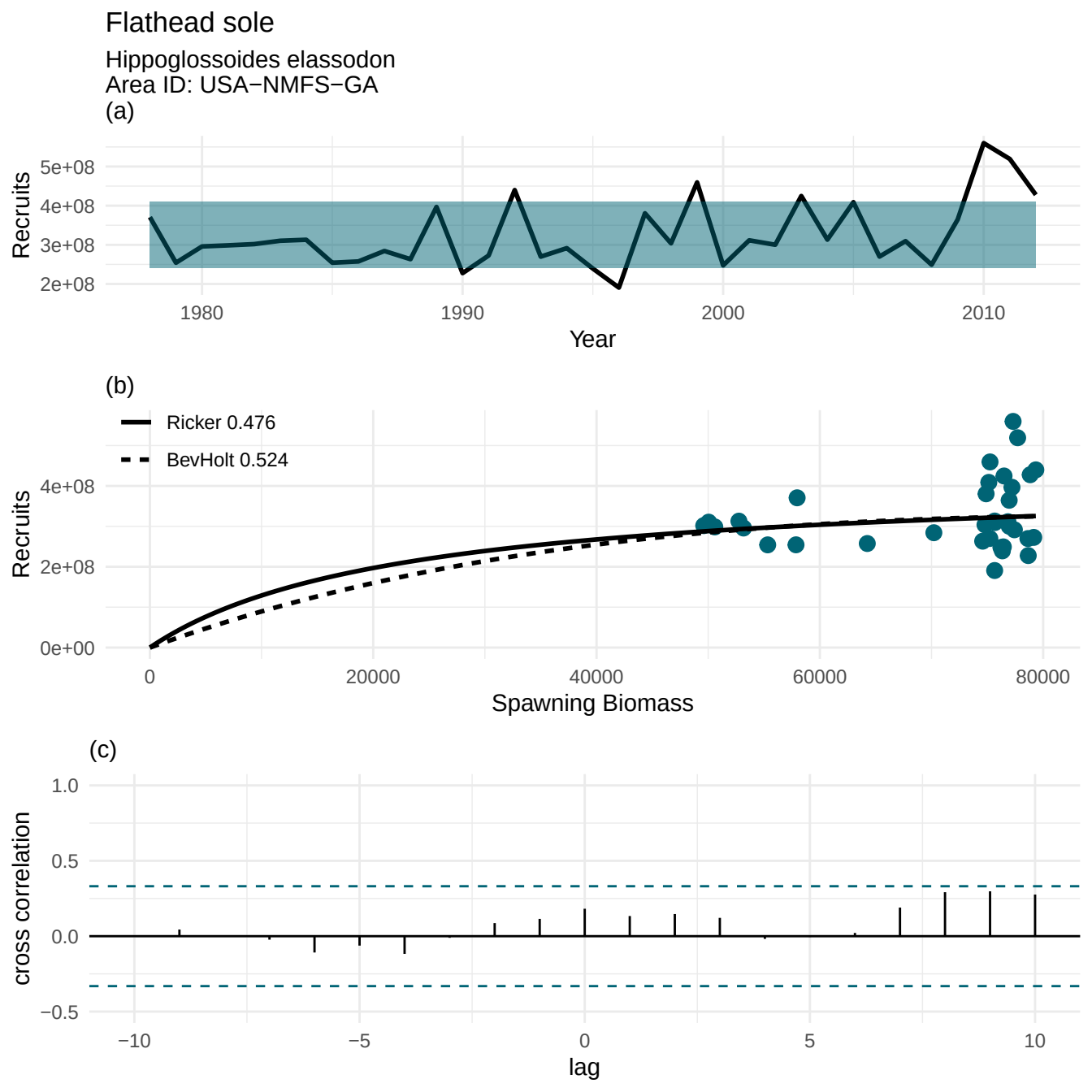

Dusky rockfish
Sebastes variabilis
Area ID: USA−NMFS−GA
(a)
Recruits
1.5e+07
1.0e+07
5.0e+06
1980
1990
2000
2010
Year
(b)
Ricker 0.63
BevHolt 0.37
Recruits
1.5e+07
1.0e+07
5.0e+06
0.0e+00
0
10000
20000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

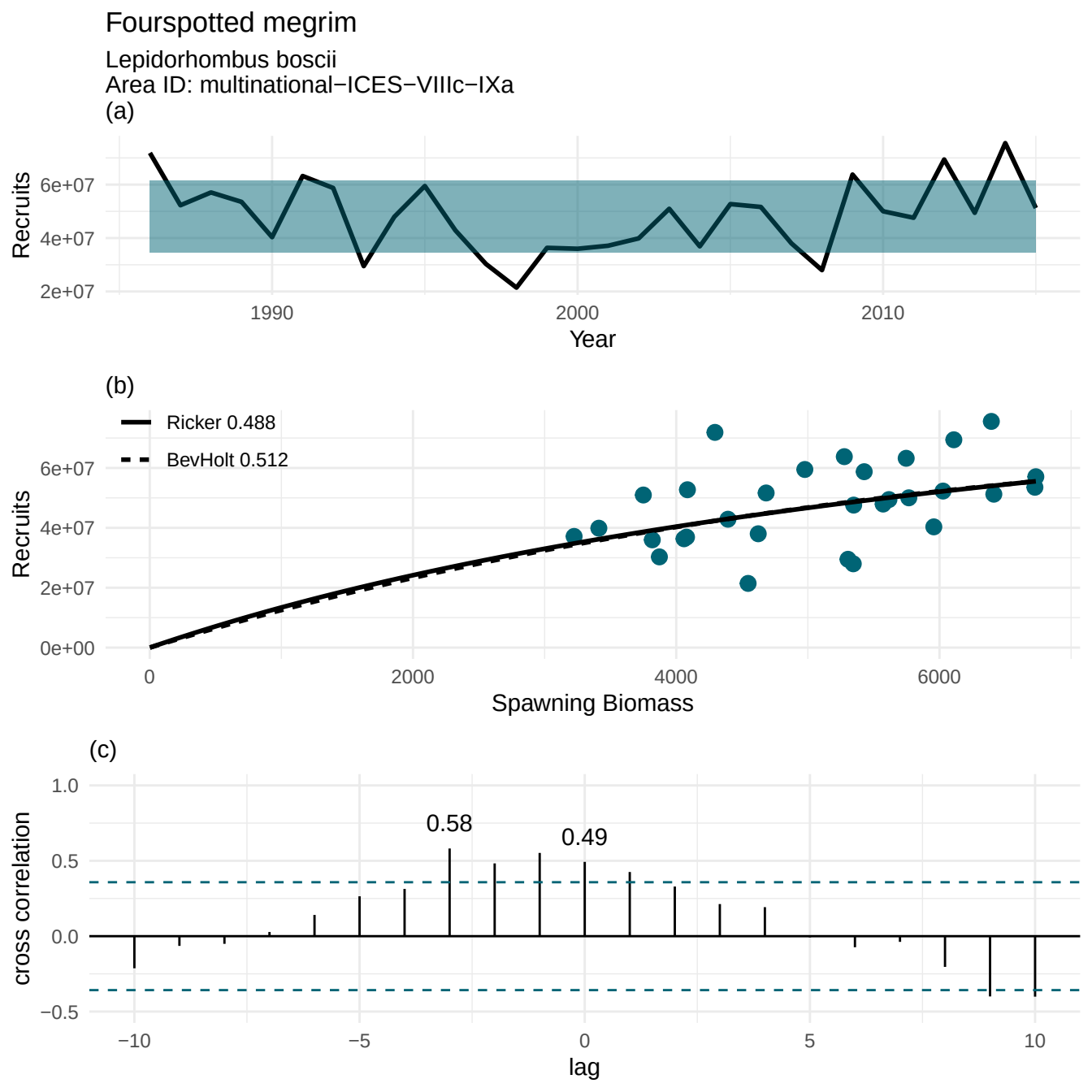

European seabass
Dicentrarchus labrax
Area ID: multinational−ICES−IVbc−VII
(a)
Recruits
7.5e+07
5.0e+07
2.5e+07
0.0e+00
1990
2000
2010
Year
(b)
Ricker 0.673
BevHolt 0.327
Recruits
7.5e+07
5.0e+07
2.5e+07
0.0e+00
0
5000
10000
15000
20000
25000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.49
−10
−5
0
5
10
lag

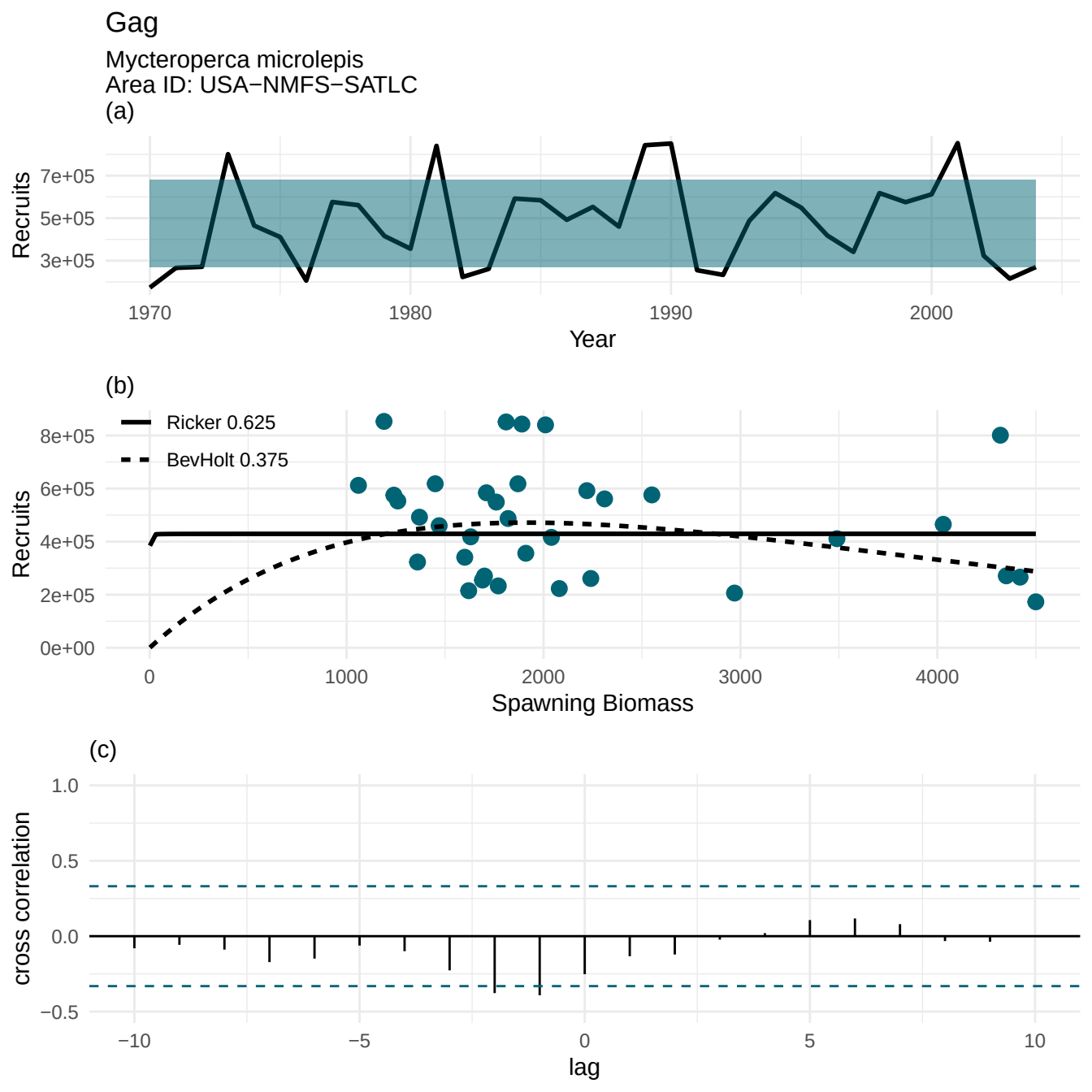

European seabass
Dicentrarchus labrax
Area ID: multinational−ICES−VIIIab
(a)
Recruits
5e+07
4e+07
3e+07
2e+07
1e+07
1990
1995
2000
2005
2010
2015
Year
(b)
Ricker 0.604
BevHolt 0.396
Recruits
5e+07
4e+07
3e+07
2e+07
1e+07
0e+00
0
5000
10000
15000
20000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.46
−10
−5
0
5
10
lag

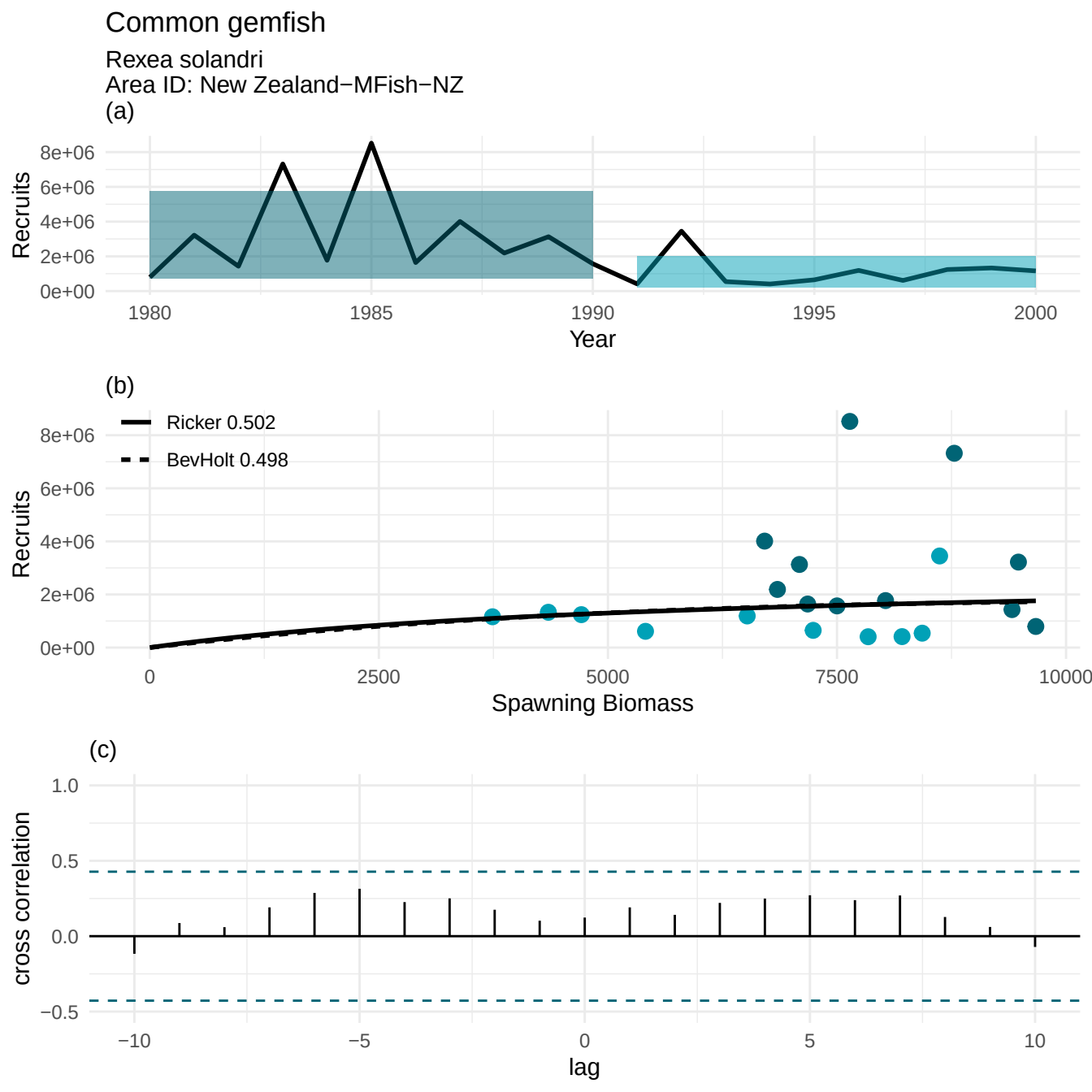

English sole
Parophrys vetulus
Area ID: USA−NMFS−PCOAST
(a)
Recruits
4e+08
3e+08
2e+08
1e+08
1940
1960
1980
2000
Year
(b)
Ricker 0.357
BevHolt 0.643
Recruits
4e+08
3e+08
2e+08
1e+08
0e+00
0
10000
20000
30000
40000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.7
0.26
−10
−5
0
5
10
lag

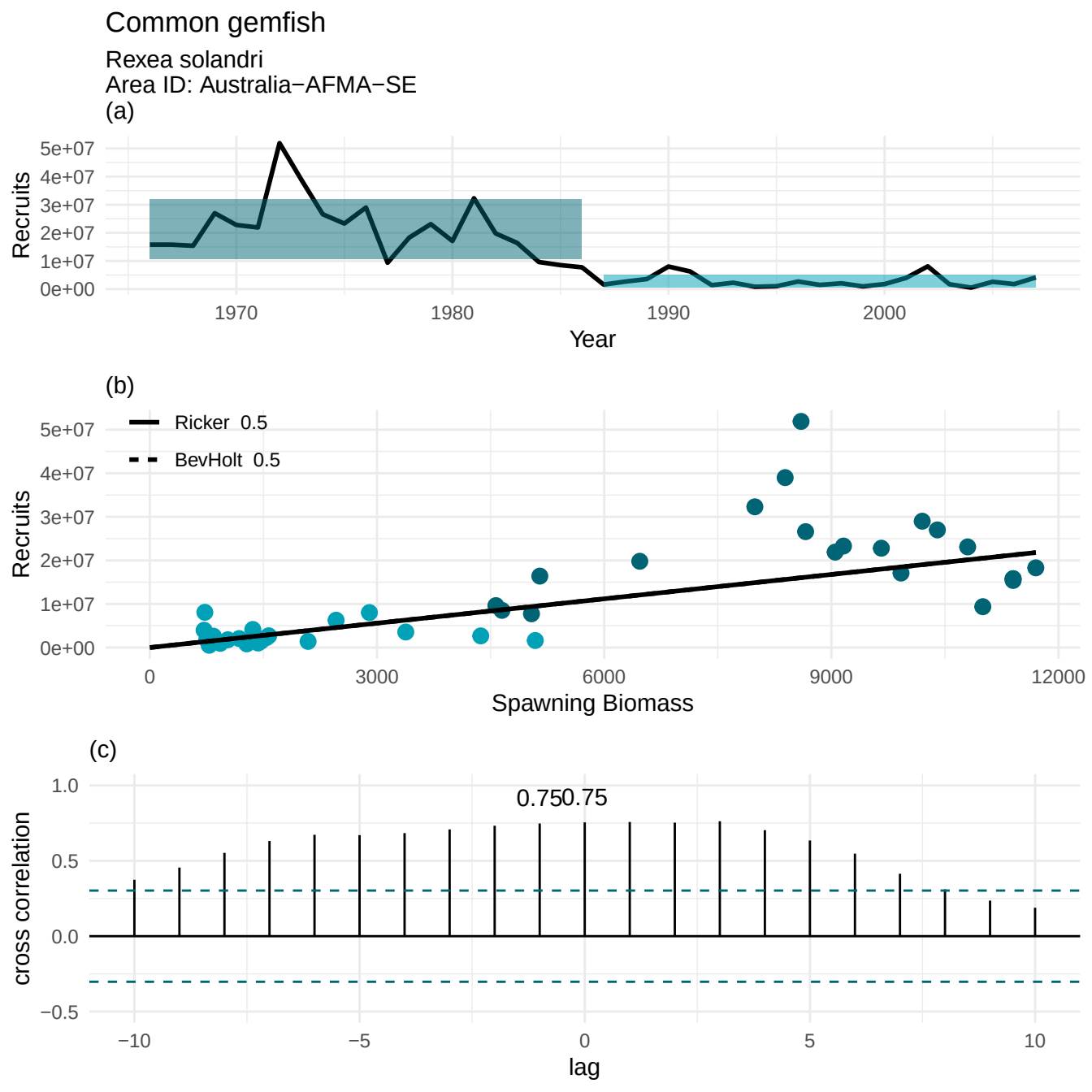

Flathead sole
Hippoglossoides elassodon
Area ID: USA−NMFS−BSAI
(a)
Recruits
2.5e+09
2.0e+09
1.5e+09
1.0e+09
5.0e+08
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.705
BevHolt 0.295
Recruits
2.5e+09
2.0e+09
1.5e+09
1.0e+09
5.0e+08
0.0e+00
0
50000
100000
150000
200000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

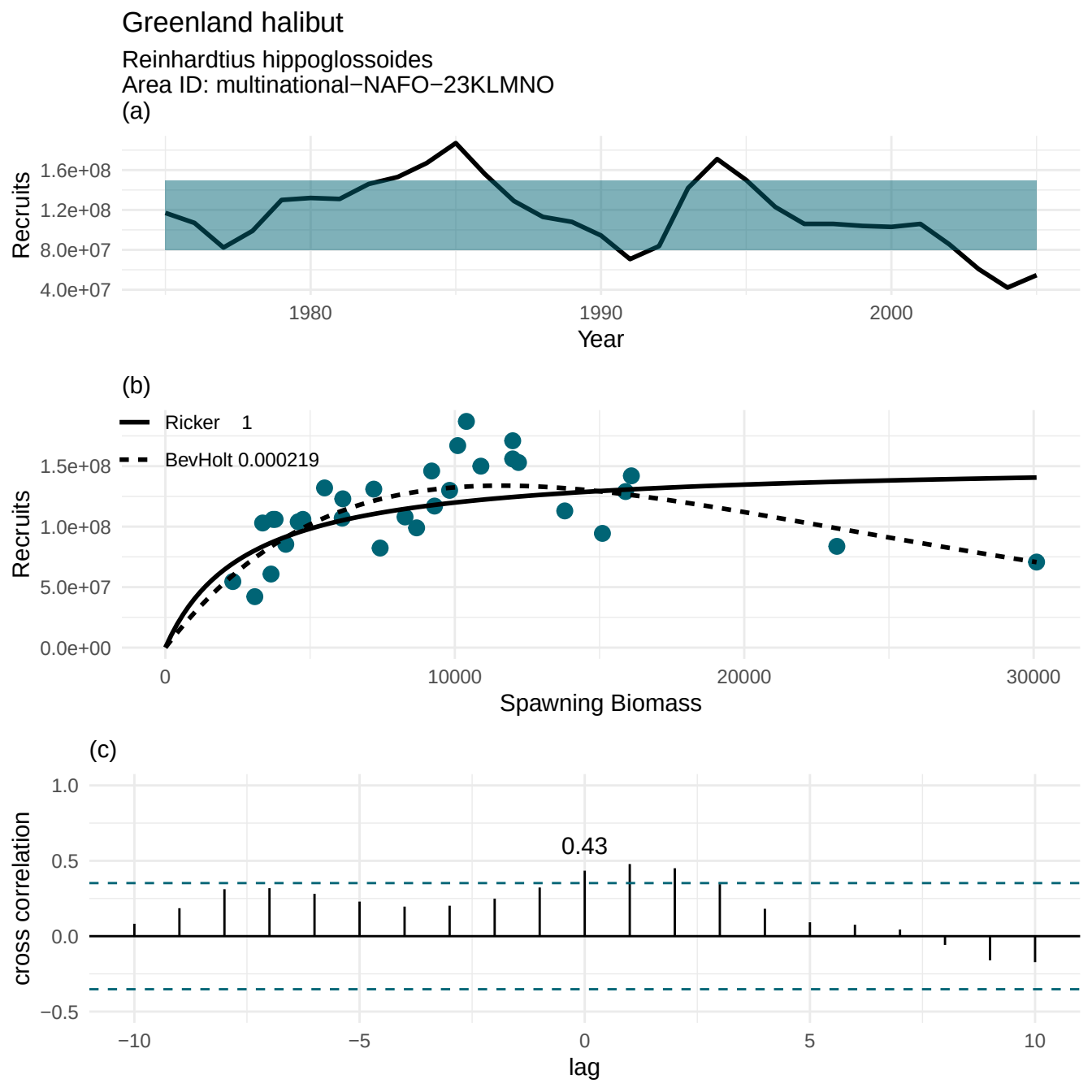

Flathead sole
Hippoglossoides elassodon
Area ID: USA−NMFS−GA
(a)
Recruits
5e+08
4e+08
3e+08
2e+08
1980
1990
2000
2010
Year
(b)
Ricker 0.476
BevHolt 0.524
Recruits
4e+08
2e+08
0e+00
0
20000
40000
60000
80000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

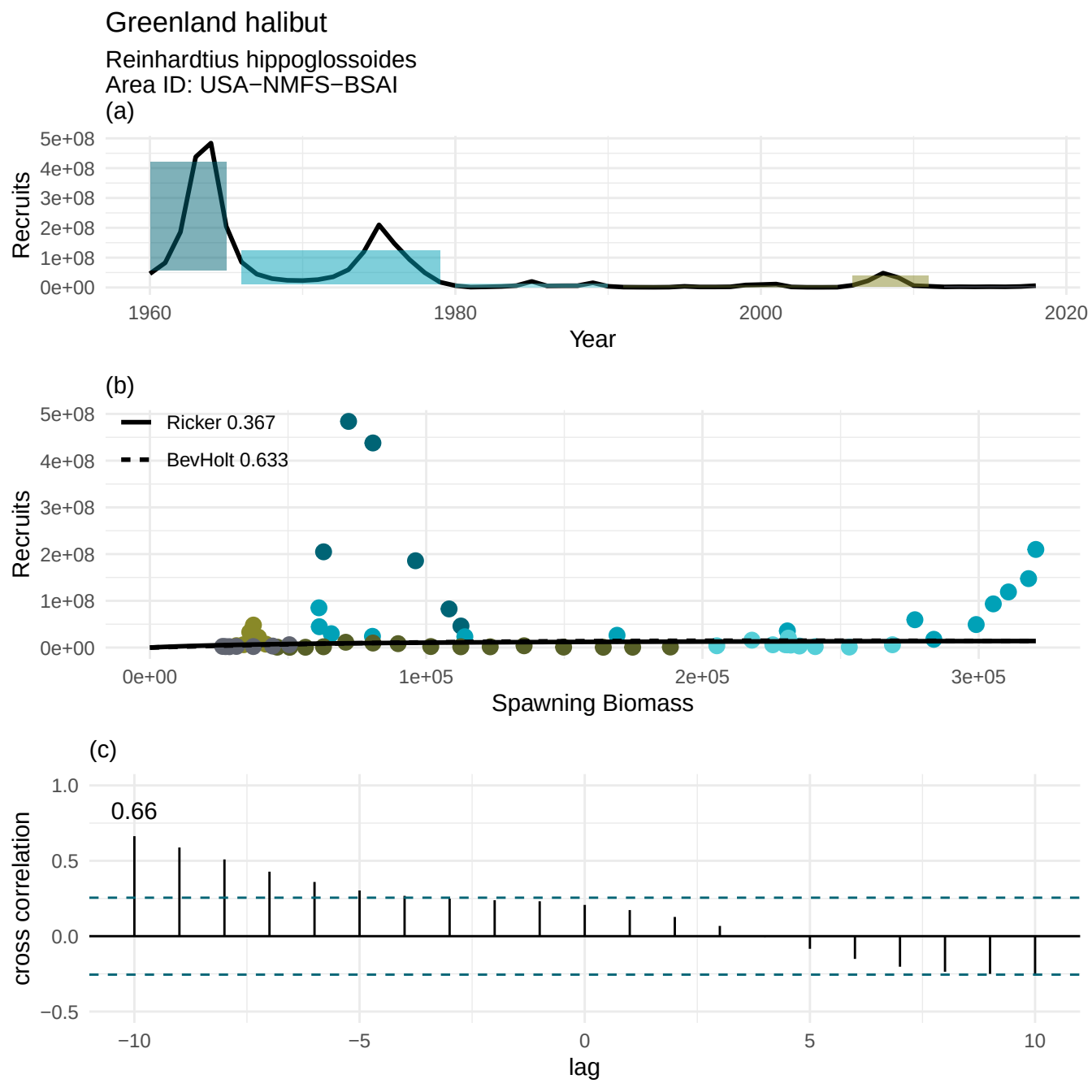

Fourspotted megrim
Lepidorhombus boscii
Area ID: multinational−ICES−VIIIc−IXa
(a)
Recruits
6e+07
4e+07
2e+07
1990
2000
2010
Year
(b)
Ricker 0.488
BevHolt 0.512
Recruits
6e+07
4e+07
2e+07
0e+00
0
2000
4000
6000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.58
0.49
−10
−5
0
5
10
lag

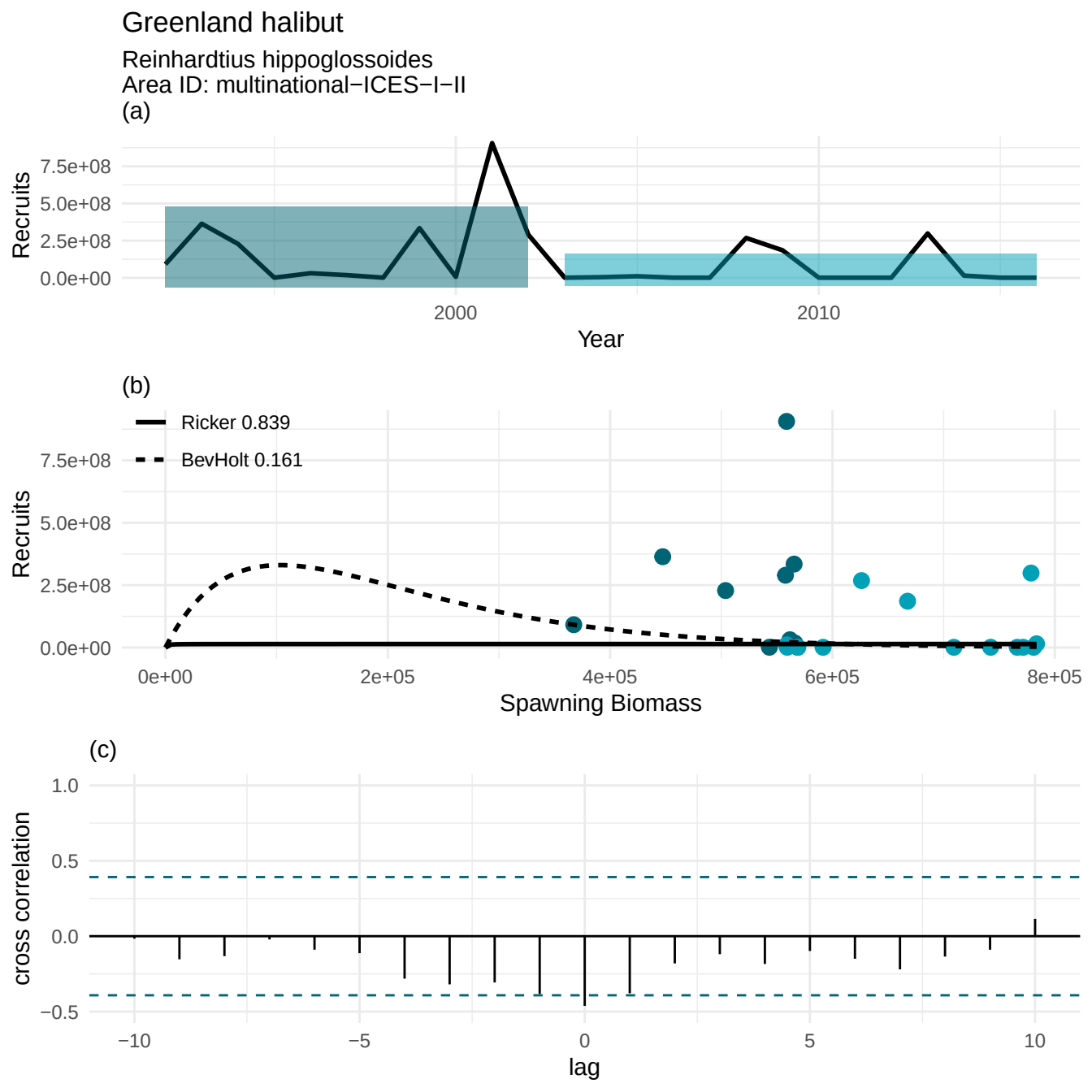

Gag
Mycteroperca microlepis
Area ID: USA−NMFS−SATLC
(a)
Recruits
7e+05
5e+05
3e+05
1970
1980
1990
2000
Year
(b)
Ricker 0.625
BevHolt 0.375
Recruits
8e+05
6e+05
4e+05
2e+05
0e+00
0
1000
2000
3000
4000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

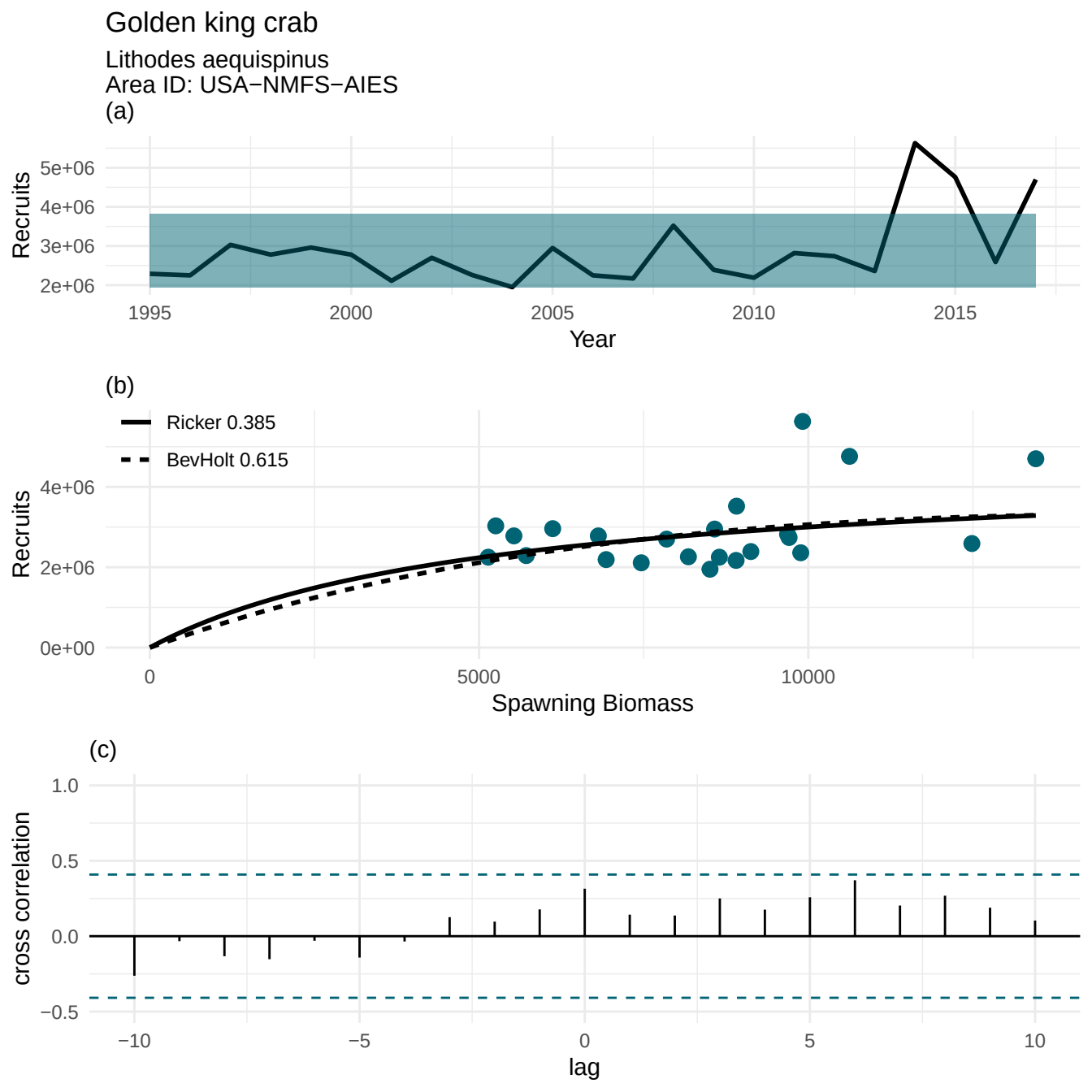

Common gemfish
Rexea solandri
Area ID: New Zealand−MFish−NZ
(a)
Recruits
8e+06
6e+06
4e+06
2e+06
0e+00
1980
1985
1990
1995
2000
Year
(b)
Ricker 0.502
BevHolt 0.498
Recruits
8e+06
6e+06
4e+06
2e+06
0e+00
0
2500
5000
7500
10000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

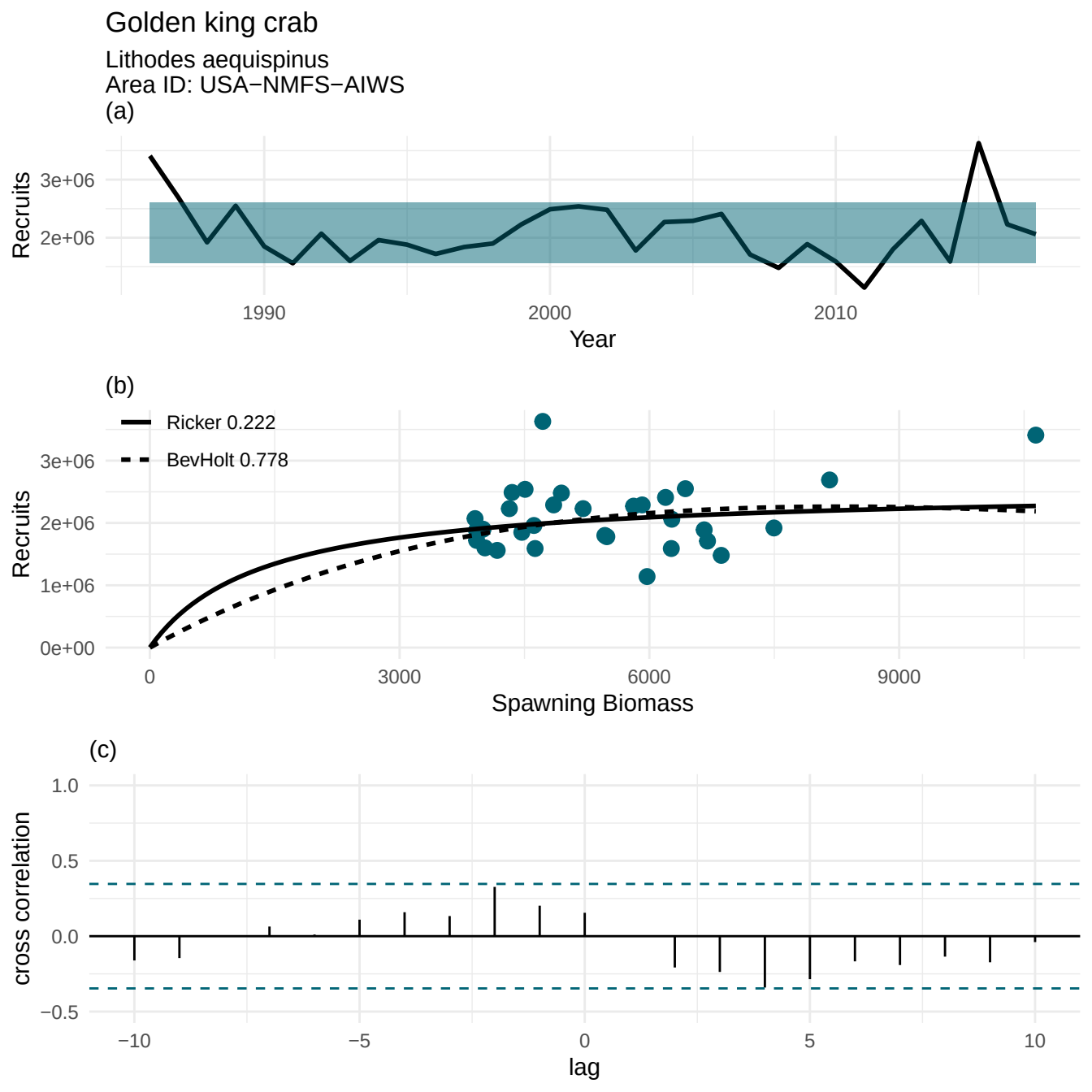

Common gemfish
Rexea solandri
Area ID: Australia−AFMA−SE
(a)
Recruits
5e+07
4e+07
3e+07
2e+07
1e+07
0e+00
1970
1980
1990
2000
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
5e+07
4e+07
3e+07
2e+07
1e+07
0e+00
0
3000
6000
9000
12000
Spawning Biomass
(c)
0.750.75
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

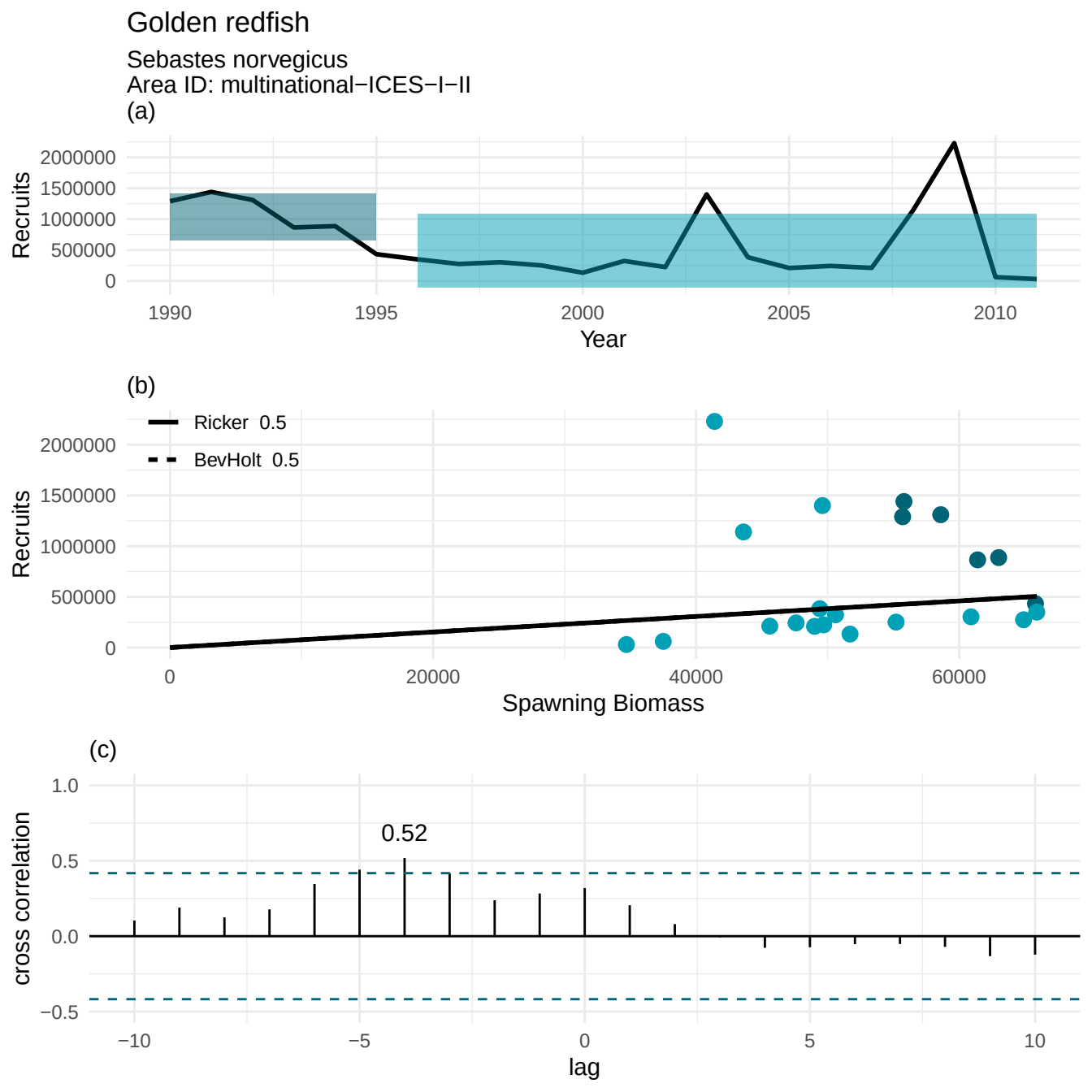

Greenland halibut
Reinhardtius hippoglossoides
Area ID: multinational−NAFO−23KLMNO
(a)
Recruits
1.6e+08
1.2e+08
8.0e+07
4.0e+07
1980
1990
2000
Year
(b)
Ricker 1
BevHolt 0.000219
Recruits
1.5e+08
1.0e+08
5.0e+07
0.0e+00
0
10000
20000
30000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.43
−10
−5
0
5
10
lag

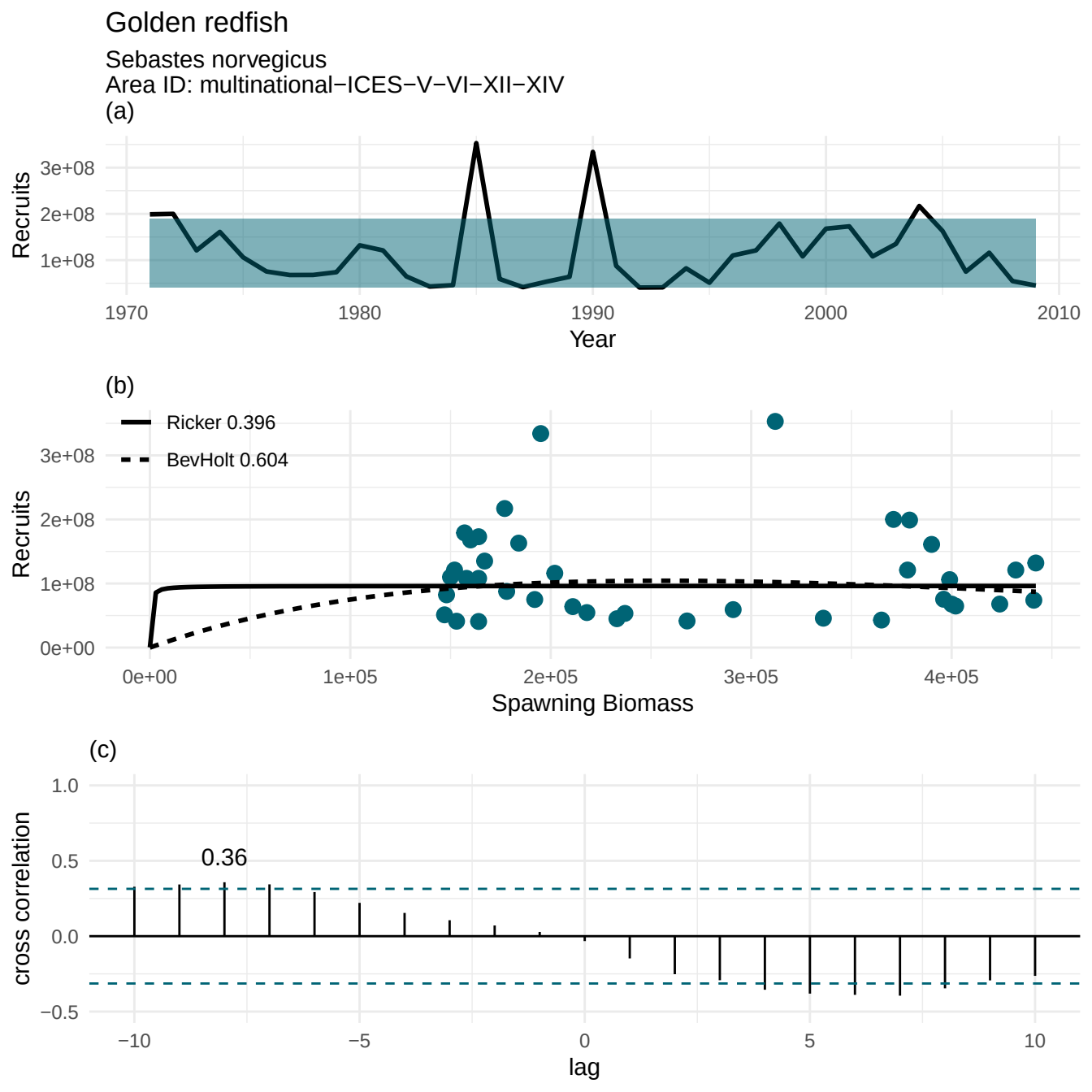

Greenland halibut
Reinhardtius hippoglossoides
Area ID: USA−NMFS−BSAI
(a)
Recruits
5e+08
4e+08
3e+08
2e+08
1e+08
0e+00
1960
1980
2000
2020
Year
(b)
Ricker 0.367
BevHolt 0.633
Recruits
0e+00
1e+05
2e+05
3e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.66
−10
−5
0
5
10
lag

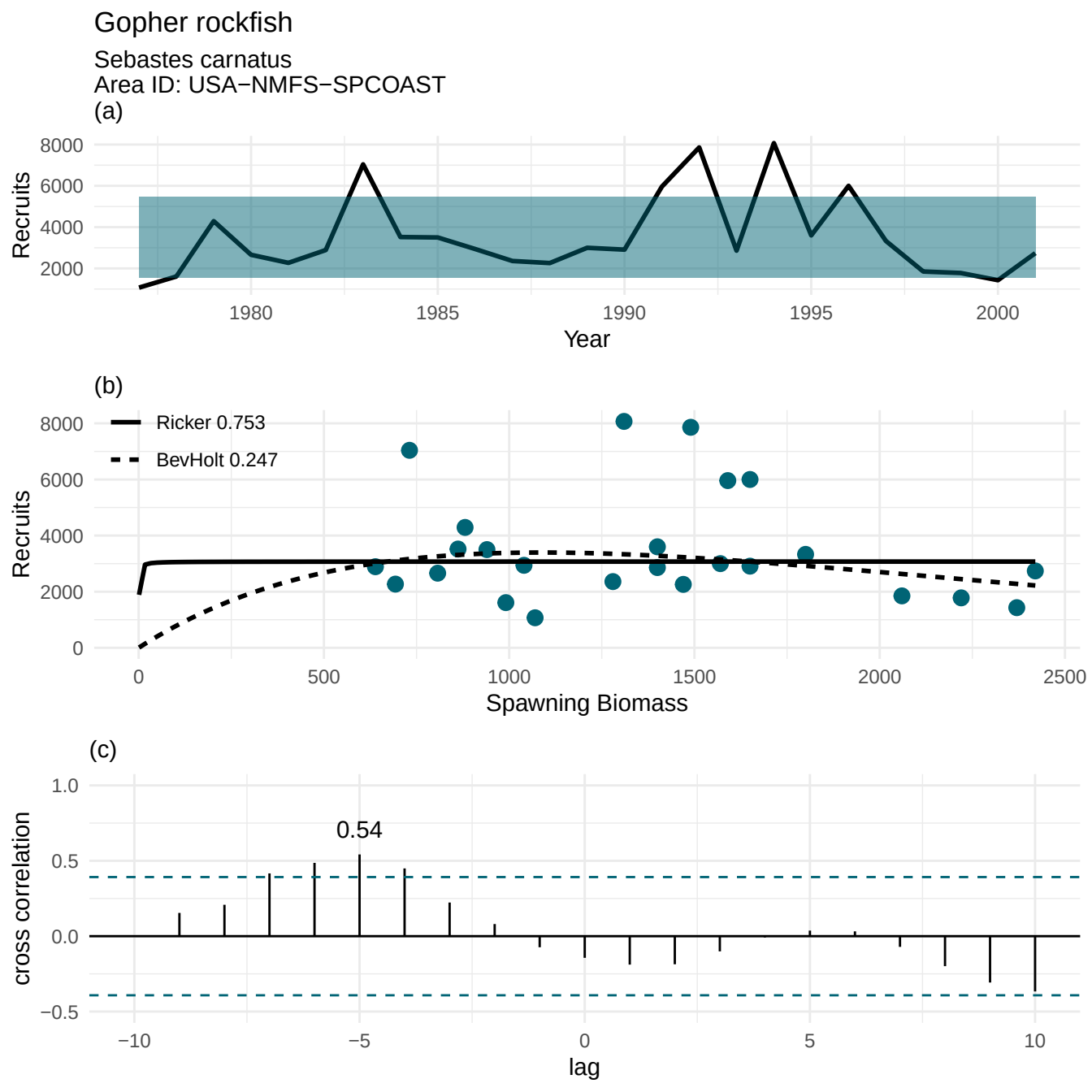

Greenland halibut
Reinhardtius hippoglossoides
Area ID: multinational−ICES−I−II
(a)
Recruits
7.5e+08
5.0e+08
2.5e+08
0.0e+00
2000
2010
Year
(b)
Ricker 0.839
BevHolt 0.161
Recruits
7.5e+08
5.0e+08
2.5e+08
0.0e+00
0e+00
2e+05
4e+05
6e+05
8e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

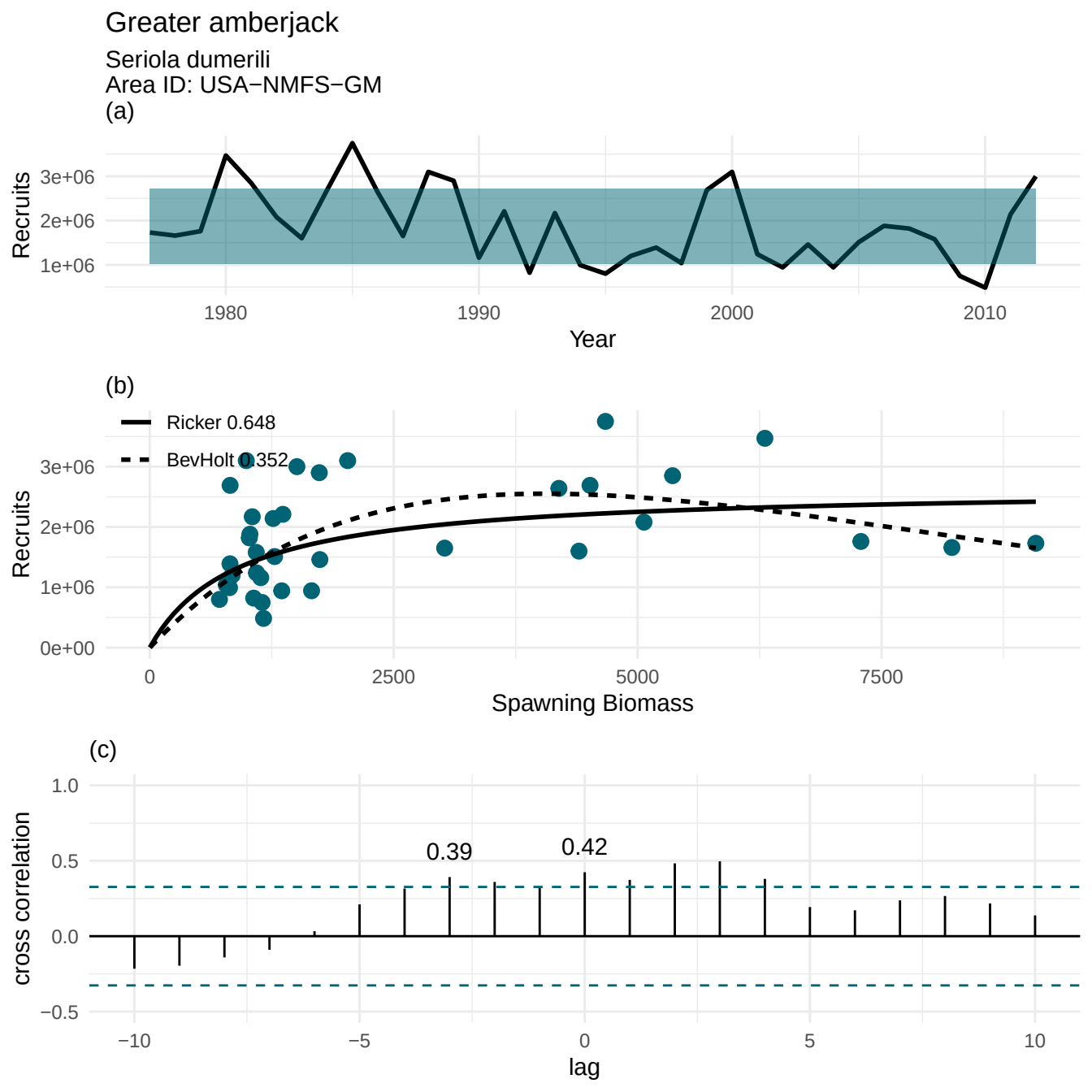

Golden king crab
Lithodes aequispinus
Area ID: USA−NMFS−AIES
(a)
Recruits
5e+06
4e+06
3e+06
2e+06
1995
2000
2005
2010
2015
Year
(b)
Ricker 0.385
BevHolt 0.615
Recruits
4e+06
2e+06
0e+00
0
5000
10000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

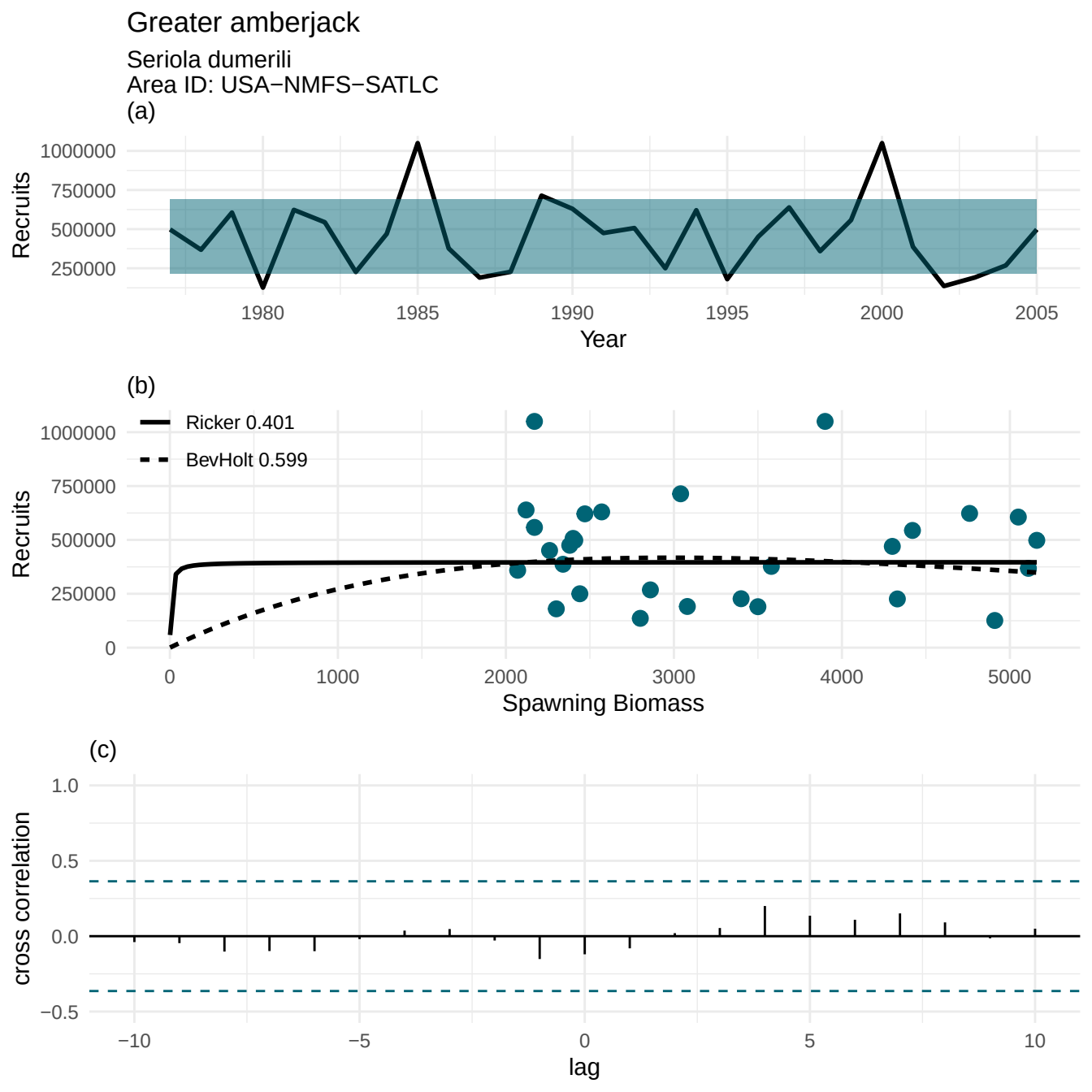

Golden king crab
Lithodes aequispinus
Area ID: USA−NMFS−AIWS
(a)
Recruits
3e+06
2e+06
1990
2000
2010
Year
(b)
Ricker 0.222
BevHolt 0.778
Recruits
3e+06
2e+06
1e+06
0e+00
0
3000
6000
9000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

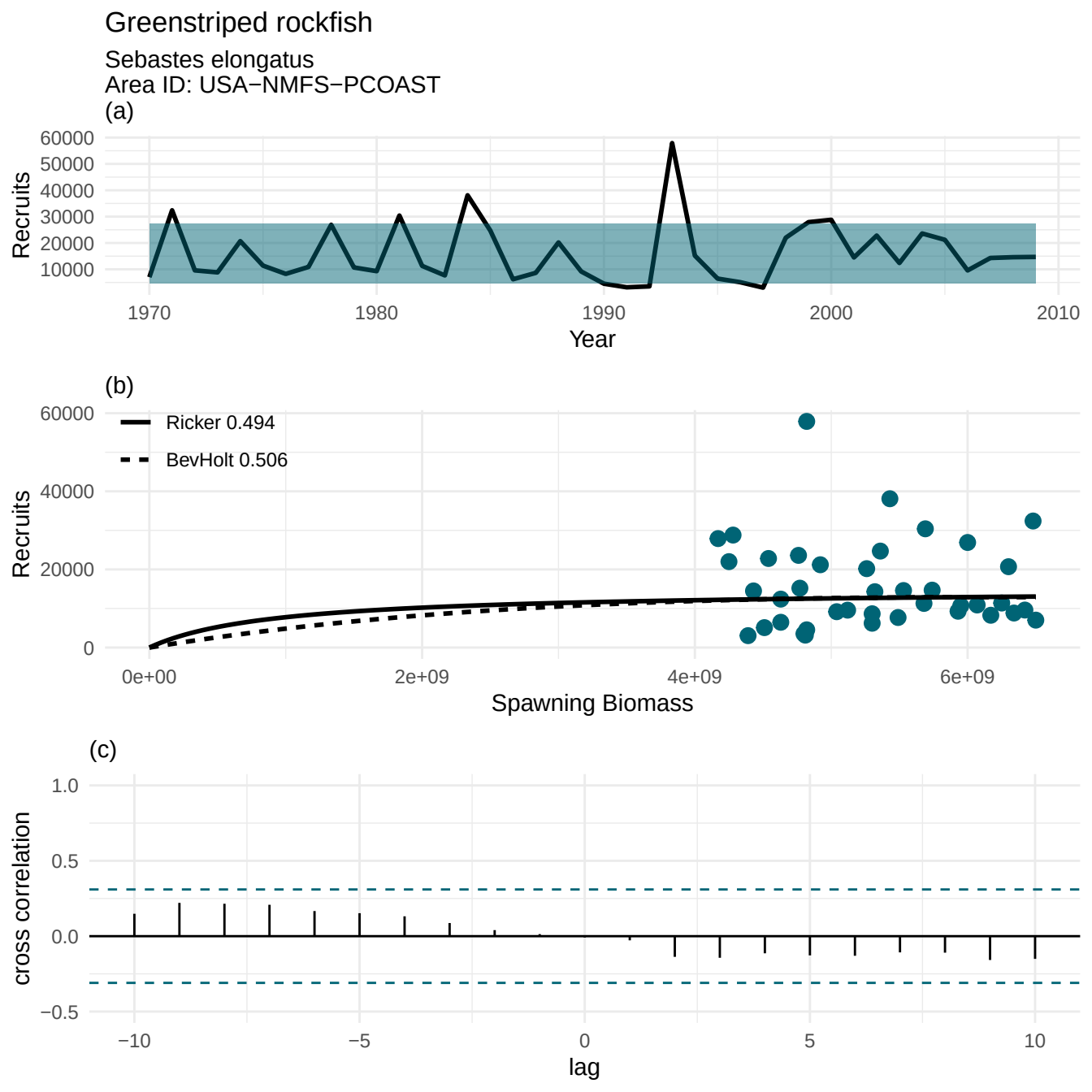

Golden redfish
Sebastes norvegicus
Area ID: multinational−ICES−I−II
(a)
Recruits
2000000
1500000
1000000
500000
0
1990
1995
2000
2005
2010
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
2000000
1500000
1000000
500000
0
0
20000
40000
60000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.52
−10
−5
0
5
10
lag

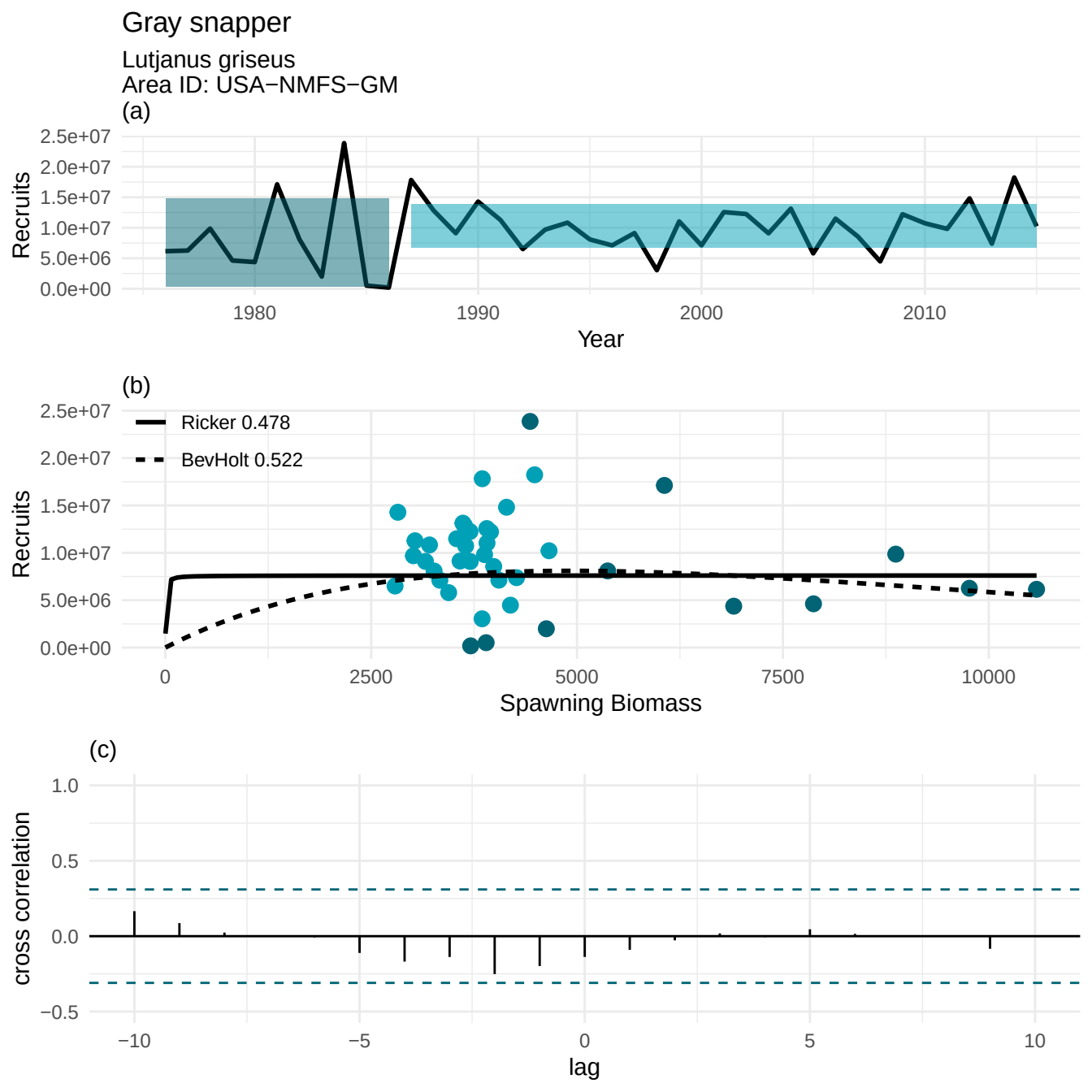

Golden redfish
Sebastes norvegicus
Area ID: multinational−ICES−V−VI−XII−XIV
(a)
Recruits
3e+08
2e+08
1e+08
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.396
BevHolt 0.604
Recruits
3e+08
2e+08
1e+08
0e+00
0e+00
1e+05
2e+05
3e+05
4e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.36
−10
−5
0
5
10
lag

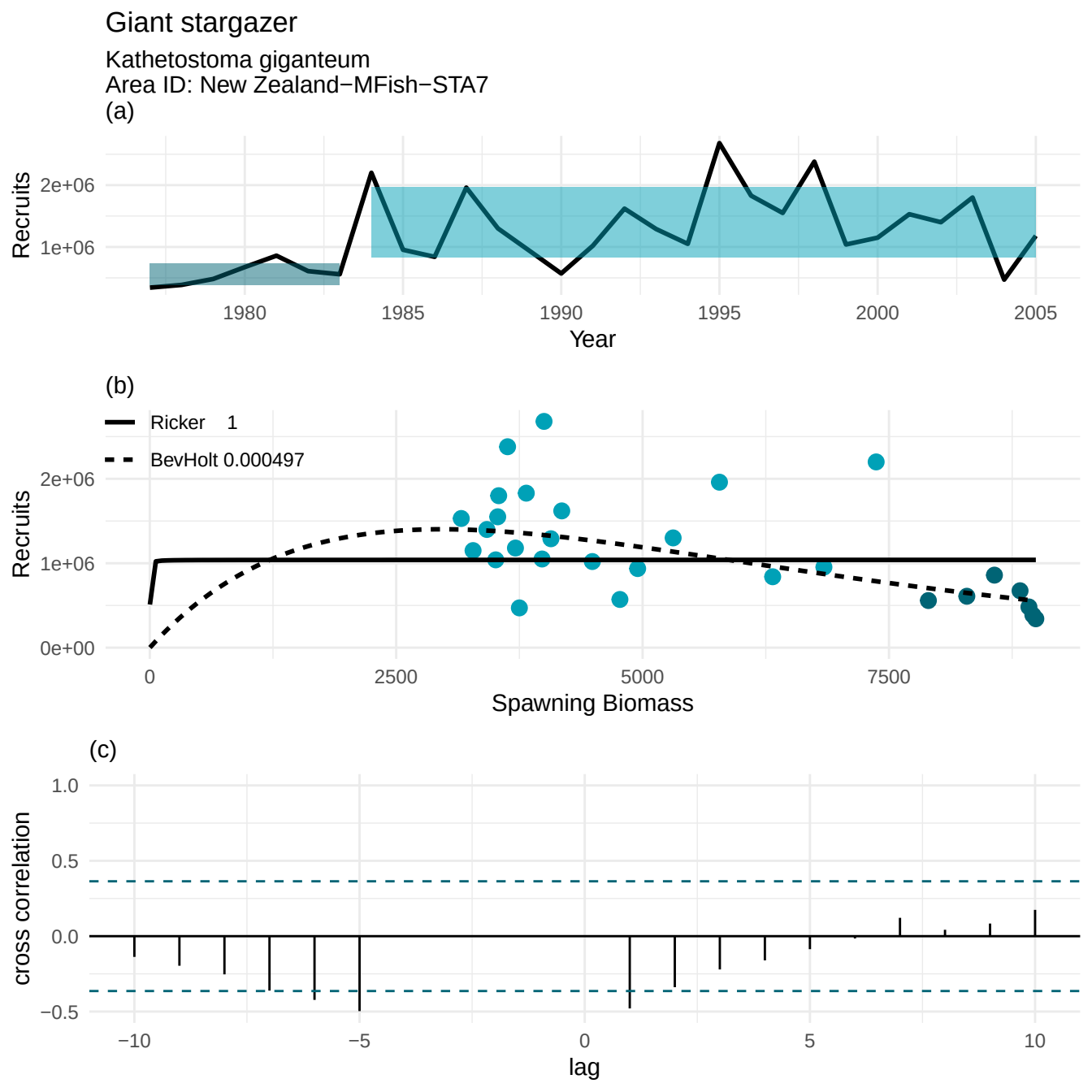

Gopher rockfish
Sebastes carnatus
Area ID: USA−NMFS−SPCOAST
(a)
Recruits
8000
6000
4000
2000
1980
1985
1990
1995
2000
Year
(b)
Ricker 0.753
BevHolt 0.247
Recruits
8000
6000
4000
2000
0
0
500
1000
1500
2000
2500
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.54
−10
−5
0
5
10
lag

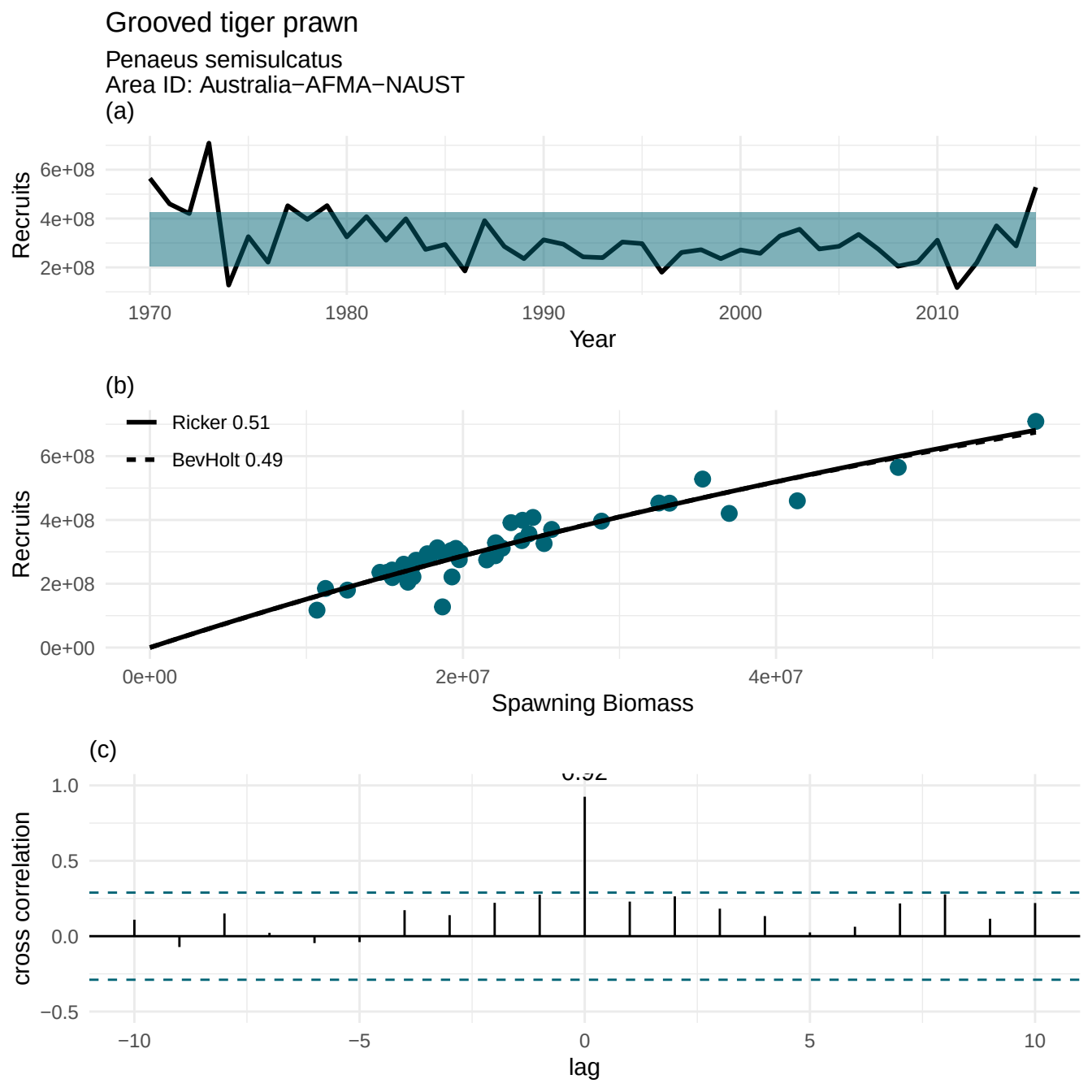

Greater amberjack
Seriola dumerili
Area ID: USA−NMFS−GM
(a)
Recruits
3e+06
2e+06
1e+06
1980
1990
2000
2010
Year
(b)
Ricker 0.648
BevHolt 0.352
Recruits
3e+06
2e+06
1e+06
0e+00
0
2500
5000
7500
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.39
0.42
−10
−5
0
5
10
lag

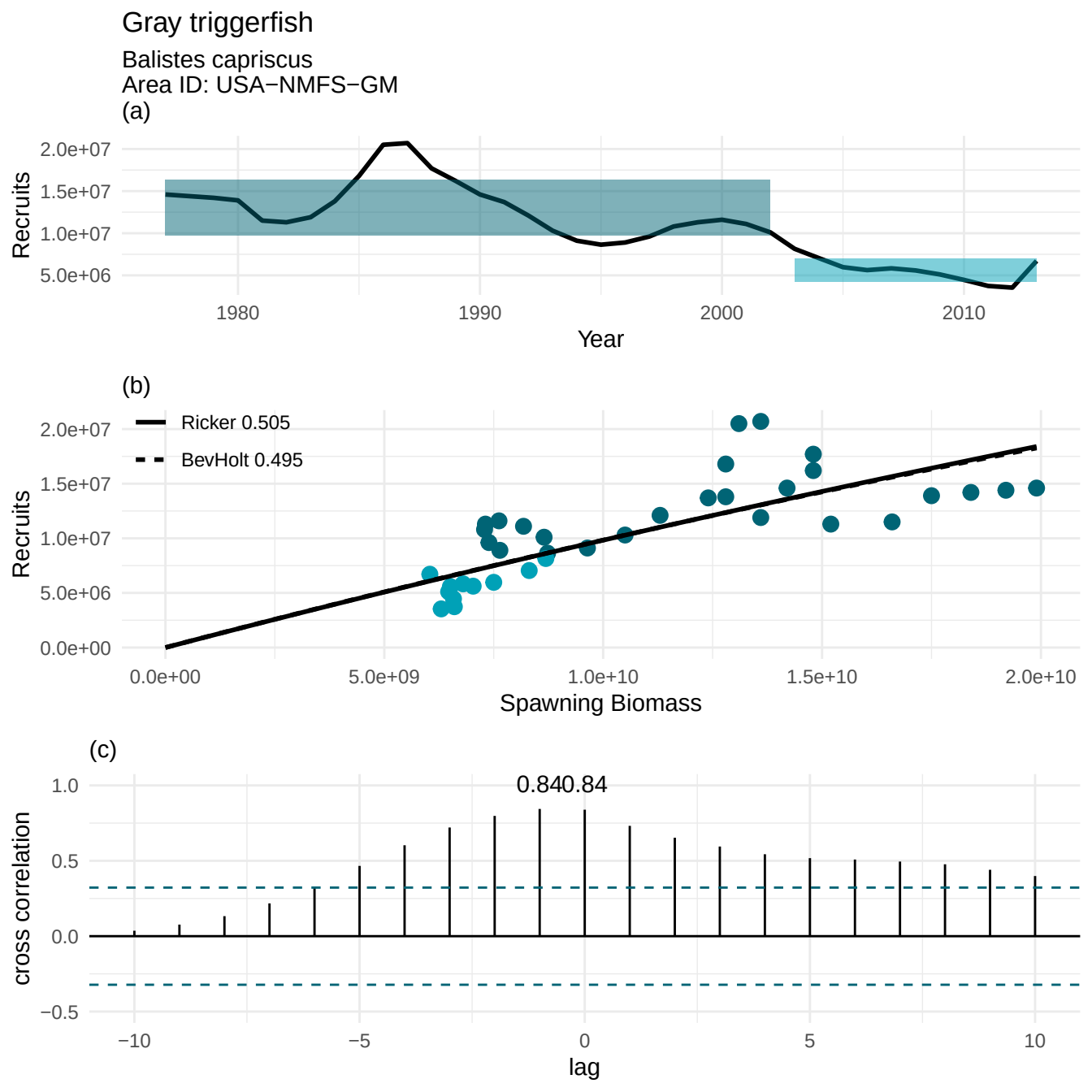

Greater amberjack
Seriola dumerili
Area ID: USA−NMFS−SATLC
(a)
Recruits
1000000
750000
500000
250000
1980
1985
1990
1995
2000
2005
Year
(b)
Ricker 0.401
BevHolt 0.599
Recruits
1000000
750000
500000
250000
0
0
1000
2000
3000
4000
5000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

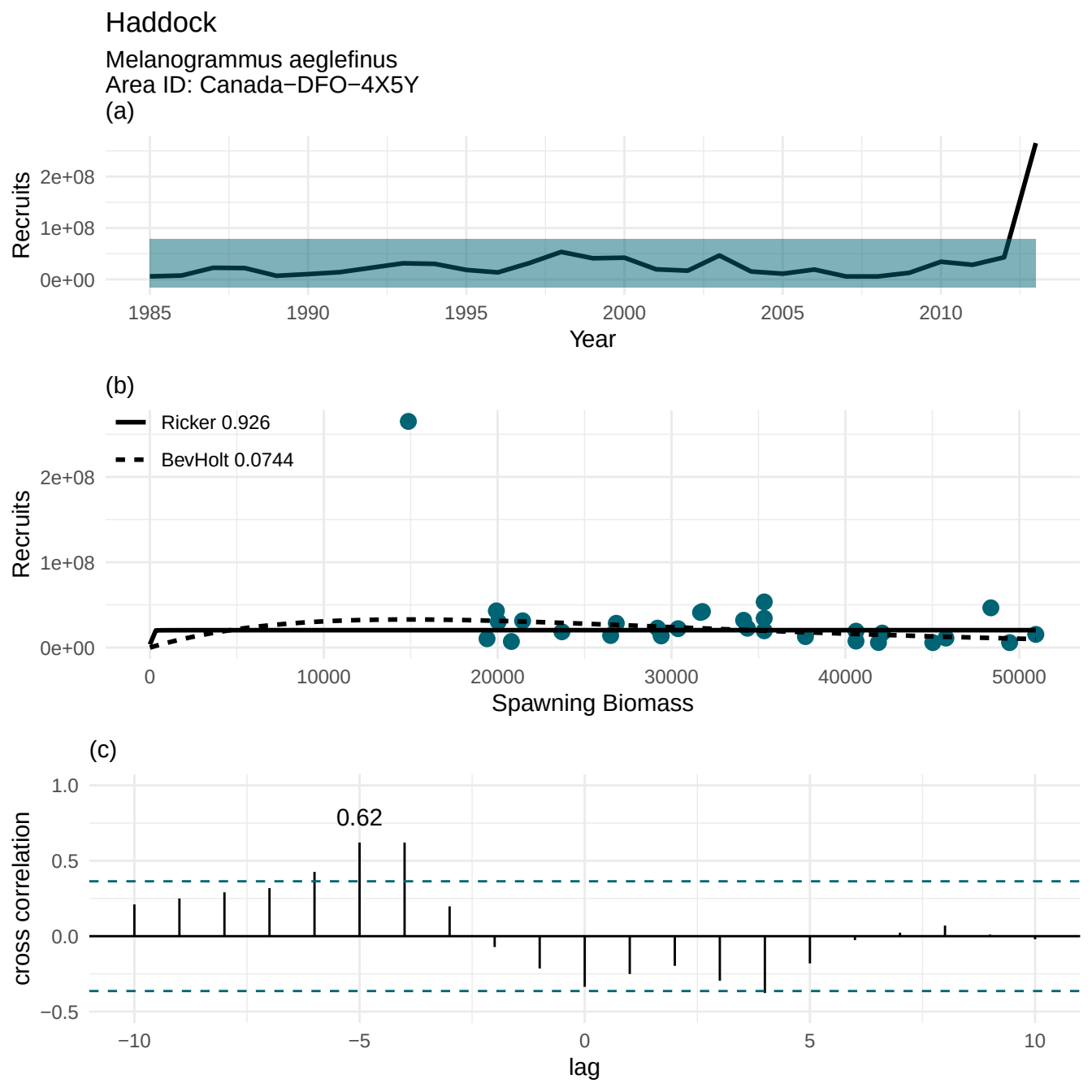

Greenstriped rockfish
Sebastes elongatus
Area ID: USA−NMFS−PCOAST
(a)
Recruits
60000
50000
40000
30000
20000
10000
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.494
BevHolt 0.506
Recruits
60000
40000
20000
0
0e+00
2e+09
4e+09
6e+09
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

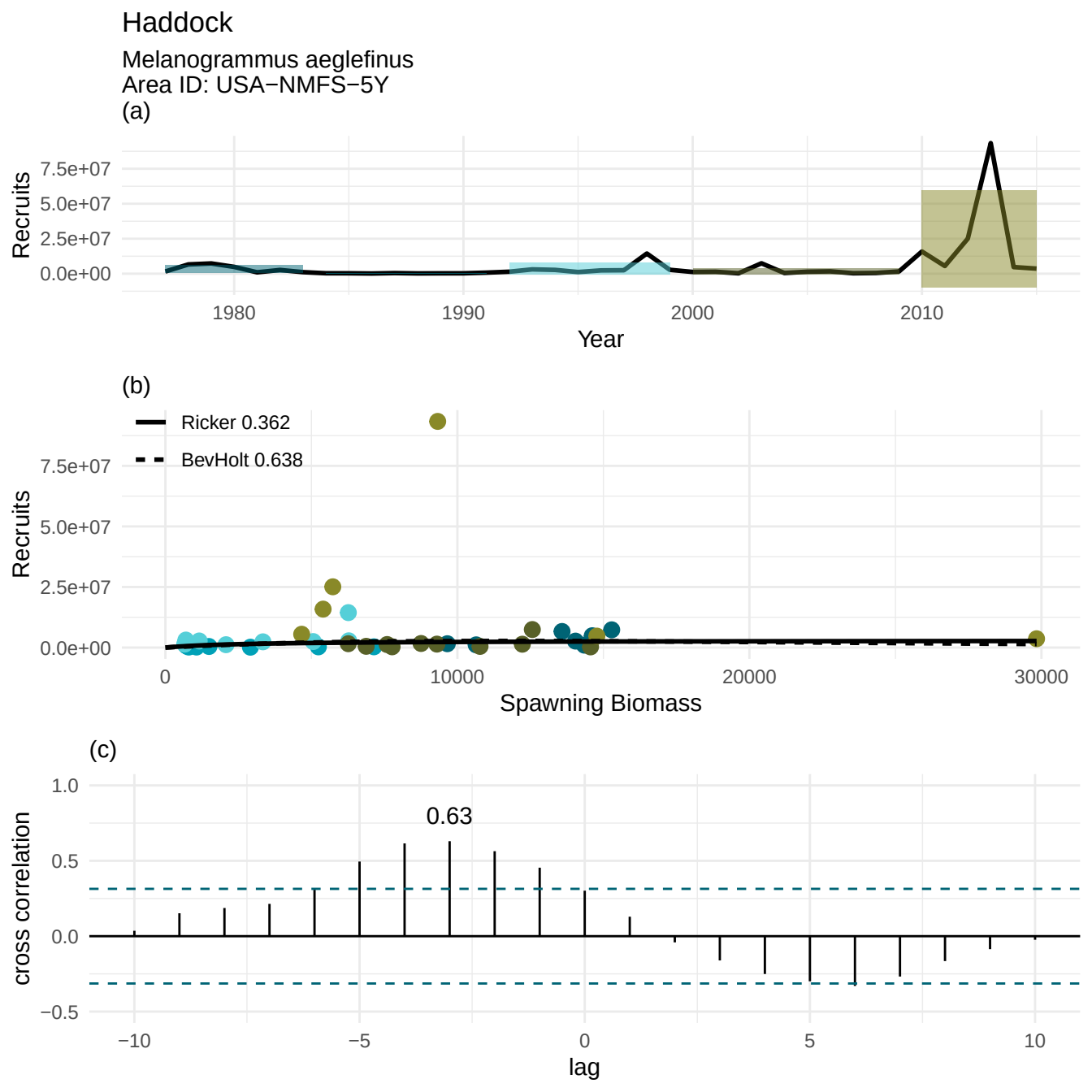

Gray snapper
Lutjanus griseus
Area ID: USA−NMFS−GM
(a)
Recruits
2.5e+07
2.0e+07
1.5e+07
1.0e+07
5.0e+06
0.0e+00
1980
1990
2000
2010
Year
(b)
Ricker 0.478
BevHolt 0.522
Recruits
0
2500
5000
7500
10000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

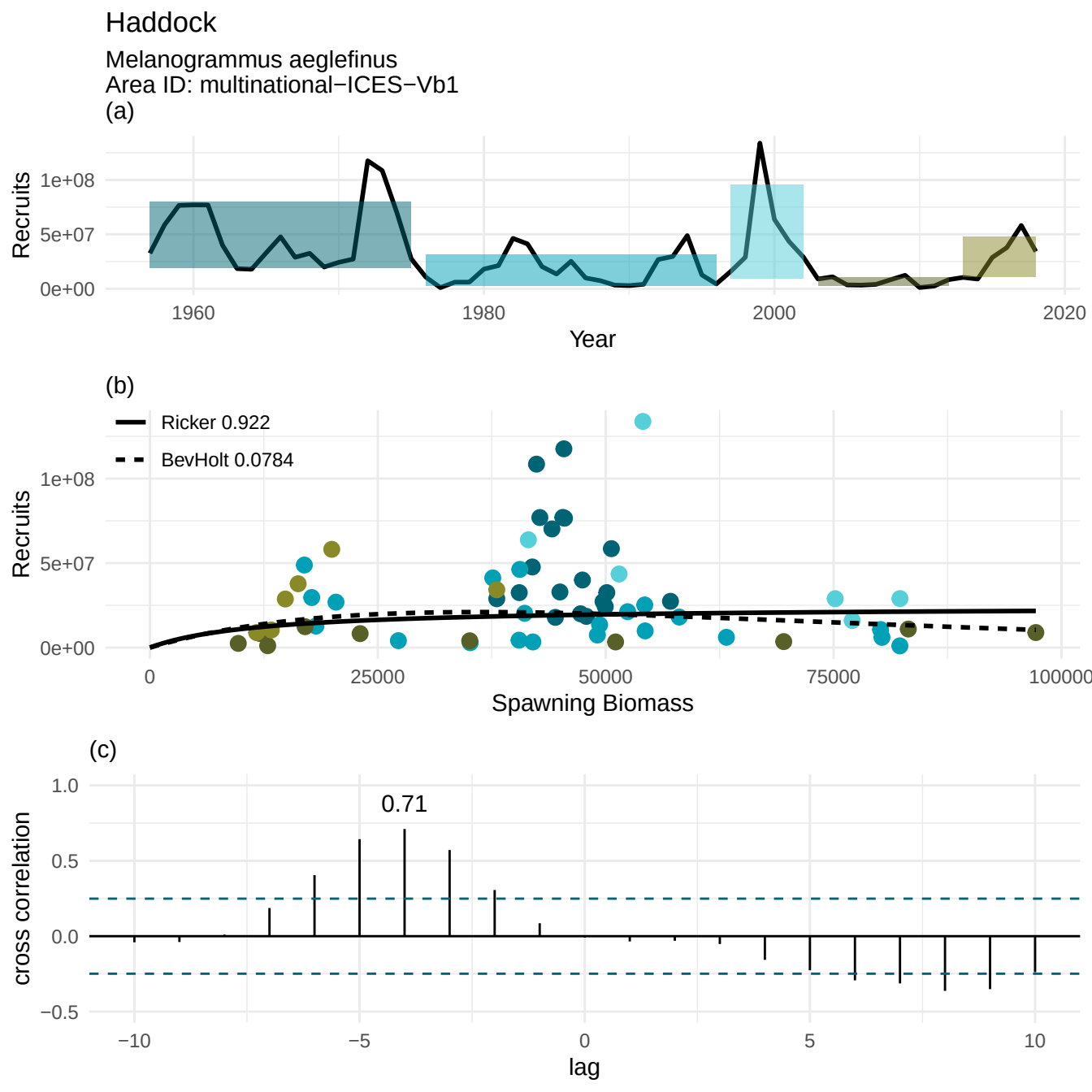

Giant stargazer
Kathetostoma giganteum
Area ID: New Zealand−MFish−STA7
(a)
Recruits
2e+06
1e+06
1980
1985
1990
1995
2000
2005
Year
(b)
Ricker 1
BevHolt 0.000497
Recruits
2e+06
1e+06
0e+00
0
2500
5000
7500
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

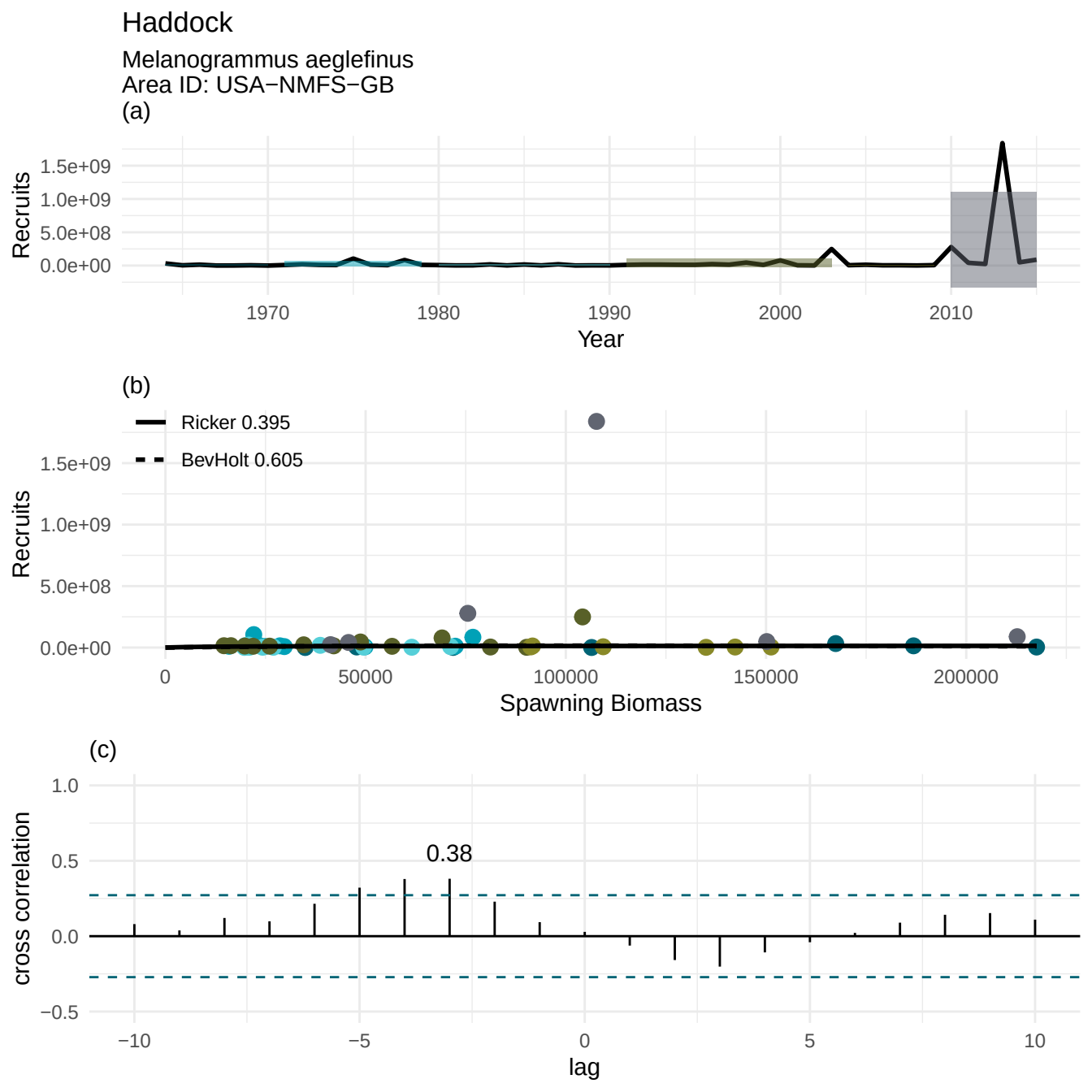

Grooved tiger prawn
Penaeus semisulcatus
Area ID: Australia−AFMA−NAUST
(a)
Recruits
6e+08
4e+08
2e+08
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.51
BevHolt 0.49
Recruits
6e+08
4e+08
2e+08
0e+00
0e+00
2e+07
4e+07
Spawning Biomass
(c)
0.92
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

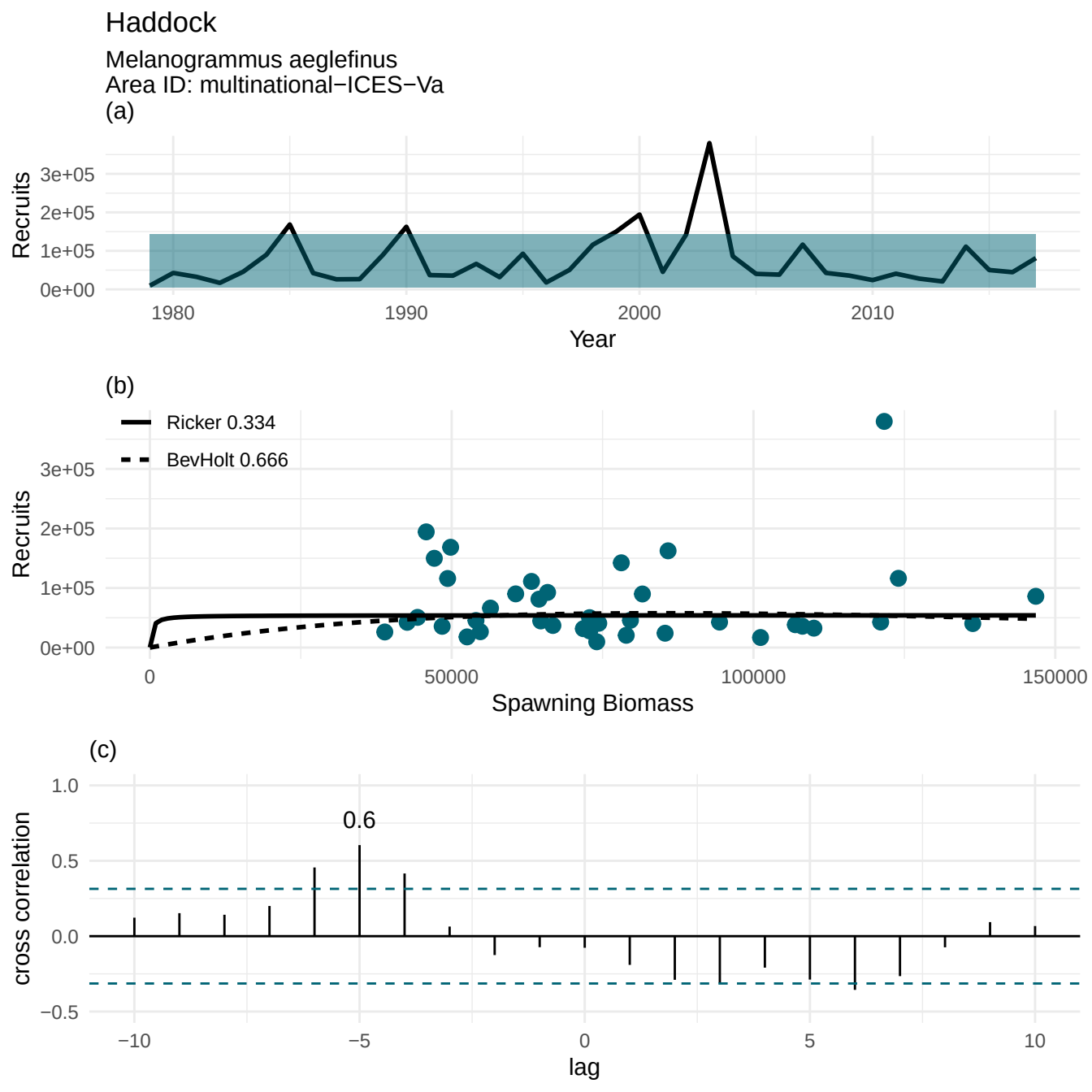

Gray triggerfish
Balistes capriscus
Area ID: USA−NMFS−GM
(a)
Recruits
2.0e+07
1.5e+07
1.0e+07
5.0e+06
1980
1990
2000
2010
Year
(b)
Ricker 0.505
BevHolt 0.495
Recruits
2.0e+07
1.5e+07
1.0e+07
5.0e+06
0.0e+00
0.0e+00
5.0e+09
1.0e+10
1.5e+10
2.0e+10
Spawning Biomass
(c)
0.840.84
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

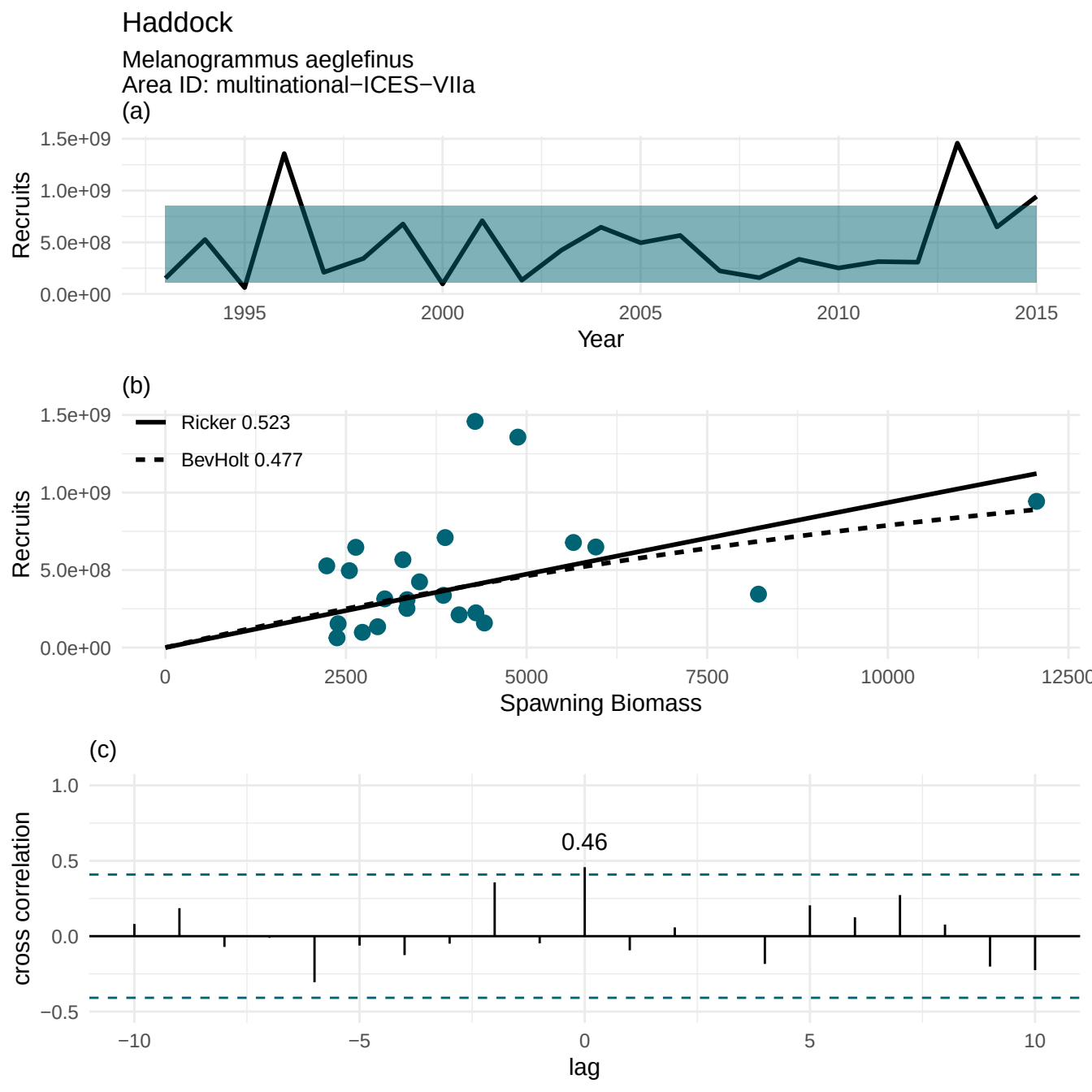

Haddock
Melanogrammus aeglefinus
Area ID: Canada−DFO−4X5Y
(a)
Recruits
2e+08
1e+08
0e+00
1985
1990
1995
2000
2005
2010
Year
(b)
Ricker 0.926
BevHolt 0.0744
Recruits
2e+08
1e+08
0e+00
0
10000
20000
30000
40000
50000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.62
−10
−5
0
5
10
lag

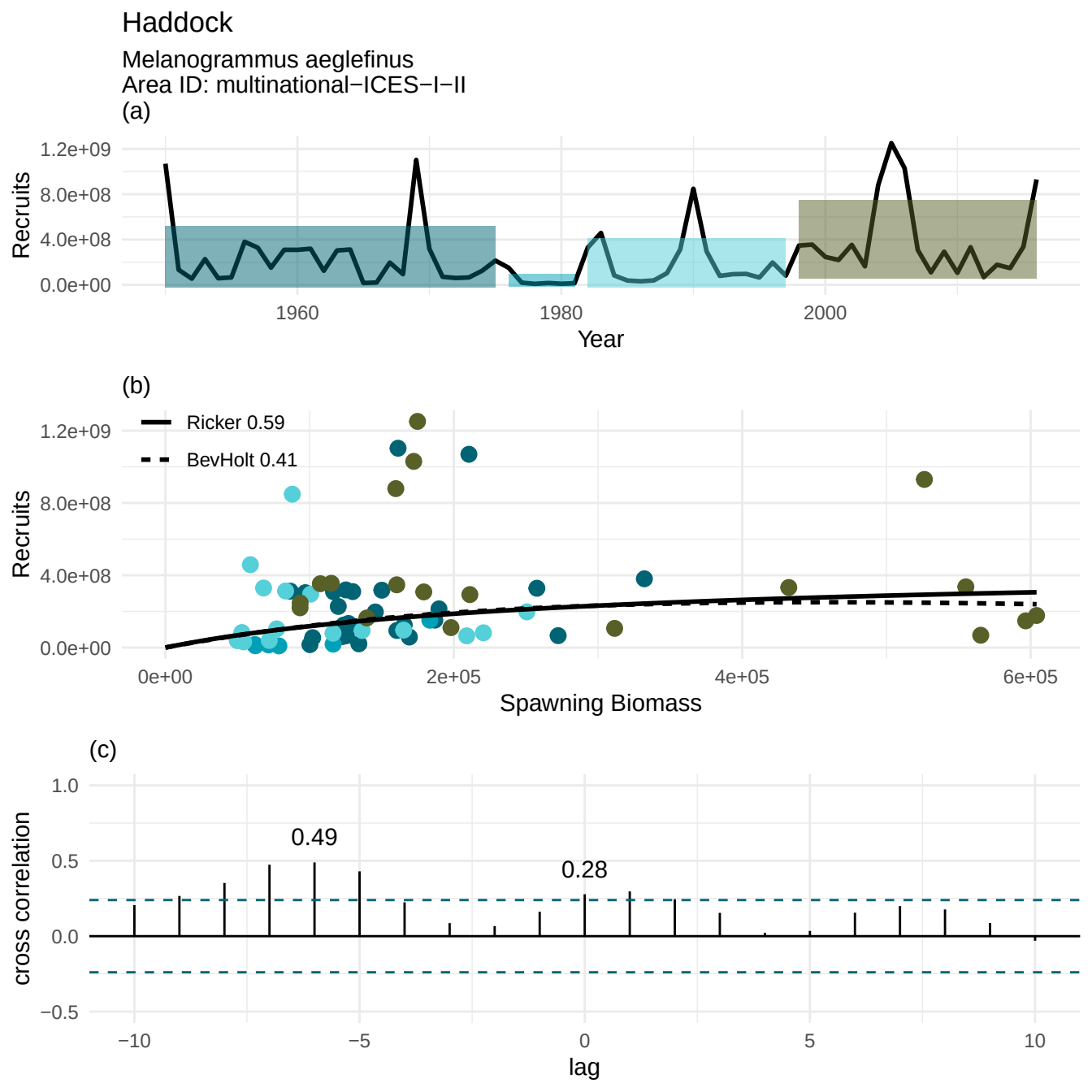

Haddock
Melanogrammus aeglefinus
Area ID: USA−NMFS−5Y
(a)
Recruits
7.5e+07
5.0e+07
2.5e+07
0.0e+00
1980
1990
2000
2010
Year
(b)
Ricker 0.362
BevHolt 0.638
Recruits
7.5e+07
5.0e+07
2.5e+07
0.0e+00
0
10000
20000
30000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.63
−10
−5
0
5
10
lag

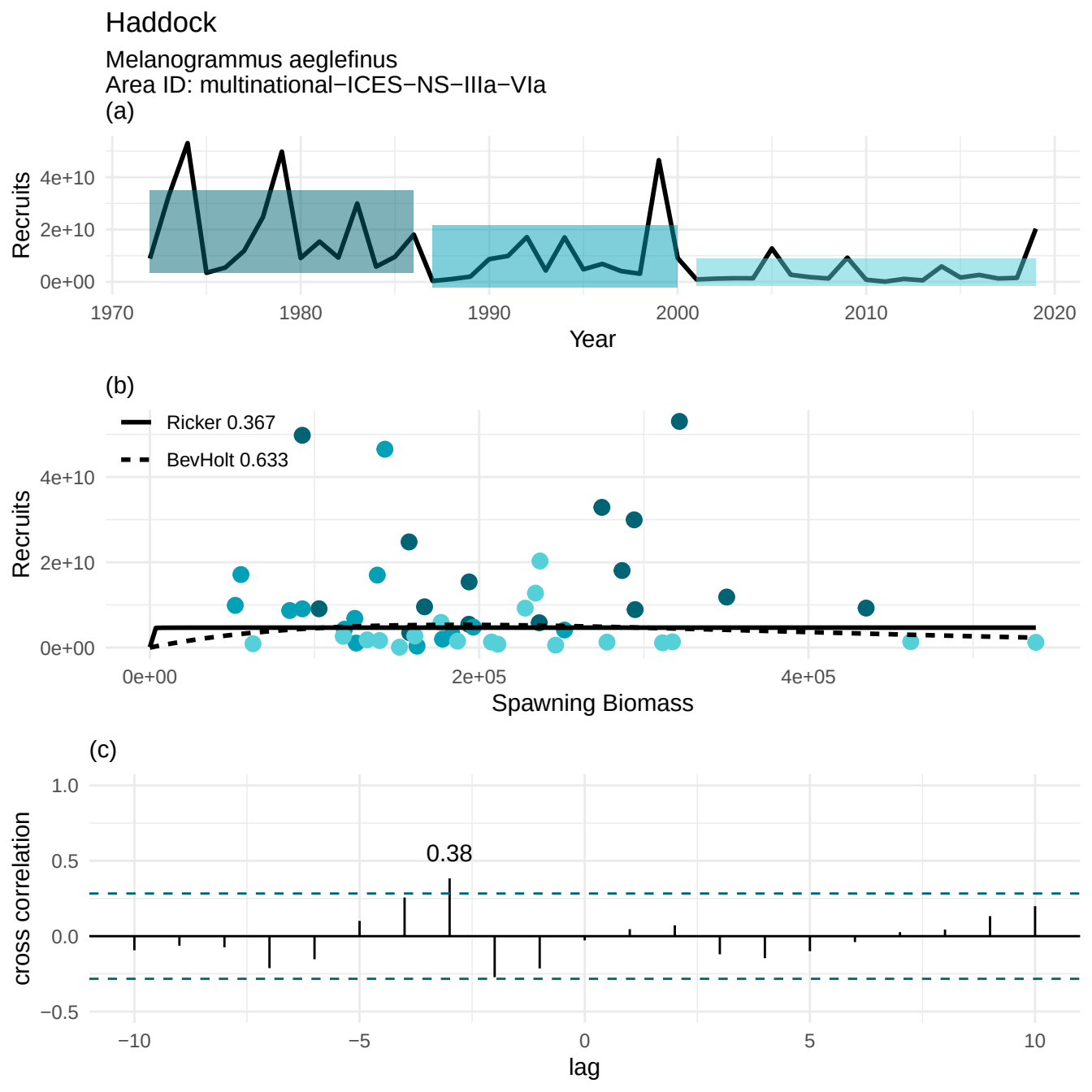

Haddock
Melanogrammus aeglefinus
Area ID: multinational−ICES−Vb1
(a)
Recruits
1e+08
5e+07
0e+00
1960
1980
2000
2020
Year
(b)
Ricker 0.922
BevHolt 0.0784
Recruits
1e+08
5e+07
0e+00
0
25000
50000
75000
100000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.71
−10
−5
0
5
10
lag

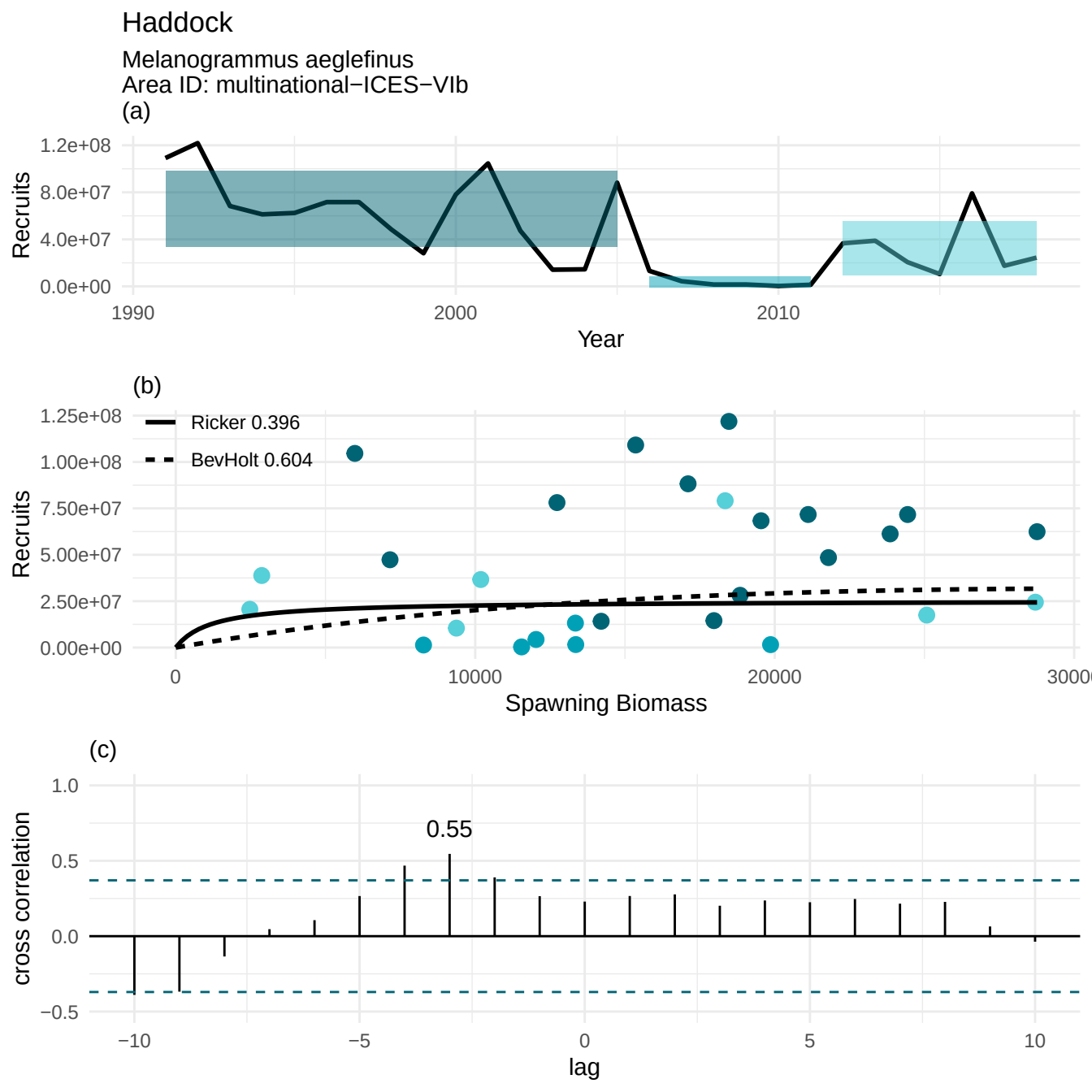

Haddock
Melanogrammus aeglefinus
Area ID: USA−NMFS−GB
(a)
Recruits
1.5e+09
1.0e+09
5.0e+08
0.0e+00
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.395
BevHolt 0.605
Recruits
1.5e+09
1.0e+09
5.0e+08
0.0e+00
0
50000
100000
150000
200000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.38
−10
−5
0
5
10
lag

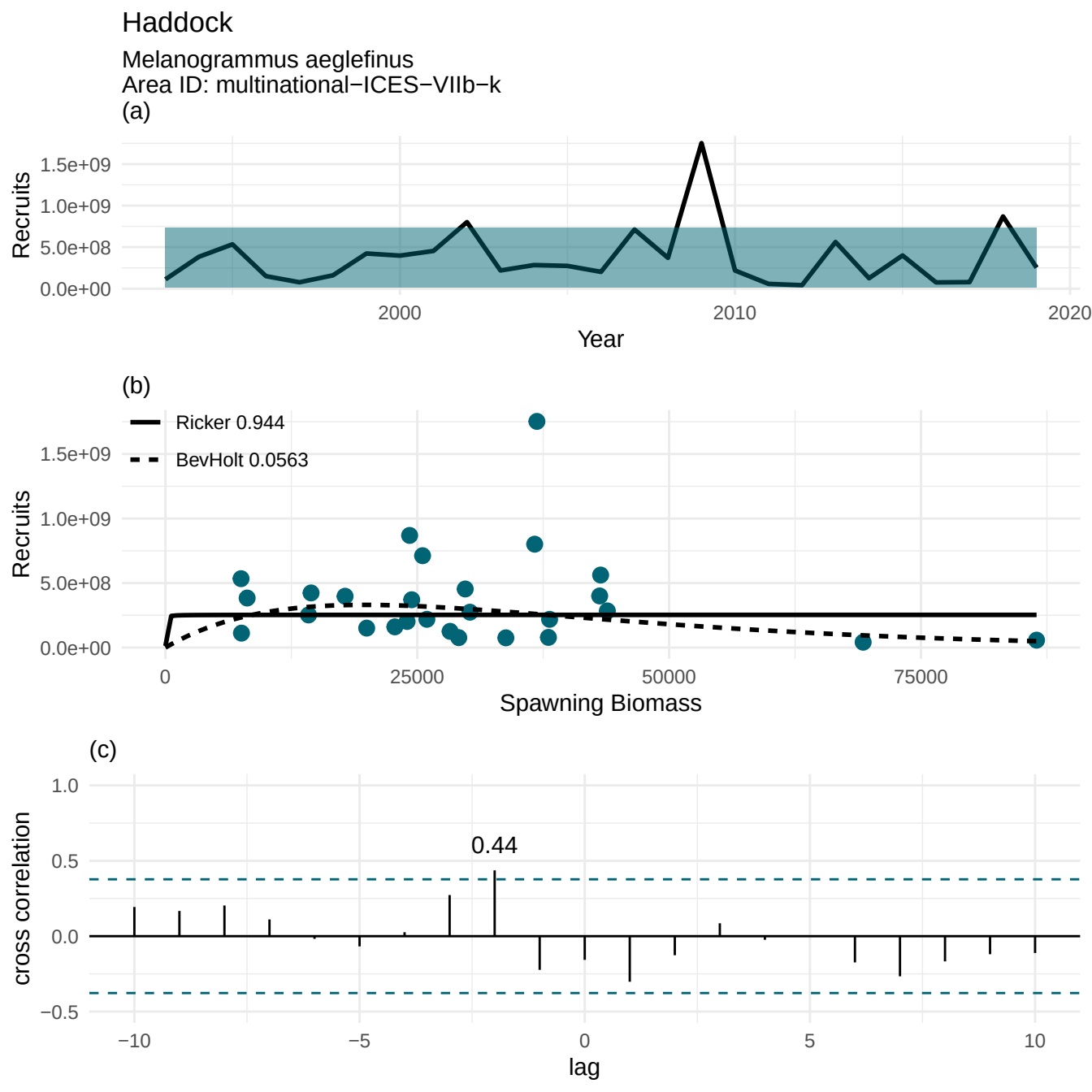

Haddock
Melanogrammus aeglefinus
Area ID: multinational−ICES−Va
(a)
Recruits
3e+05
2e+05
1e+05
0e+00
1980
1990
2000
2010
Year
(b)
Ricker 0.334
BevHolt 0.666
Recruits
3e+05
2e+05
1e+05
0e+00
0
50000
100000
150000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.6
−10
−5
0
5
10
lag

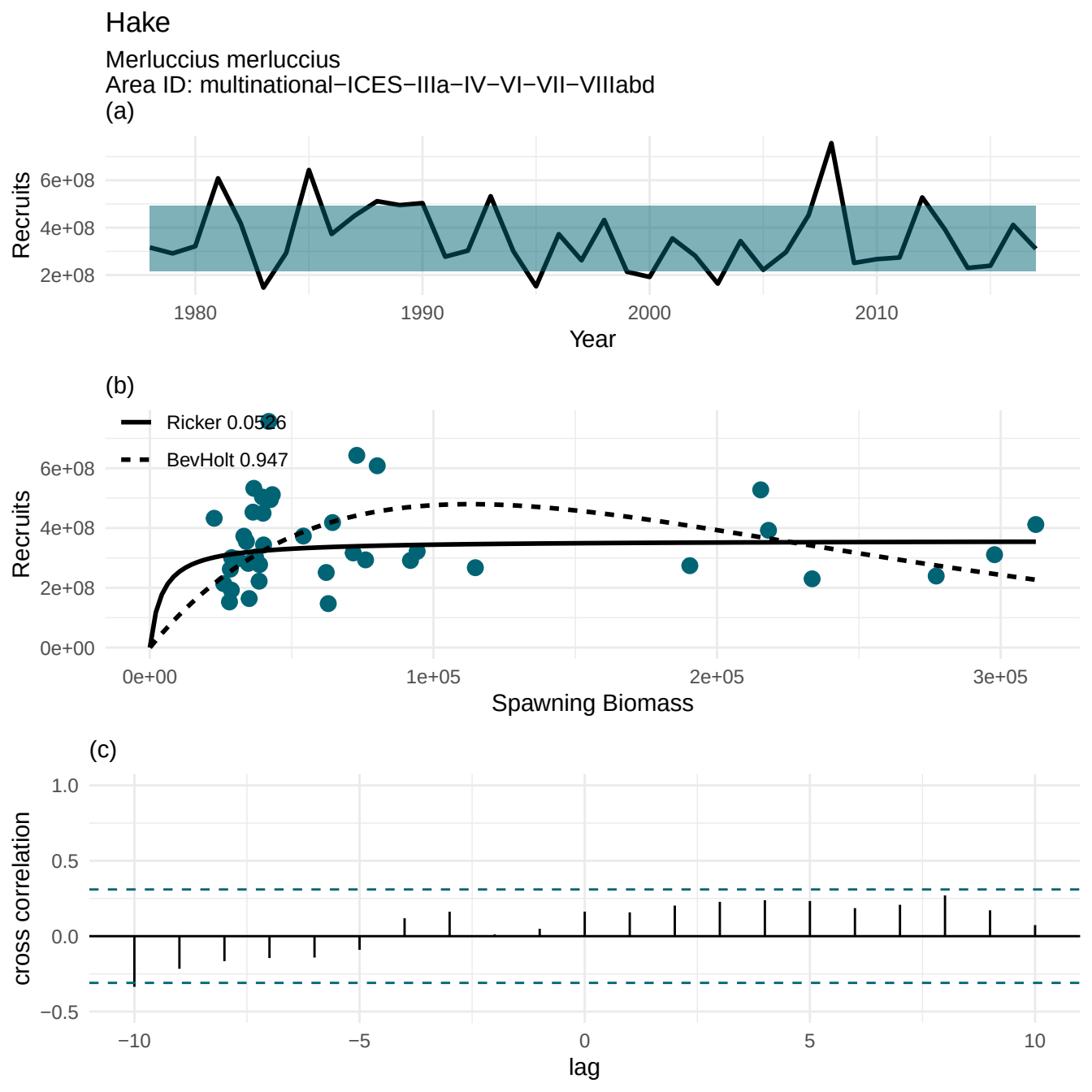

Haddock
Melanogrammus aeglefinus
Area ID: multinational−ICES−VIIa
(a)
Recruits
1.5e+09
1.0e+09
5.0e+08
0.0e+00
1995
2000
2005
2010
2015
Year
(b)
Ricker 0.523
BevHolt 0.477
Recruits
1.5e+09
1.0e+09
5.0e+08
0.0e+00
0
2500
5000
7500
10000
12500
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.46
−10
−5
0
5
10
lag

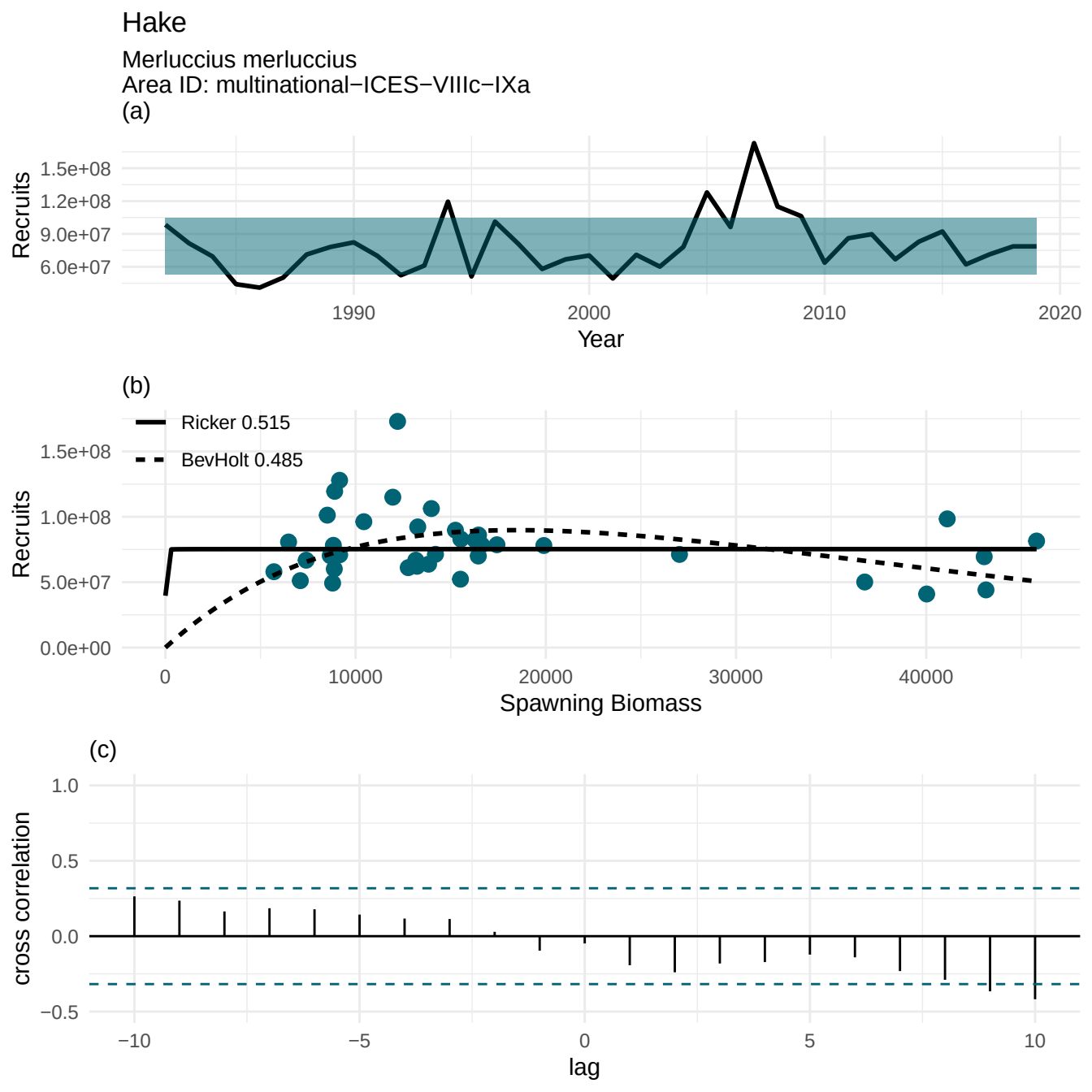

Haddock
Melanogrammus aeglefinus
Area ID: multinational−ICES−I−II
(a)
Recruits
1.2e+09
8.0e+08
4.0e+08
0.0e+00
1960
1980
2000
Year
(b)
Ricker 0.59
BevHolt 0.41
Recruits
1.2e+09
8.0e+08
4.0e+08
0.0e+00
0e+00
2e+05
4e+05
6e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.49
0.28
−10
−5
0
5
10
lag

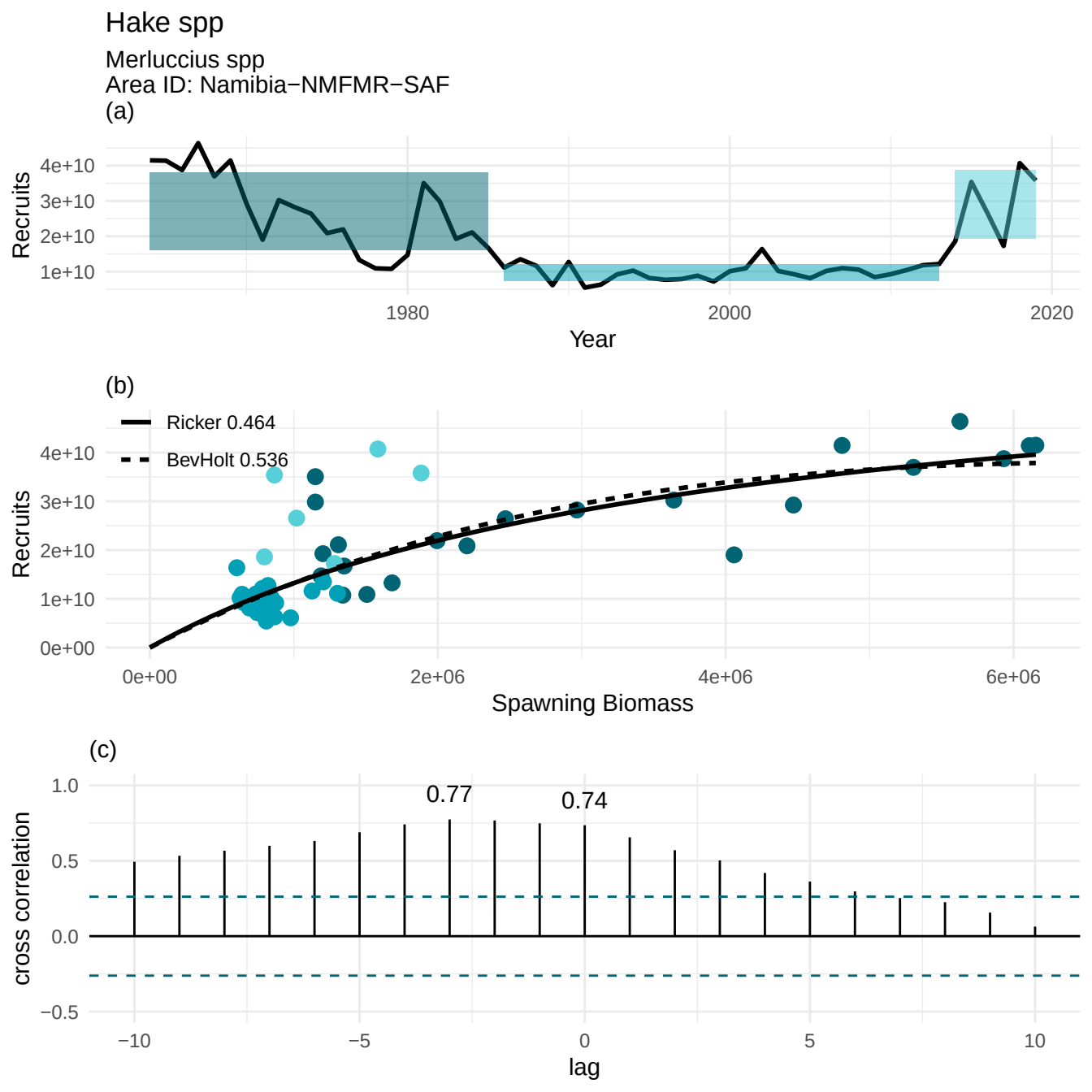

Haddock
Melanogrammus aeglefinus
Area ID: multinational−ICES−NS−IIIa−VIa
(a)
Recruits
4e+10
2e+10
0e+00
1970
1980
1990
2000
2010
2020
Year
(b)
Ricker 0.367
BevHolt 0.633
Recruits
4e+10
2e+10
0e+00
0e+00
2e+05
4e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.38
−10
−5
0
5
10
lag

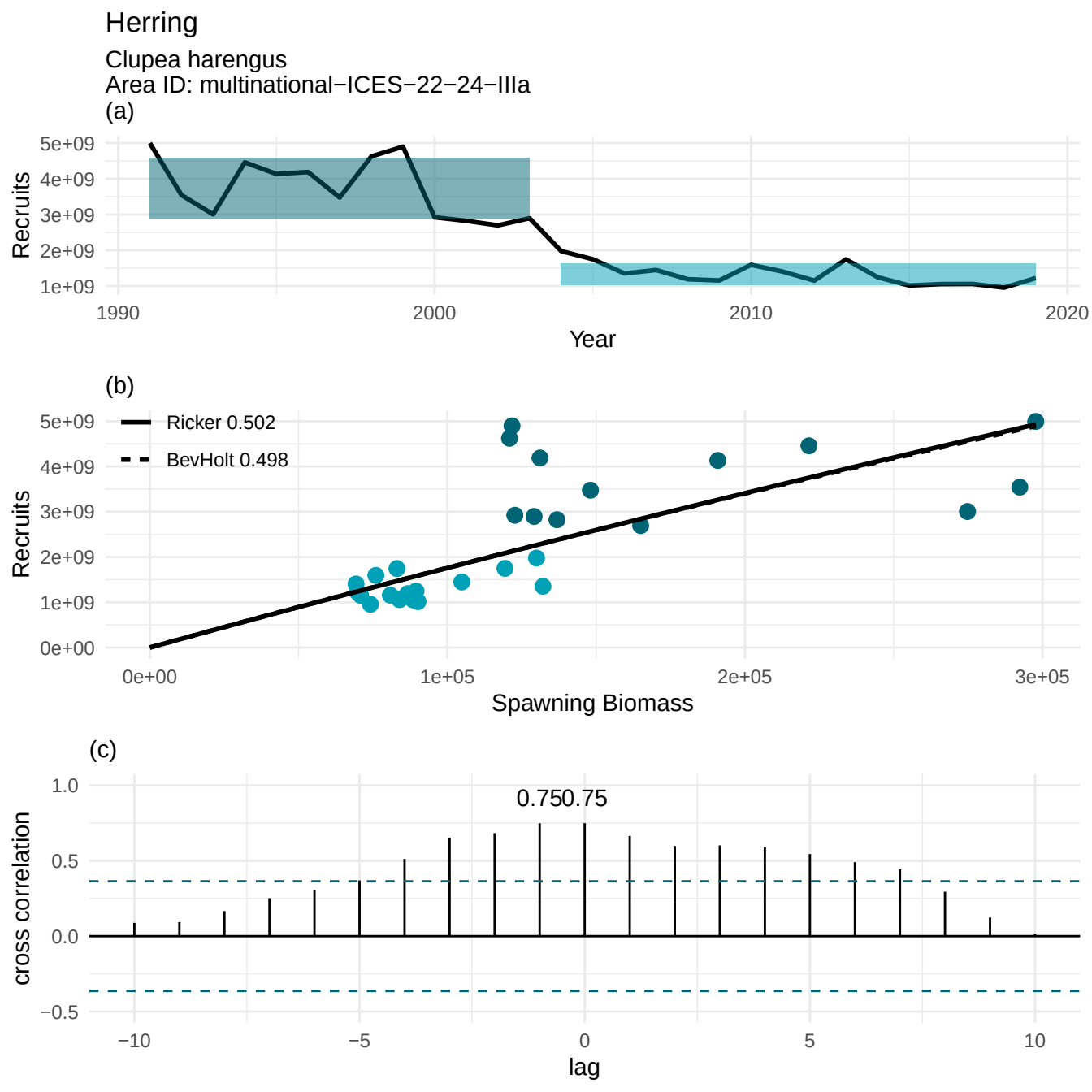

Haddock
Melanogrammus aeglefinus
Area ID: multinational−ICES−VIb
(a)
Recruits
1.2e+08
8.0e+07
4.0e+07
0.0e+00
1990
2000
2010
Year
(b)
Ricker 0.396
BevHolt 0.604
Recruits
1.25e+08
1.00e+08
7.50e+07
5.00e+07
2.50e+07
0.00e+00
0
10000
20000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.55
−10
−5
0
5
10
lag

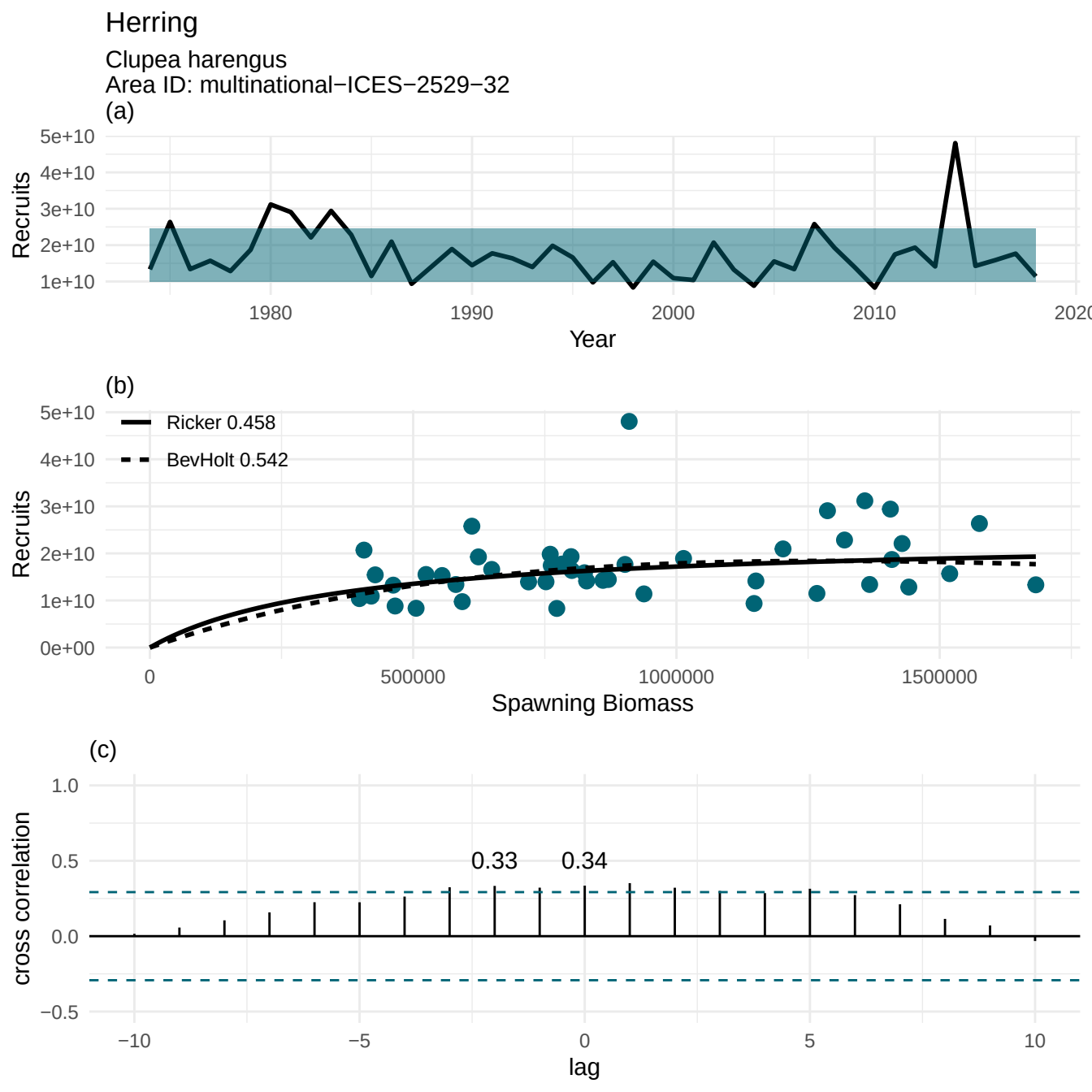

Haddock
Melanogrammus aeglefinus
Area ID: multinational−ICES−VIIb−k
(a)
Recruits
1.5e+09
1.0e+09
5.0e+08
0.0e+00
2000
2010
2020
Year
(b)
Ricker 0.944
BevHolt 0.0563
Recruits
1.5e+09
1.0e+09
5.0e+08
0.0e+00
0
25000
50000
75000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.44
−10
−5
0
5
10
lag

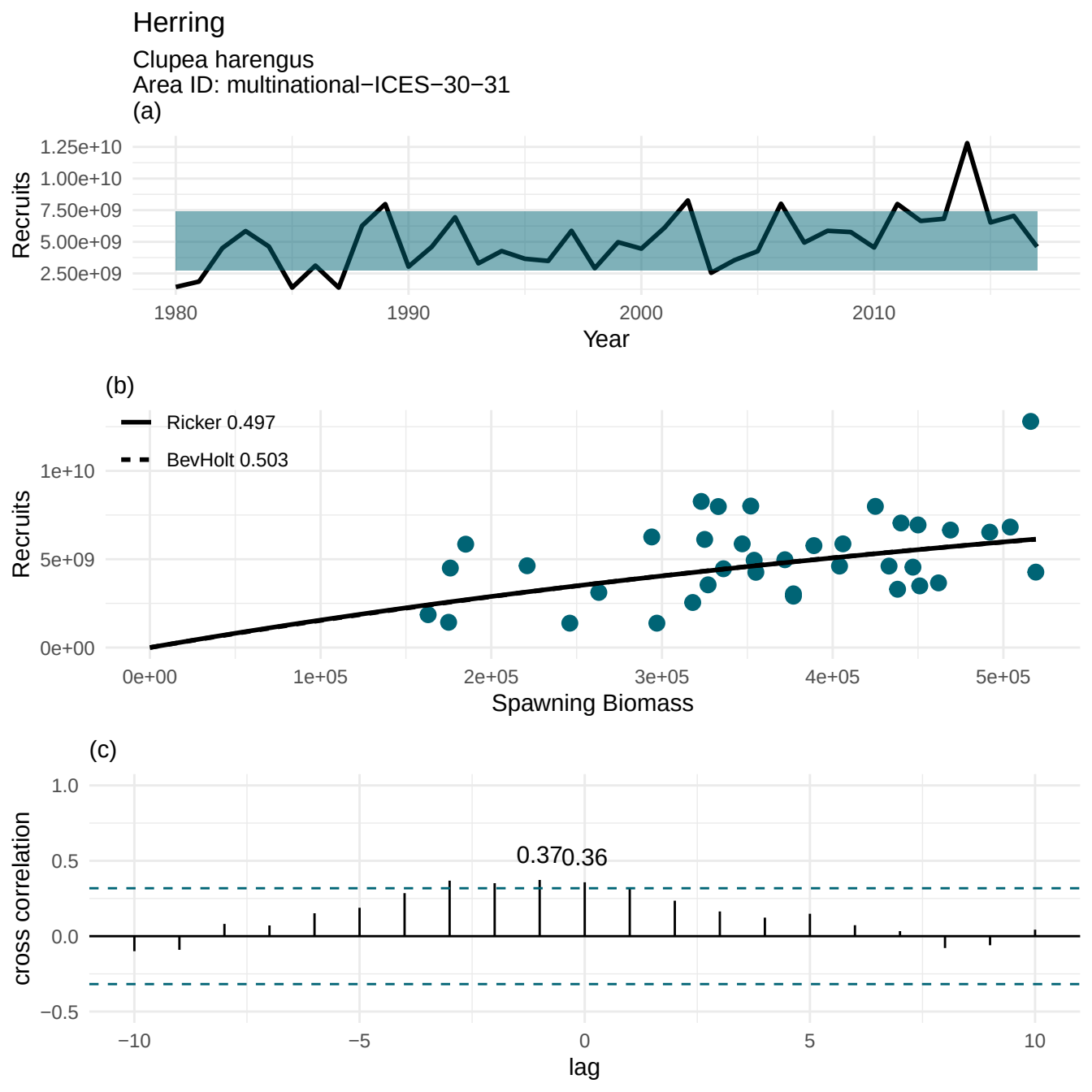

Hake
Merluccius merluccius
Area ID: multinational−ICES−IIIa−IV−VI−VII−VIIIabd
(a)
Recruits
6e+08
4e+08
2e+08
1980
1990
2000
2010
Year
(b)
Ricker 0.0526
BevHolt 0.947
Recruits
6e+08
4e+08
2e+08
0e+00
0e+00
1e+05
2e+05
3e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

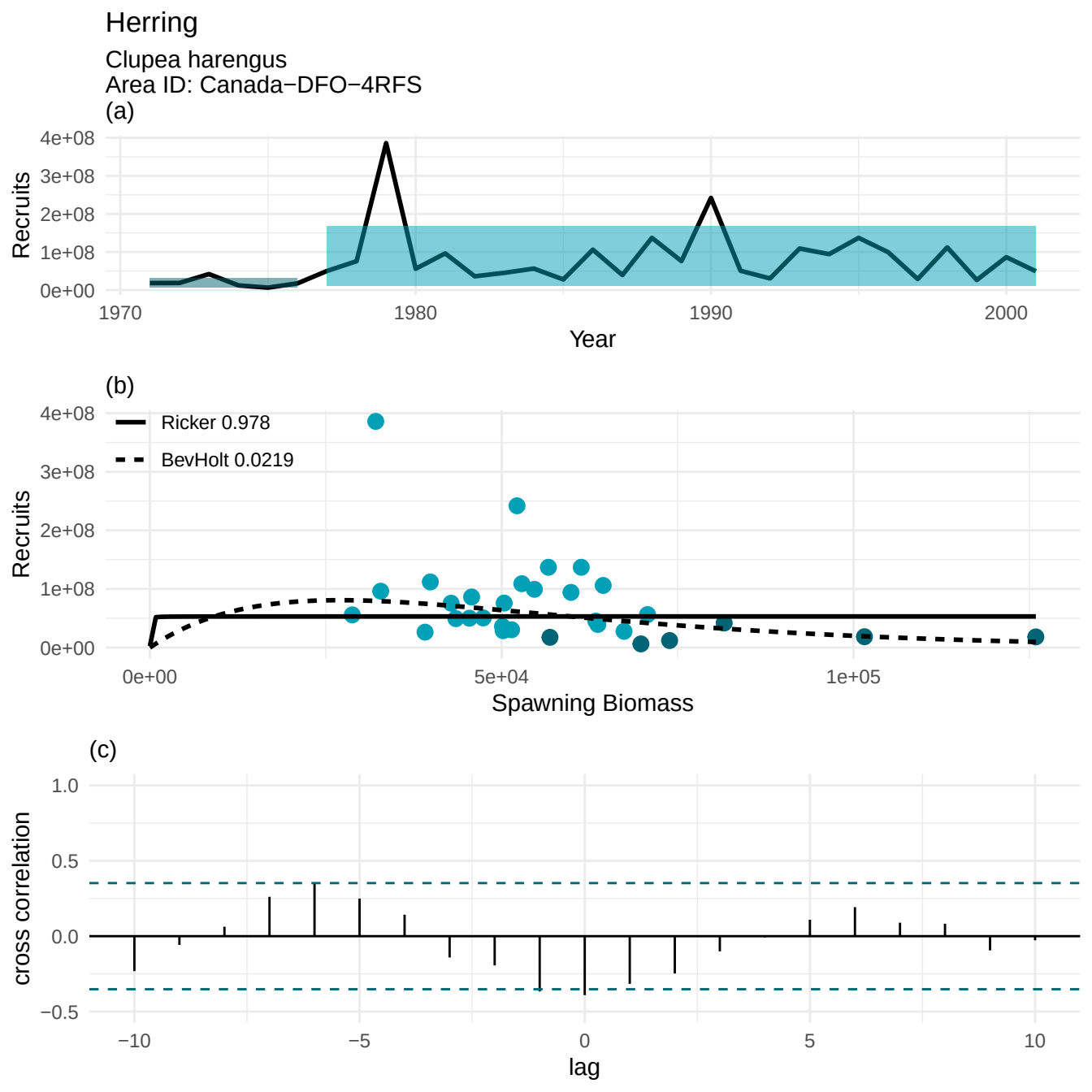

Hake
Merluccius merluccius
Area ID: multinational−ICES−VIIIc−IXa
(a)
Recruits
1.5e+08
1.2e+08
9.0e+07
6.0e+07
1990
2000
2010
2020
Year
(b)
Ricker 0.515
BevHolt 0.485
Recruits
1.5e+08
1.0e+08
5.0e+07
0.0e+00
0
10000
20000
30000
40000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

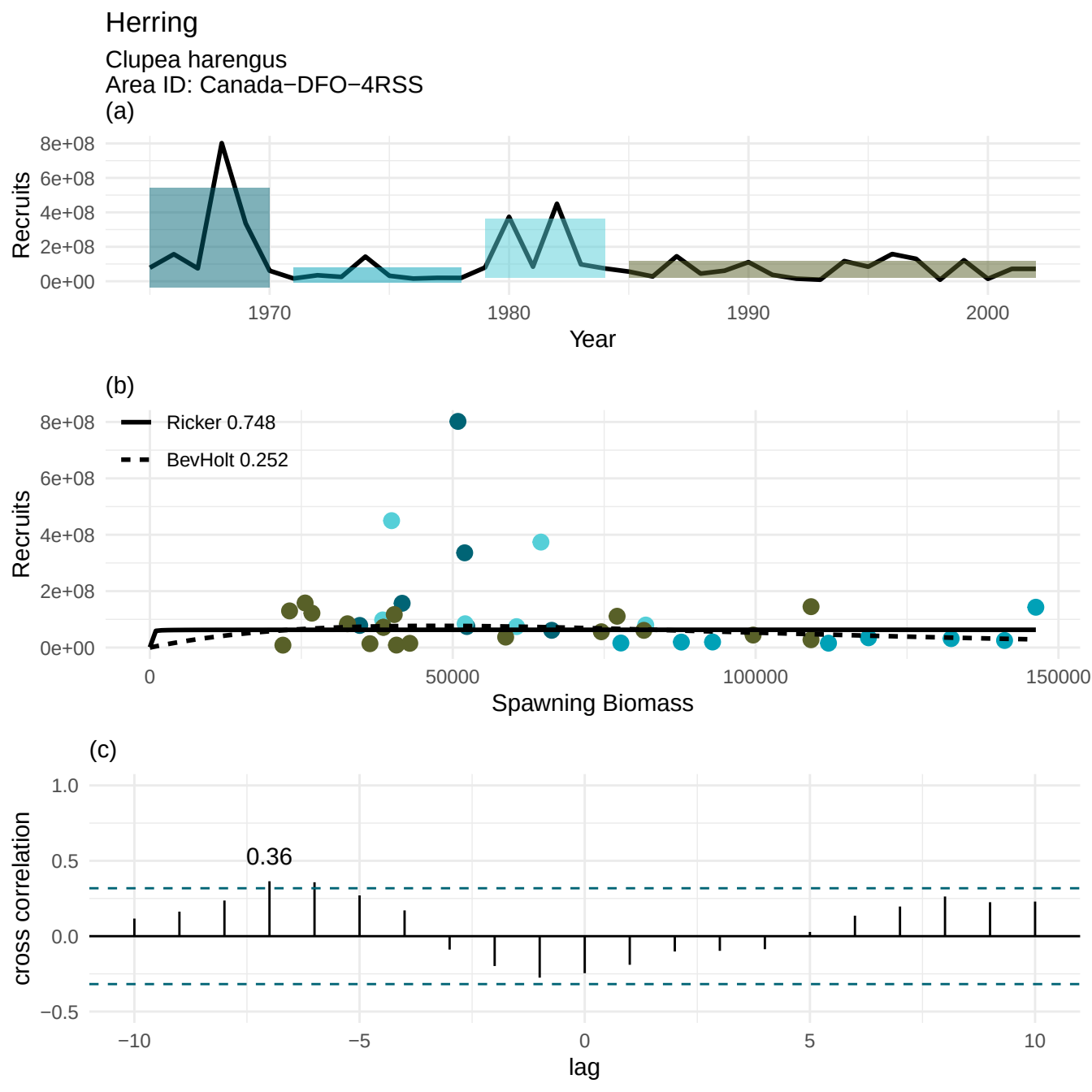

Hake spp
Merluccius spp
Area ID: Namibia−NMFMR−SAF
(a)
Recruits
4e+10
3e+10
2e+10
1e+10
1980
2000
2020
Year
(b)
Ricker 0.464
BevHolt 0.536
Recruits
4e+10
3e+10
2e+10
1e+10
0e+00
0e+00
2e+06
4e+06
6e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.77
0.74
−10
−5
0
5
10
lag

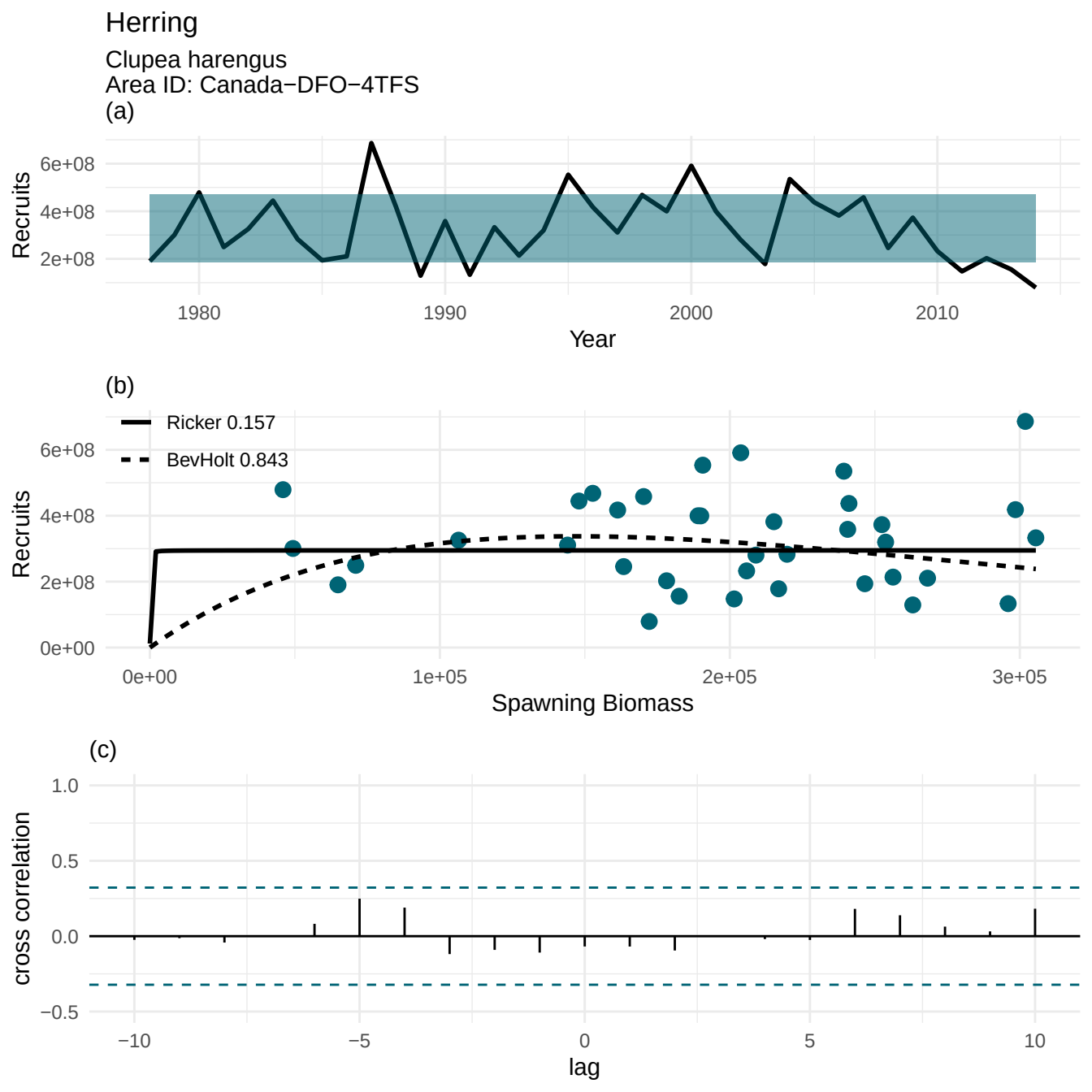

Herring
Clupea harengus
Area ID: multinational−ICES−22−24−IIIa
(a)
Recruits
5e+09
4e+09
3e+09
2e+09
1e+09
1990
2000
2010
2020
Year
(b)
Ricker 0.502
BevHolt 0.498
Recruits
5e+09
4e+09
3e+09
2e+09
1e+09
0e+00
0e+00
1e+05
2e+05
3e+05
Spawning Biomass
(c)
0.750.75
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

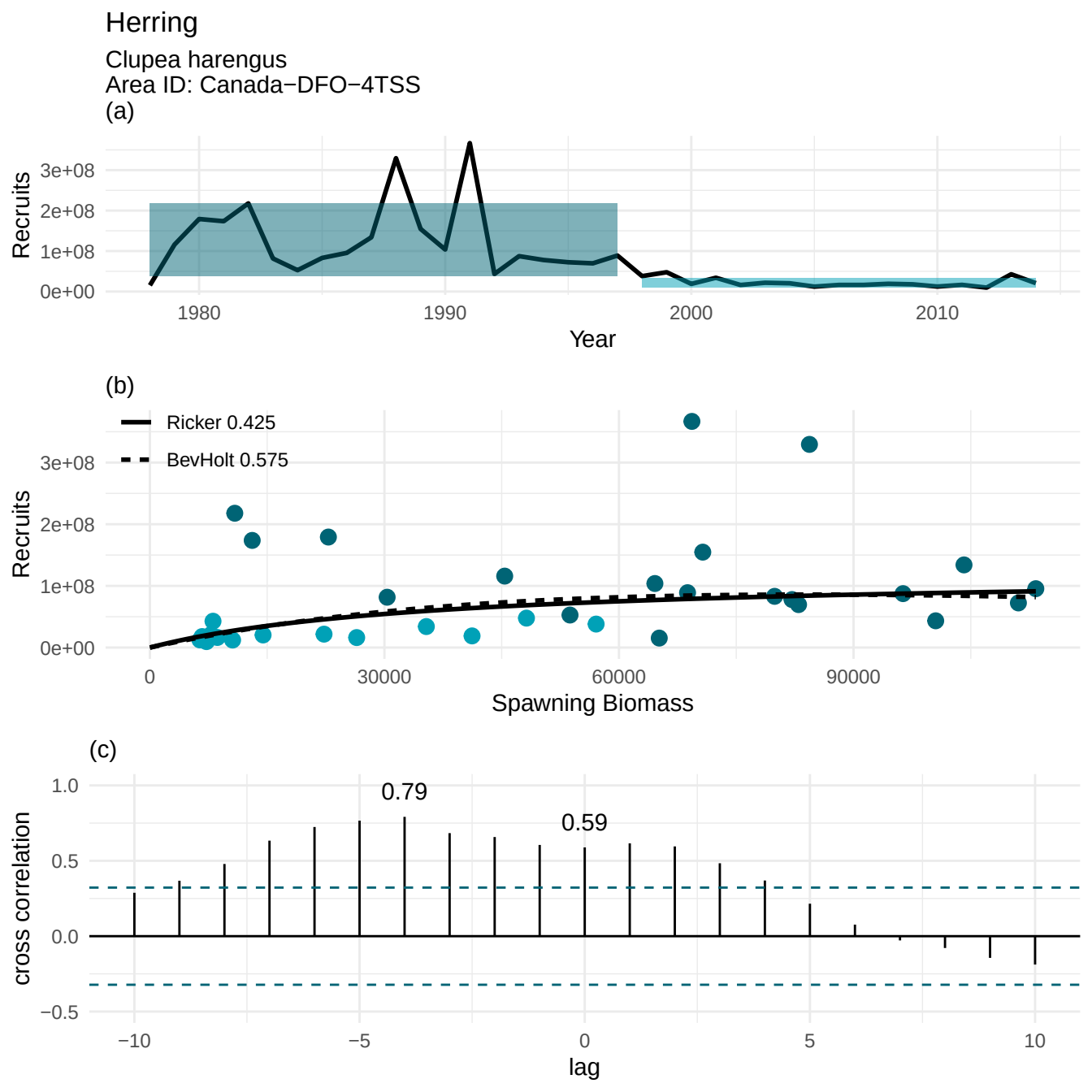

Herring
Clupea harengus
Area ID: multinational−ICES−2529−32
(a)
Recruits
5e+10
4e+10
3e+10
2e+10
1e+10
1980
1990
2000
2010
2020
Year
(b)
Ricker 0.458
BevHolt 0.542
Recruits
5e+10
4e+10
3e+10
2e+10
1e+10
0e+00
0
500000
1000000
1500000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.33
0.34
−10
−5
0
5
10
lag

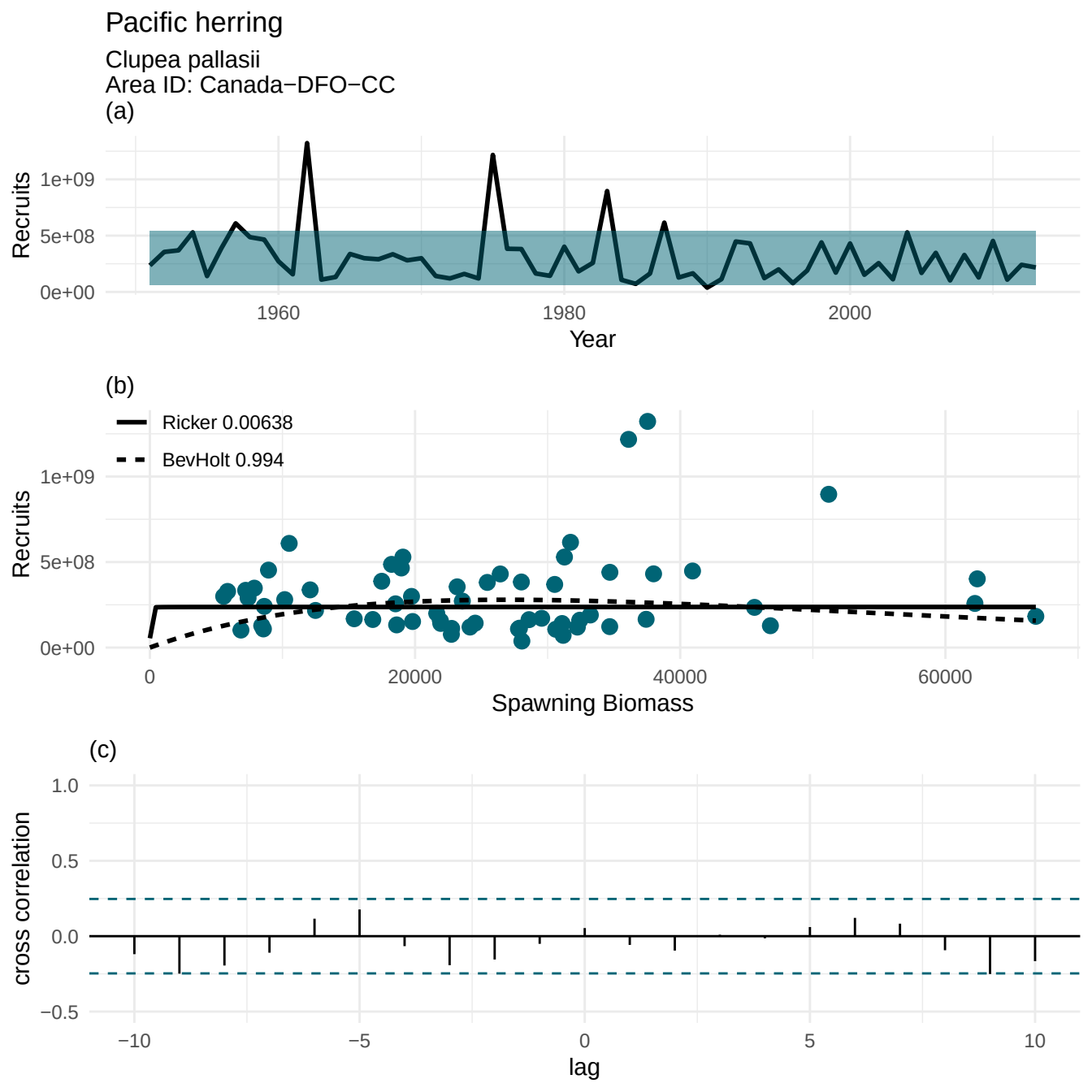

Herring
Clupea harengus
Area ID: multinational−ICES−30−31
(a)
Recruits
1.25e+10
1.00e+10
7.50e+09
5.00e+09
2.50e+09
1980
1990
2000
2010
Year
(b)
Ricker 0.497
BevHolt 0.503
Recruits
1e+10
5e+09
0e+00
0e+00
1e+05
2e+05
3e+05
4e+05
5e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.37
0.36
−10
−5
0
5
10
lag

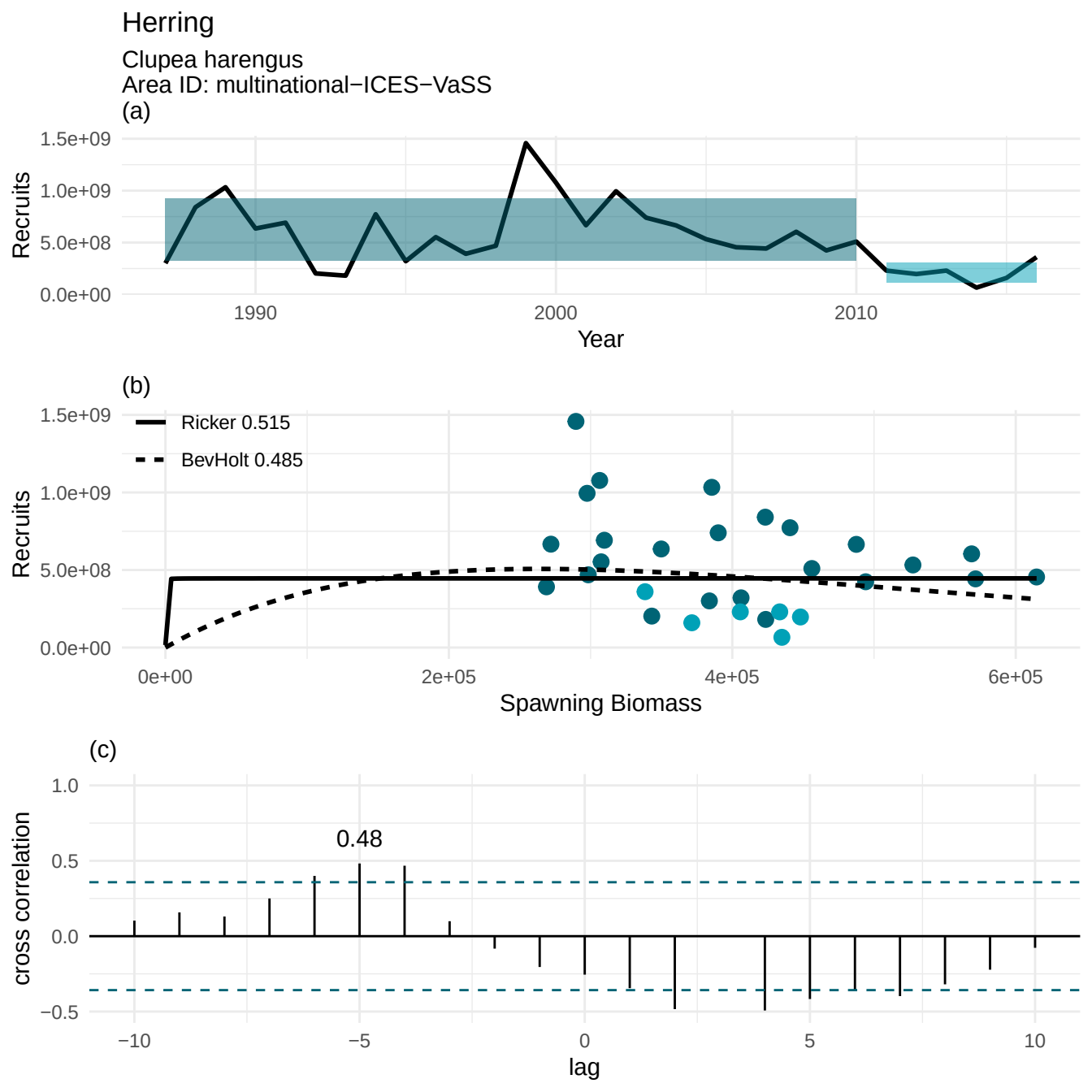

Herring
Clupea harengus
Area ID: Canada−DFO−4RFS
(a)
Recruits
4e+08
3e+08
2e+08
1e+08
0e+00
1970
1980
1990
2000
Year
(b)
Ricker 0.978
BevHolt 0.0219
Recruits
4e+08
3e+08
2e+08
1e+08
0e+00
0e+00
5e+04
1e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

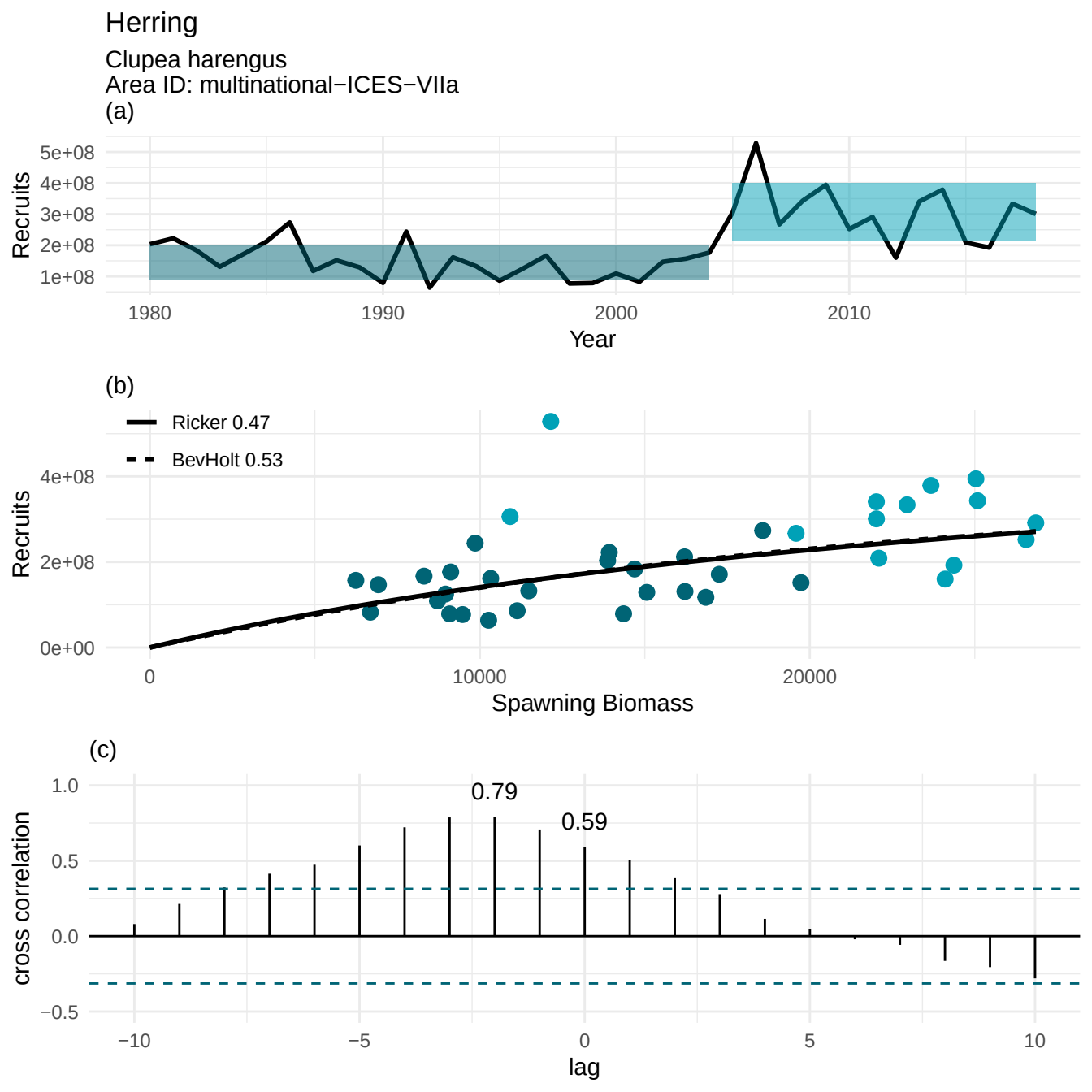

Herring
Clupea harengus
Area ID: Canada−DFO−4RSS
(a)
Recruits
8e+08
6e+08
4e+08
2e+08
0e+00
1970
1980
1990
2000
Year
(b)
Ricker 0.748
BevHolt 0.252
Recruits
8e+08
6e+08
4e+08
2e+08
0e+00
0
50000
100000
150000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.36
−10
−5
0
5
10
lag

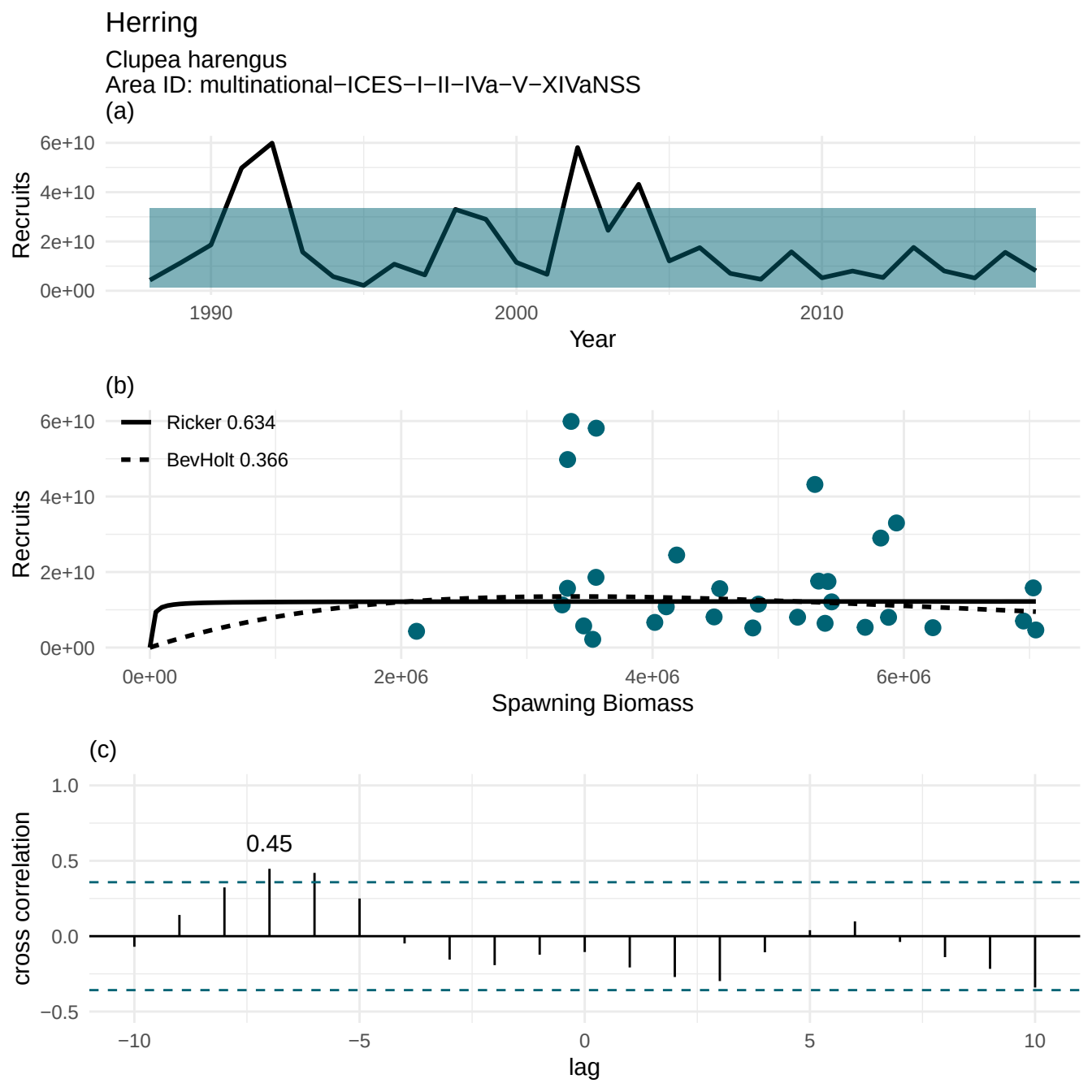

Herring
Clupea harengus
Area ID: Canada−DFO−4TFS
(a)
Recruits
6e+08
4e+08
2e+08
1980
1990
2000
2010
Year
(b)
Ricker 0.157
BevHolt 0.843
Recruits
6e+08
4e+08
2e+08
0e+00
0e+00
1e+05
2e+05
3e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

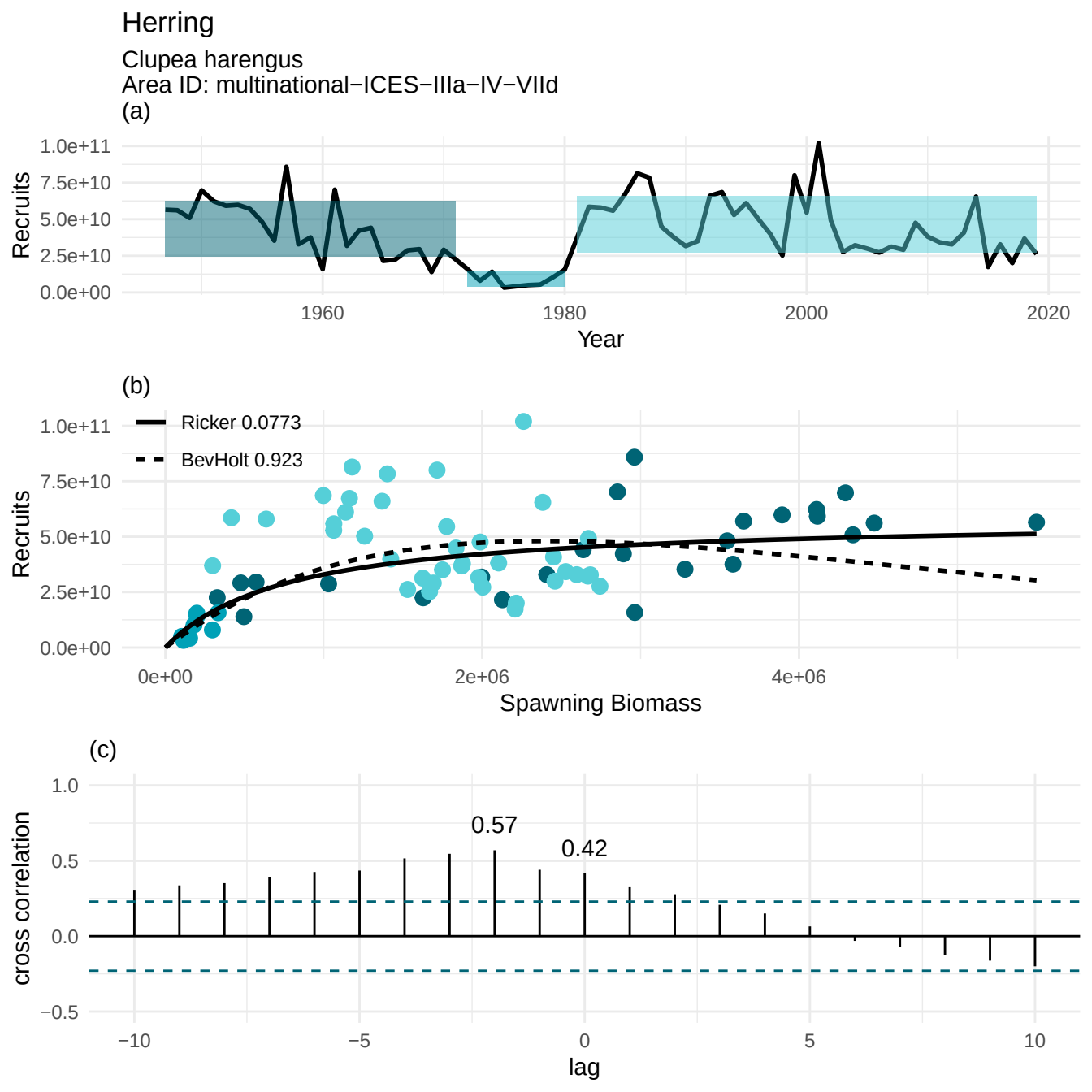

Herring
Clupea harengus
Area ID: Canada−DFO−4TSS
(a)
Recruits
3e+08
2e+08
1e+08
0e+00
1980
1990
2000
2010
Year
(b)
Ricker 0.425
BevHolt 0.575
Recruits
3e+08
2e+08
1e+08
0e+00
0
30000
60000
90000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.79
0.59
−10
−5
0
5
10
lag

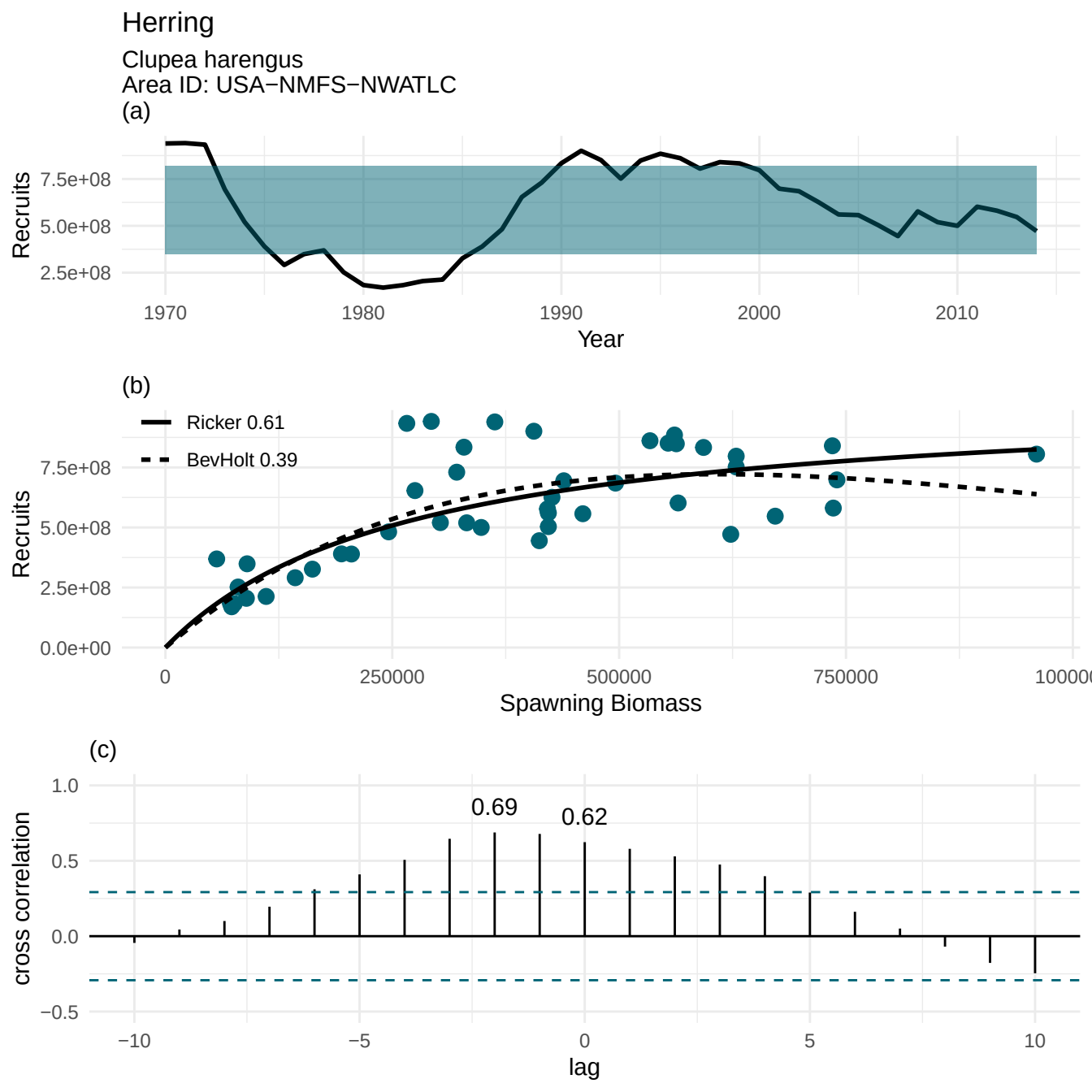

Pacific herring
Clupea pallasii
Area ID: Canada−DFO−CC
(a)
Recruits
1e+09
5e+08
0e+00
1960
1980
2000
Year
(b)
Ricker 0.00638
BevHolt 0.994
Recruits
1e+09
5e+08
0e+00
0
20000
40000
60000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

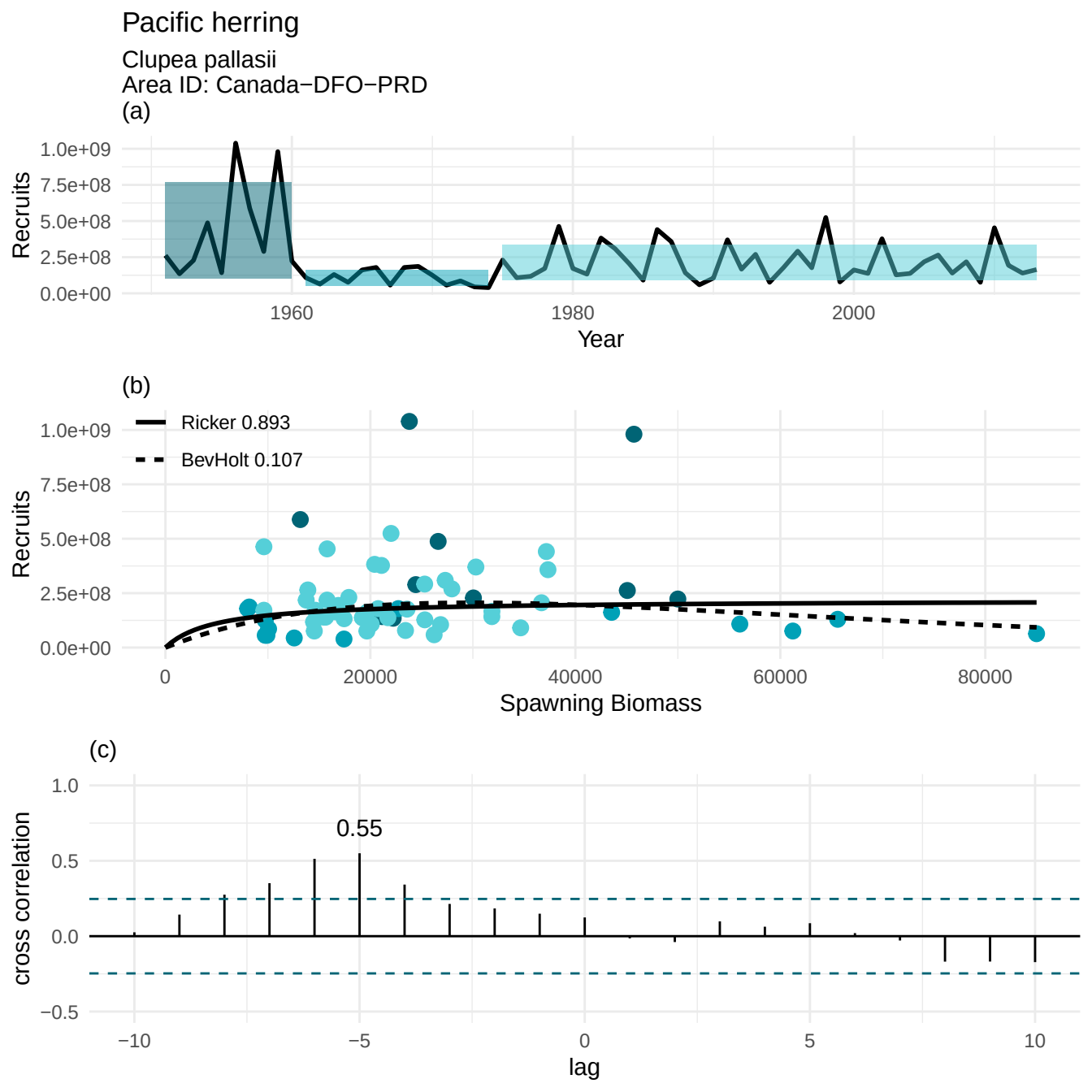

Herring
Clupea harengus
Area ID: multinational−ICES−VaSS
(a)
Recruits
1.5e+09
1.0e+09
5.0e+08
0.0e+00
1990
2000
2010
Year
(b)
Ricker 0.515
BevHolt 0.485
Recruits
1.5e+09
1.0e+09
5.0e+08
0.0e+00
0e+00
2e+05
4e+05
6e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.48
−10
−5
0
5
10
lag

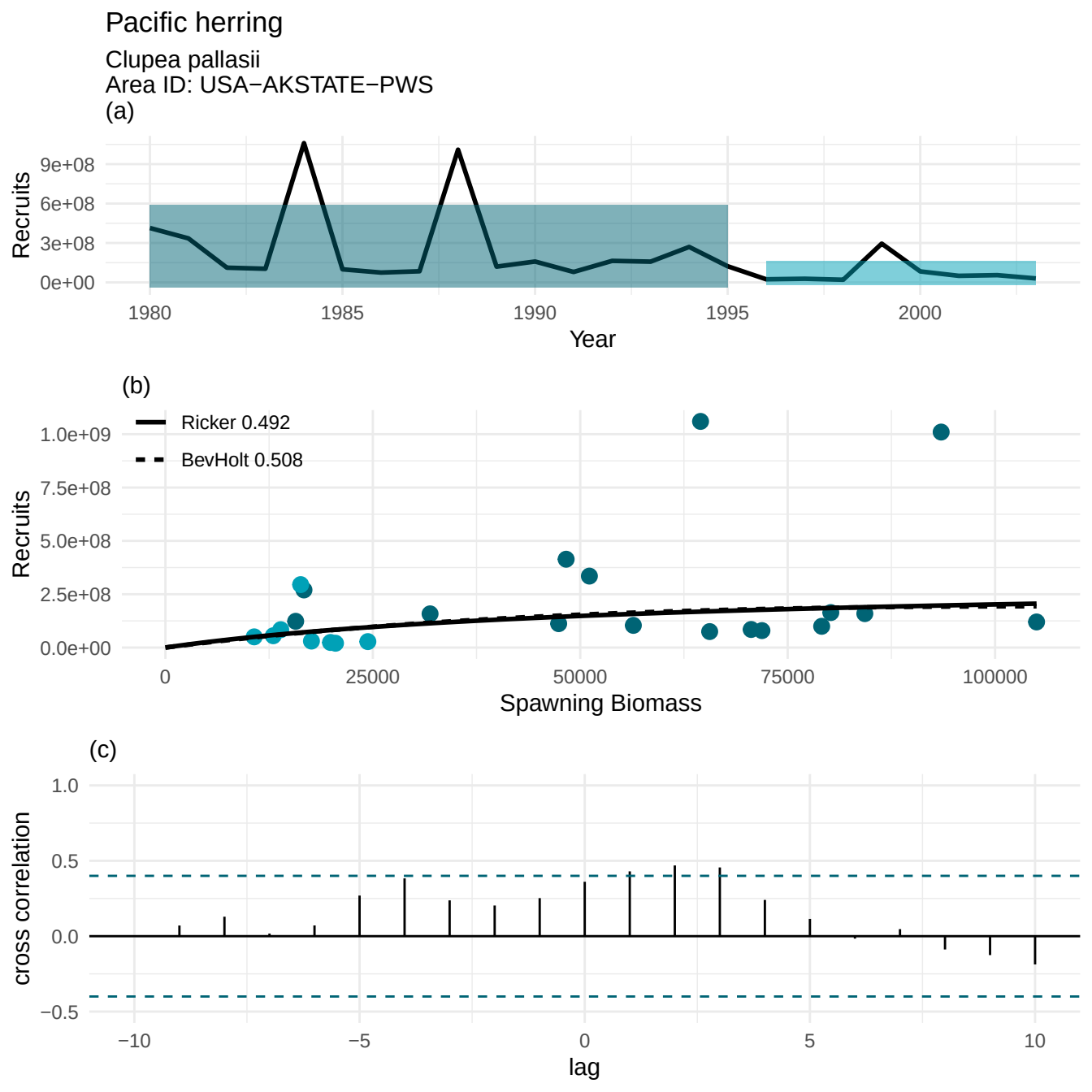

Herring
Clupea harengus
Area ID: multinational−ICES−VIIa
(a)
Recruits
5e+08
4e+08
3e+08
2e+08
1e+08
1980
1990
2000
2010
Year
(b)
Ricker 0.47
BevHolt 0.53
Recruits
4e+08
2e+08
0e+00
0
10000
20000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.79
0.59
−10
−5
0
5
10
lag

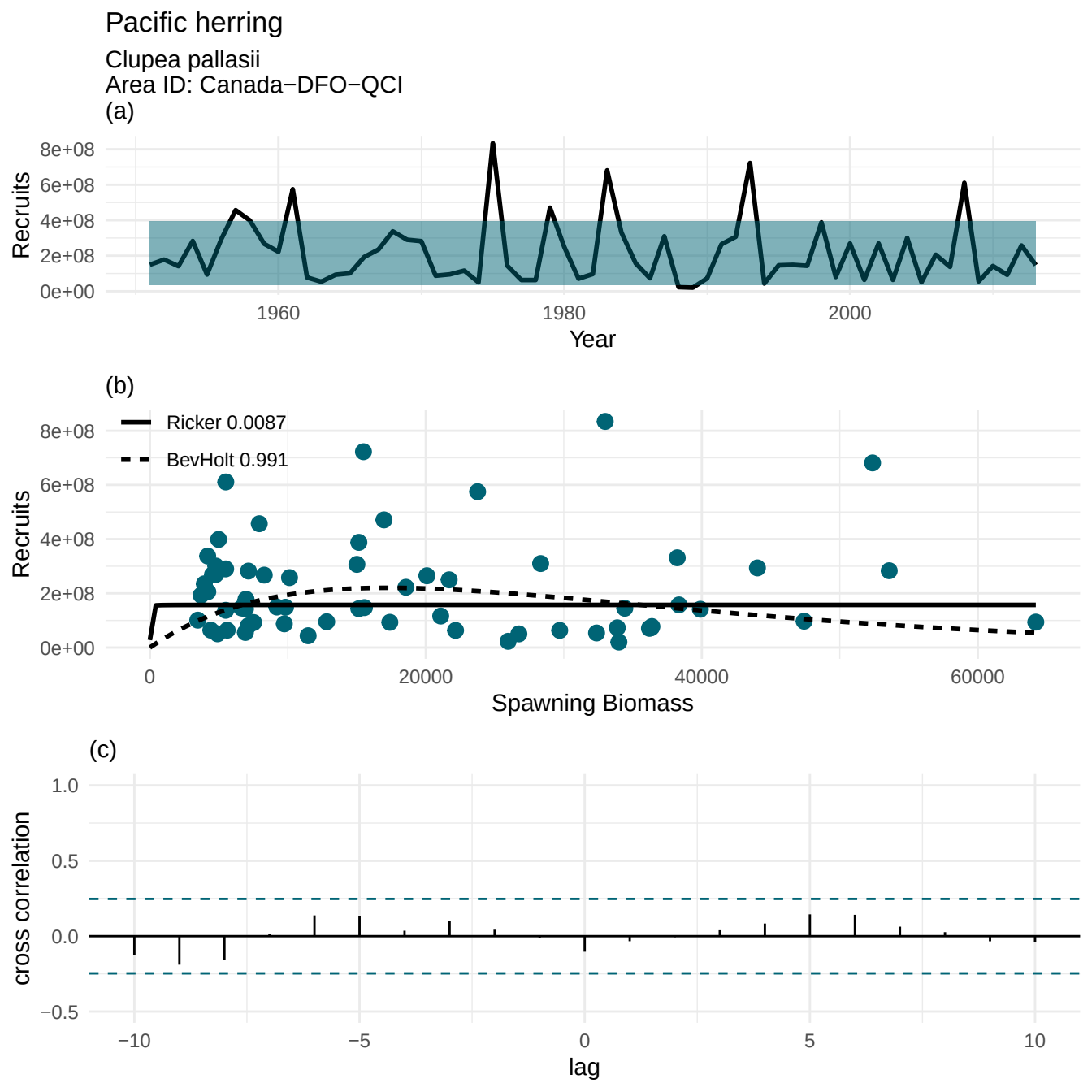

Herring
Clupea harengus
Area ID: multinational−ICES−I−II−IVa−V−XIVaNSS
(a)
Recruits
6e+10
4e+10
2e+10
0e+00
1990
2000
2010
Year
(b)
Ricker 0.634
BevHolt 0.366
Recruits
6e+10
4e+10
2e+10
0e+00
0e+00
2e+06
4e+06
6e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.45
−10
−5
0
5
10
lag

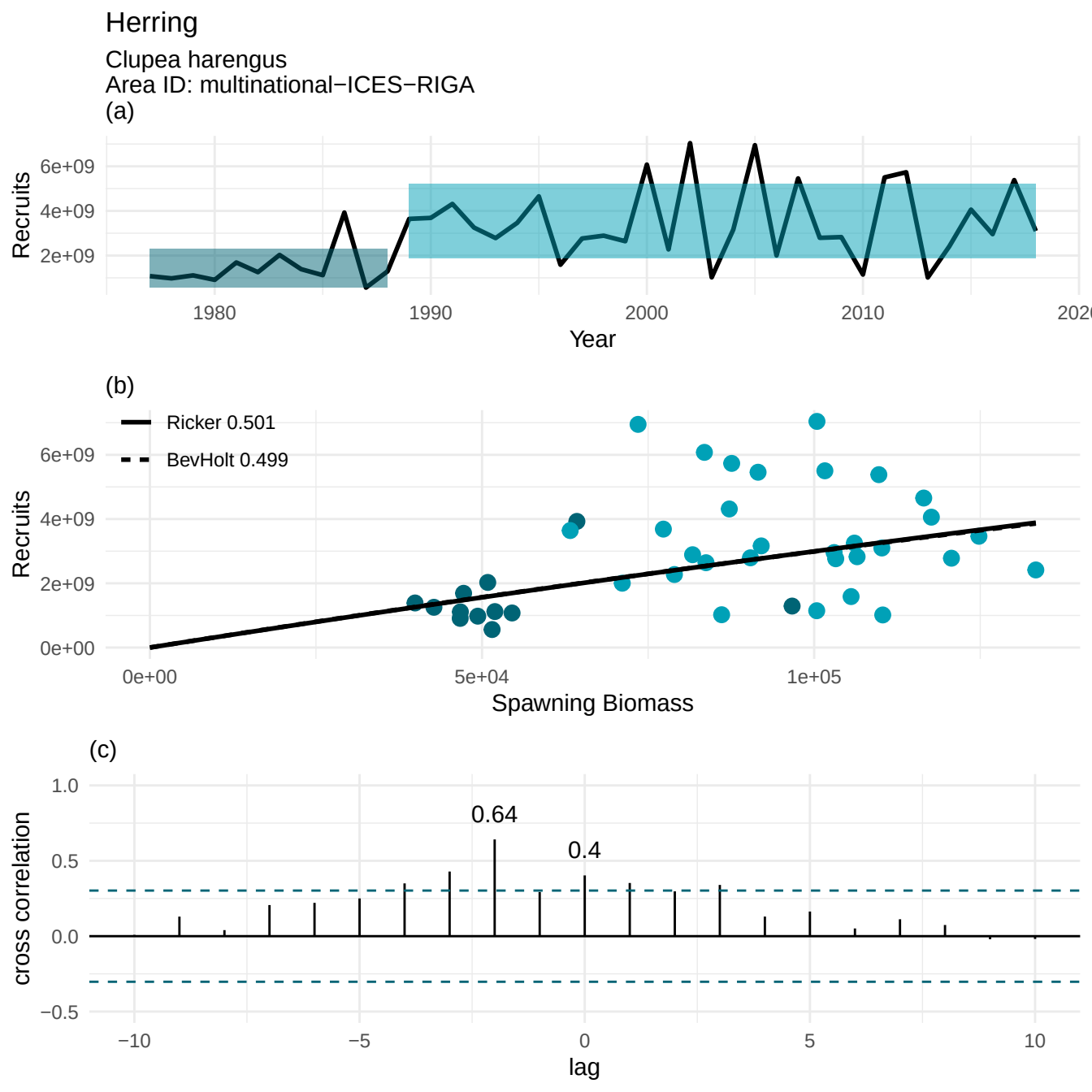

Herring
Clupea harengus
Area ID: multinational−ICES−IIIa−IV−VIId
(a)
Recruits
1.0e+11
7.5e+10
5.0e+10
2.5e+10
0.0e+00
1960
1980
2000
2020
Year
(b)
Ricker 0.0773
BevHolt 0.923
Recruits
1.0e+11
7.5e+10
5.0e+10
2.5e+10
0.0e+00
0e+00
2e+06
4e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.57
0.42
−10
−5
0
5
10
lag

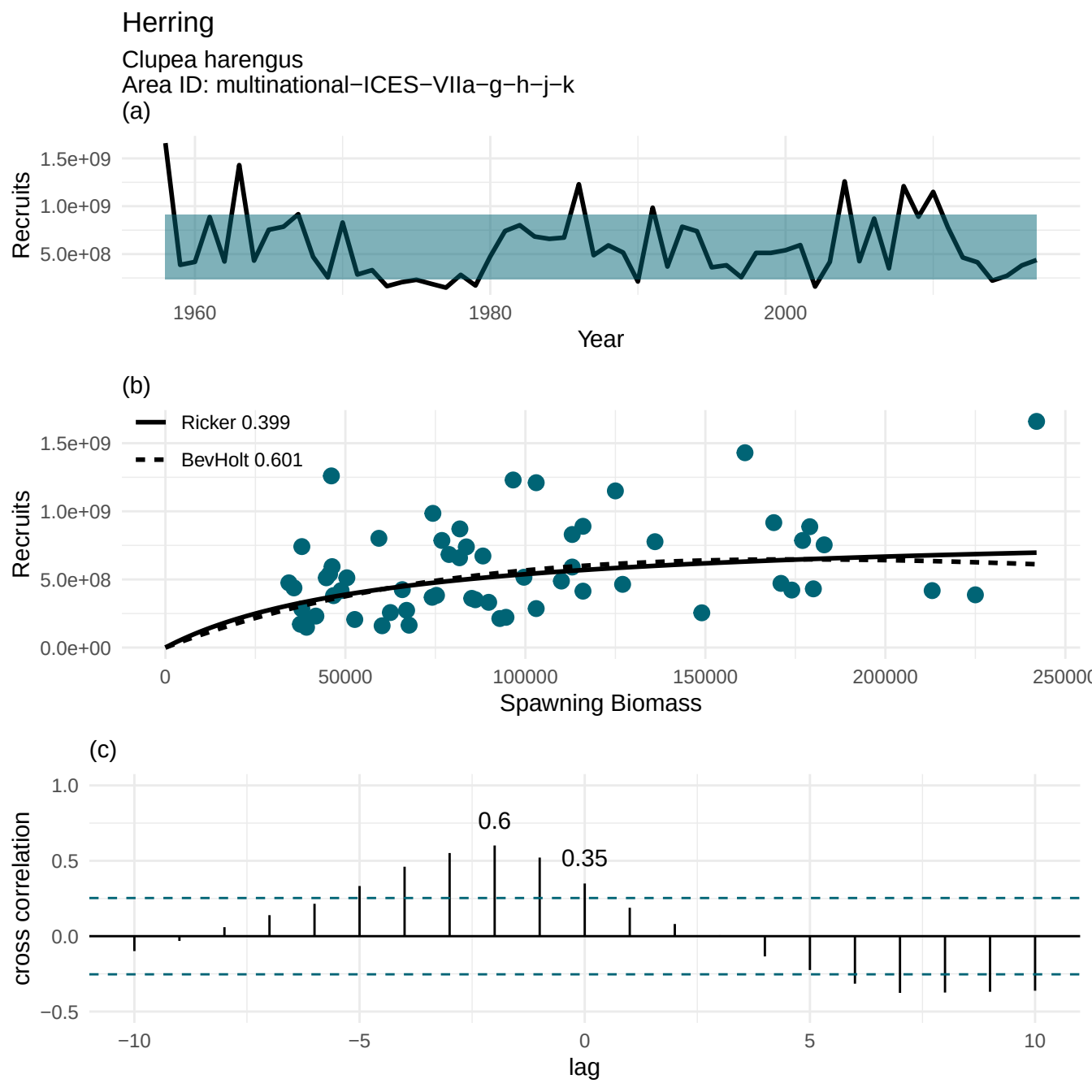

Herring
Clupea harengus
Area ID: USA−NMFS−NWATLC
(a)
Recruits
7.5e+08
5.0e+08
2.5e+08
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.61
BevHolt 0.39
Recruits
7.5e+08
5.0e+08
2.5e+08
0.0e+00
0
250000
500000
750000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.69
0.62
−10
−5
0
5
10
lag

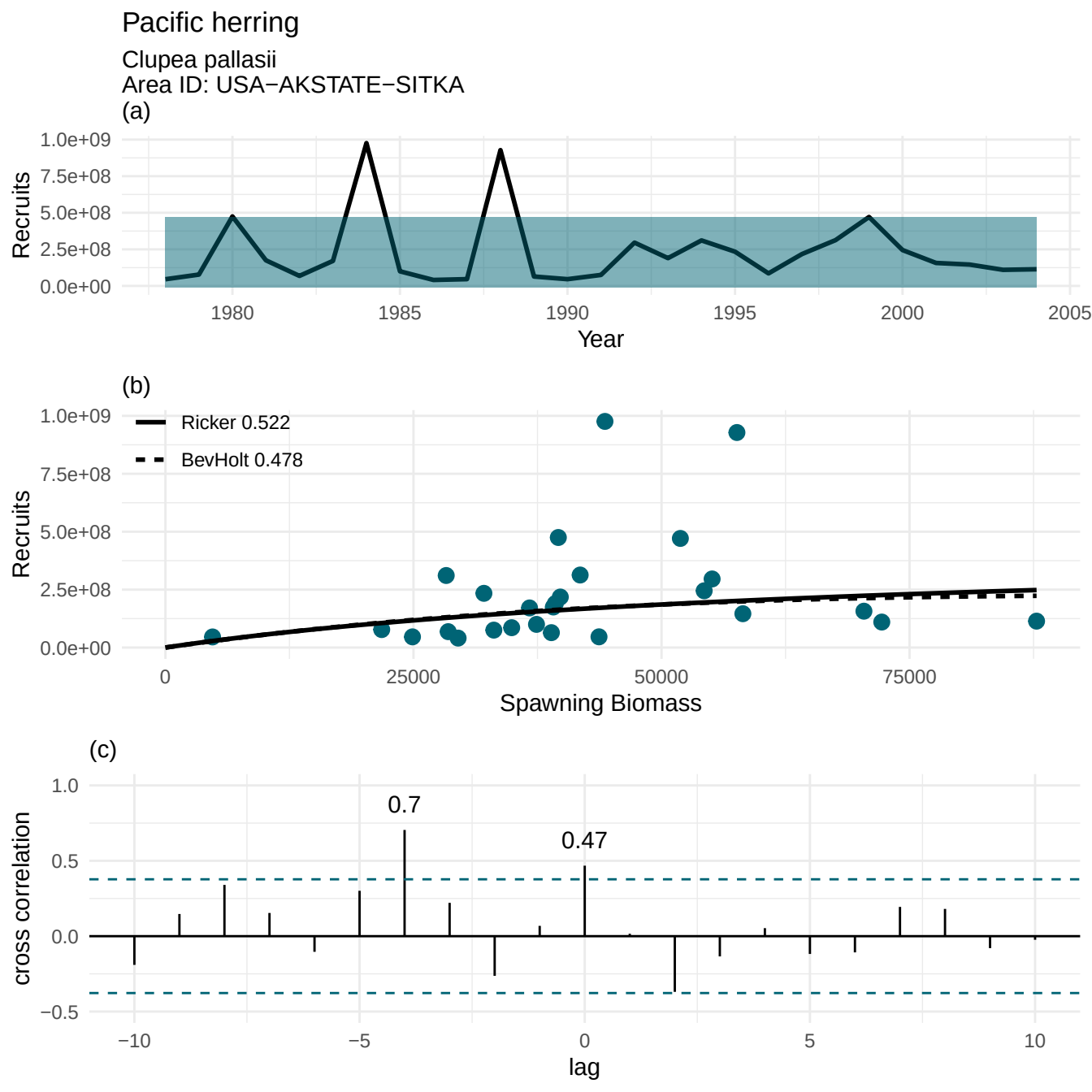

Pacific herring
Clupea pallasii
Area ID: Canada−DFO−PRD
(a)
Recruits
1.0e+09
7.5e+08
5.0e+08
2.5e+08
0.0e+00
1960
1980
2000
Year
(b)
Ricker 0.893
BevHolt 0.107
Recruits
1.0e+09
7.5e+08
5.0e+08
2.5e+08
0.0e+00
0
20000
40000
60000
80000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.55
−10
−5
0
5
10
lag

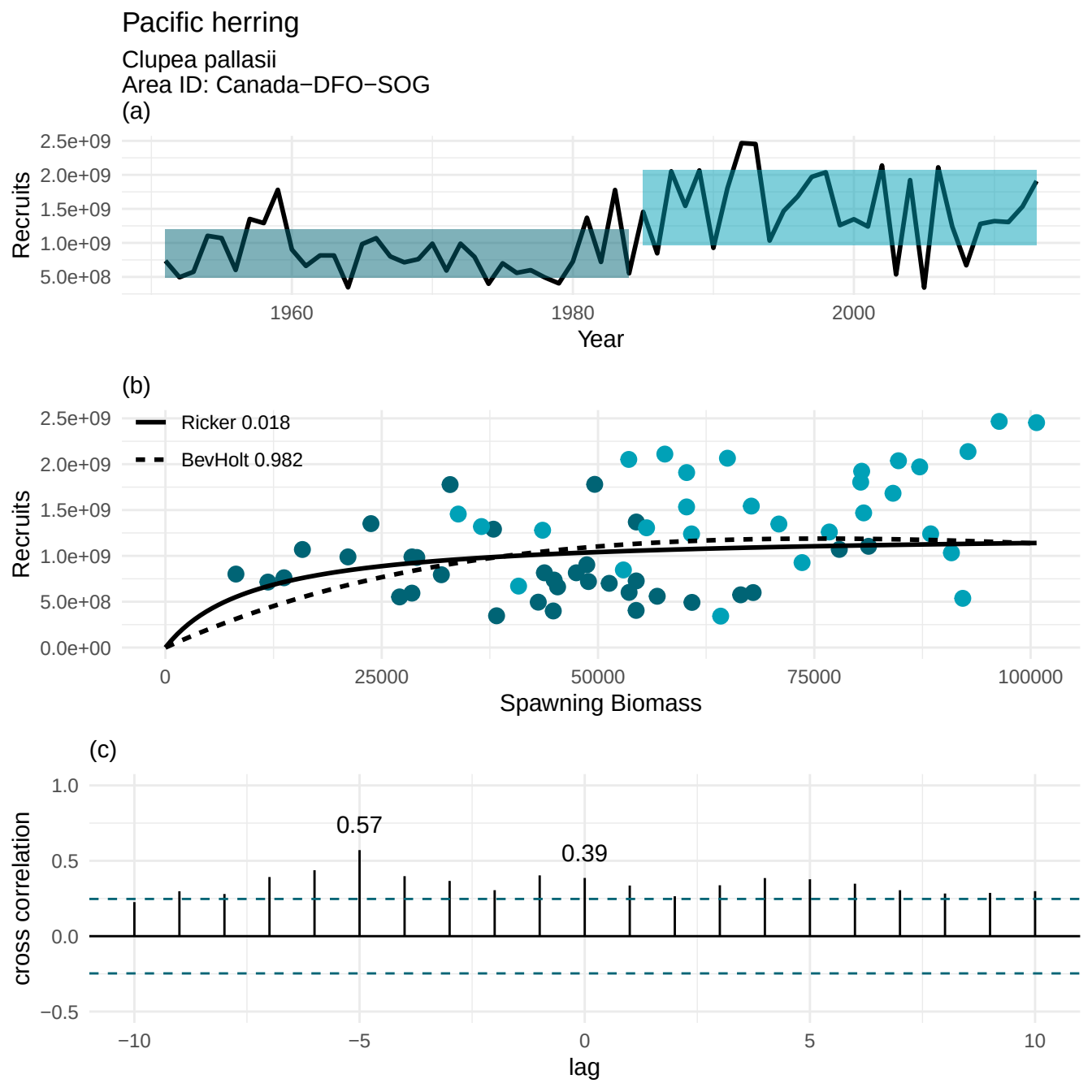

Pacific herring
Clupea pallasii
Area ID: USA−AKSTATE−PWS
(a)
Recruits
9e+08
6e+08
3e+08
0e+00
1980
1985
1990
1995
2000
Year
(b)
Ricker 0.492
BevHolt 0.508
Recruits
1.0e+09
7.5e+08
5.0e+08
2.5e+08
0.0e+00
0
25000
50000
75000
100000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

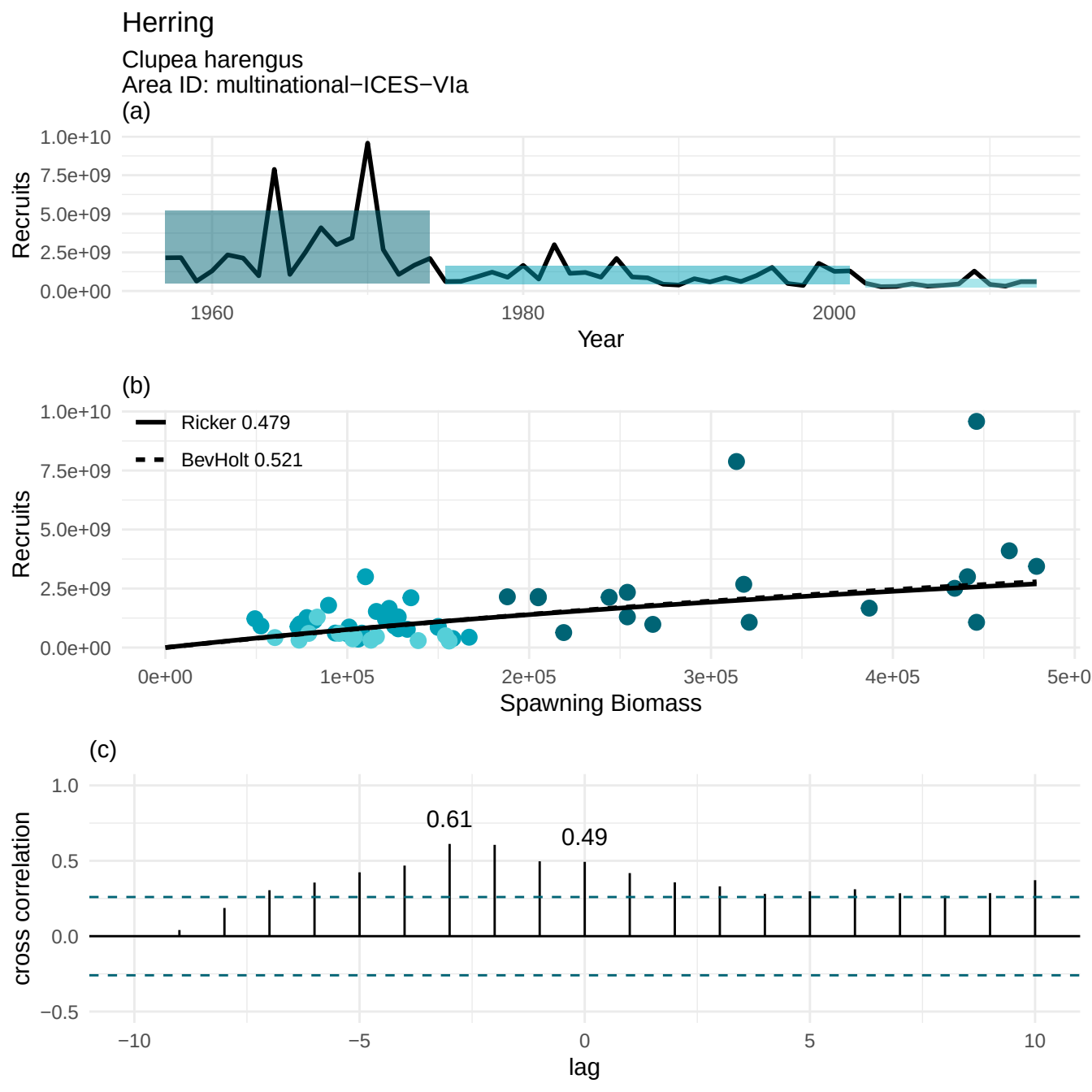

Pacific herring
Clupea pallasii
Area ID: Canada−DFO−QCI
(a)
Recruits
8e+08
6e+08
4e+08
2e+08
0e+00
1960
1980
2000
Year
(b)
Ricker 0.0087
BevHolt 0.991
Recruits
8e+08
6e+08
4e+08
2e+08
0e+00
0
20000
40000
60000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

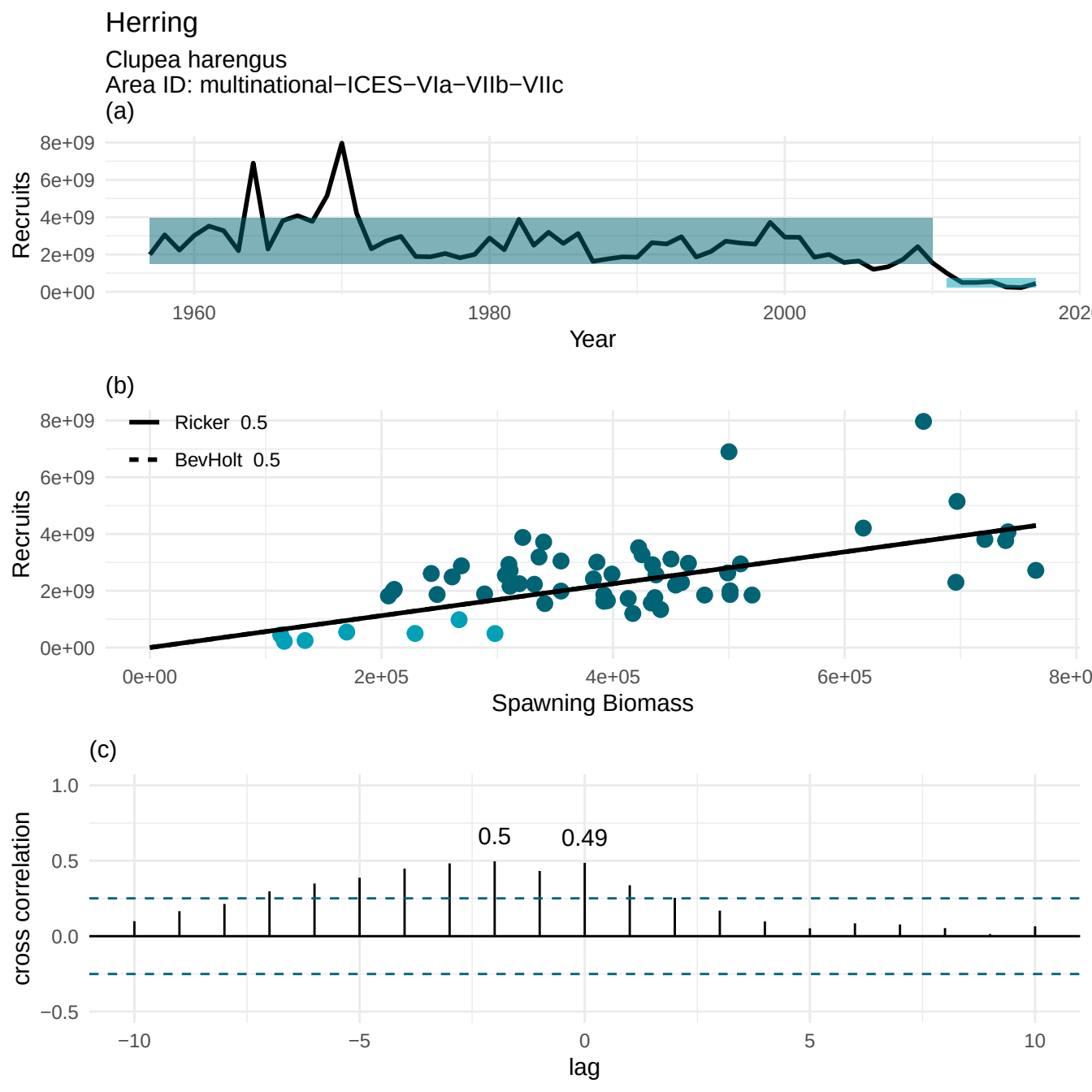

Herring
Clupea harengus
Area ID: multinational−ICES−RIGA
(a)
Recruits
6e+09
4e+09
2e+09
1980
1990
2000
2010
Year
(b)
Ricker 0.501
BevHolt 0.499
Recruits
6e+09
4e+09
2e+09
0e+00
0e+00
5e+04
1e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.64
0.4
−10
−5
0
5
10
lag

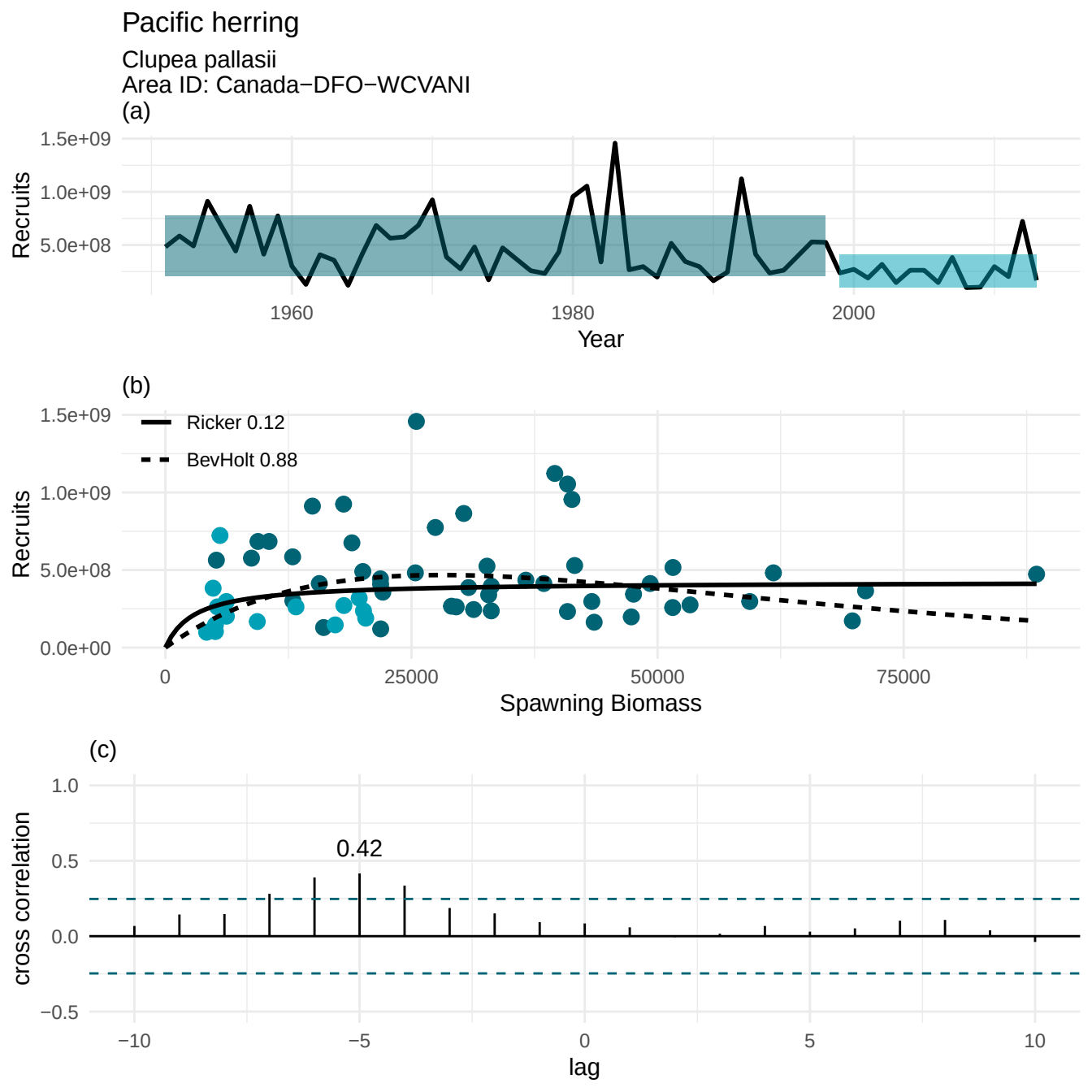

Herring
Clupea harengus
Area ID: multinational−ICES−VIIa−g−h−j−k
(a)
Recruits
1.5e+09
1.0e+09
5.0e+08
1960
1980
2000
Year
(b)
Ricker 0.399
BevHolt 0.601
Recruits
1.5e+09
1.0e+09
5.0e+08
0.0e+00
0
50000
100000
150000
200000
250000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.6
0.35
−10
−5
0
5
10
lag

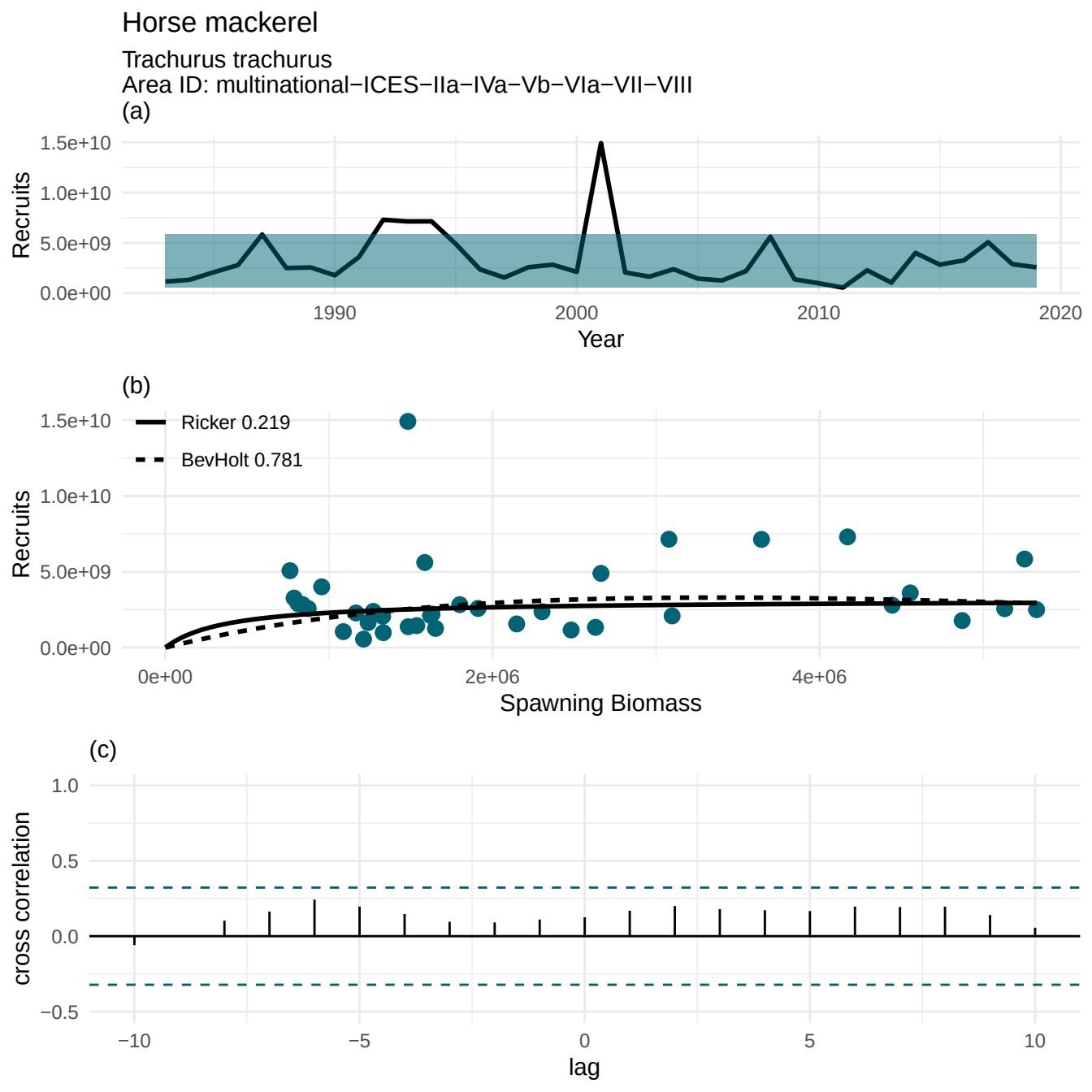

Pacific herring
Clupea pallasii
Area ID: USA−AKSTATE−SITKA
(a)
Recruits
1.0e+09
7.5e+08
5.0e+08
2.5e+08
0.0e+00
1980
1985
1990
1995
2000
2005
Year
(b)
Ricker 0.522
BevHolt 0.478
Recruits
1.0e+09
7.5e+08
5.0e+08
2.5e+08
0.0e+00
0
25000
50000
75000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.7
0.47
−10
−5
0
5
10
lag

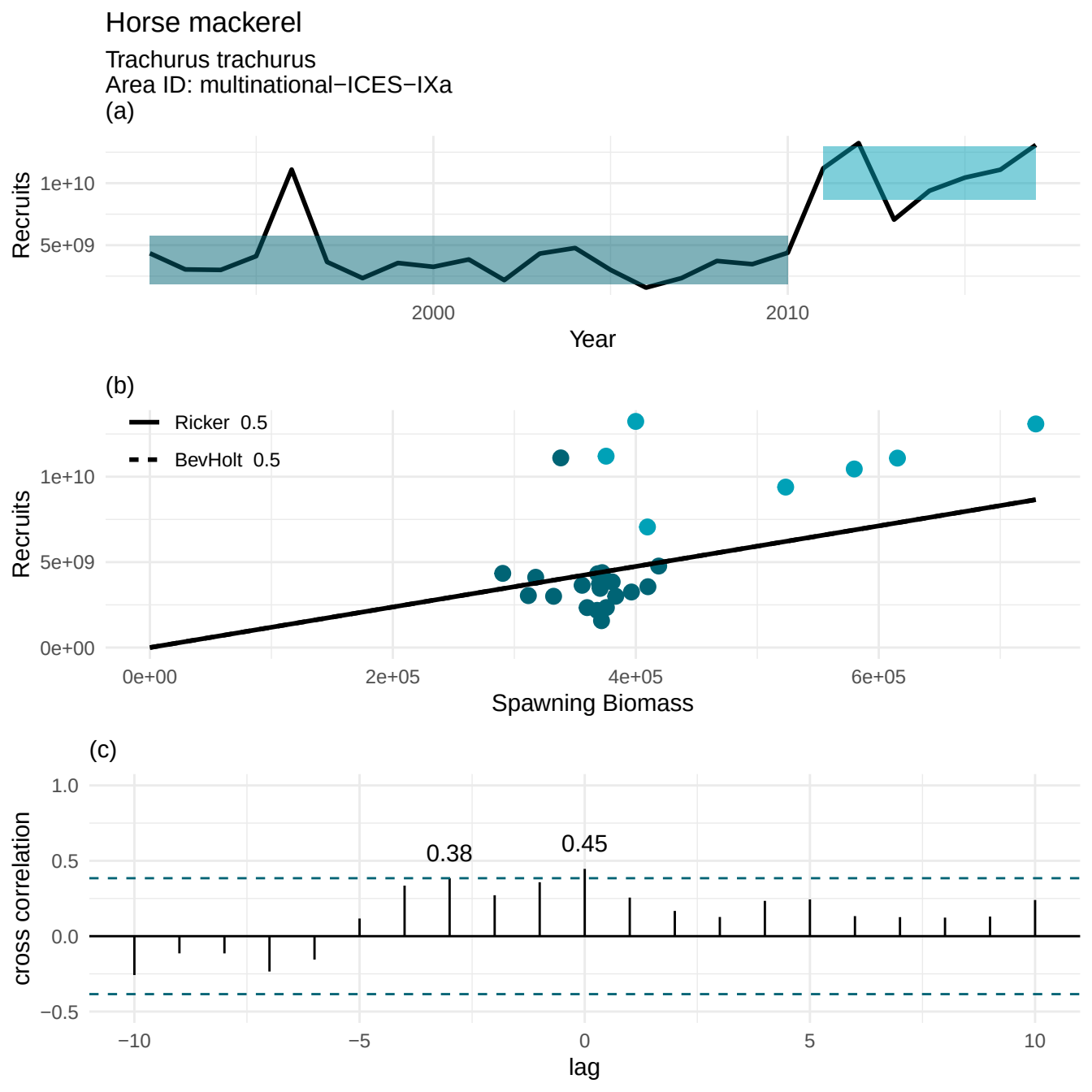

Pacific herring
Clupea pallasii
Area ID: Canada−DFO−SOG
(a)
Recruits
2.5e+09
2.0e+09
1.5e+09
1.0e+09
5.0e+08
1960
1980
2000
Year
(b)
Ricker 0.018
BevHolt 0.982
Recruits
2.5e+09
2.0e+09
1.5e+09
1.0e+09
5.0e+08
0.0e+00
0
25000
50000
75000
100000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.57
0.39
−10
−5
0
5
10
lag

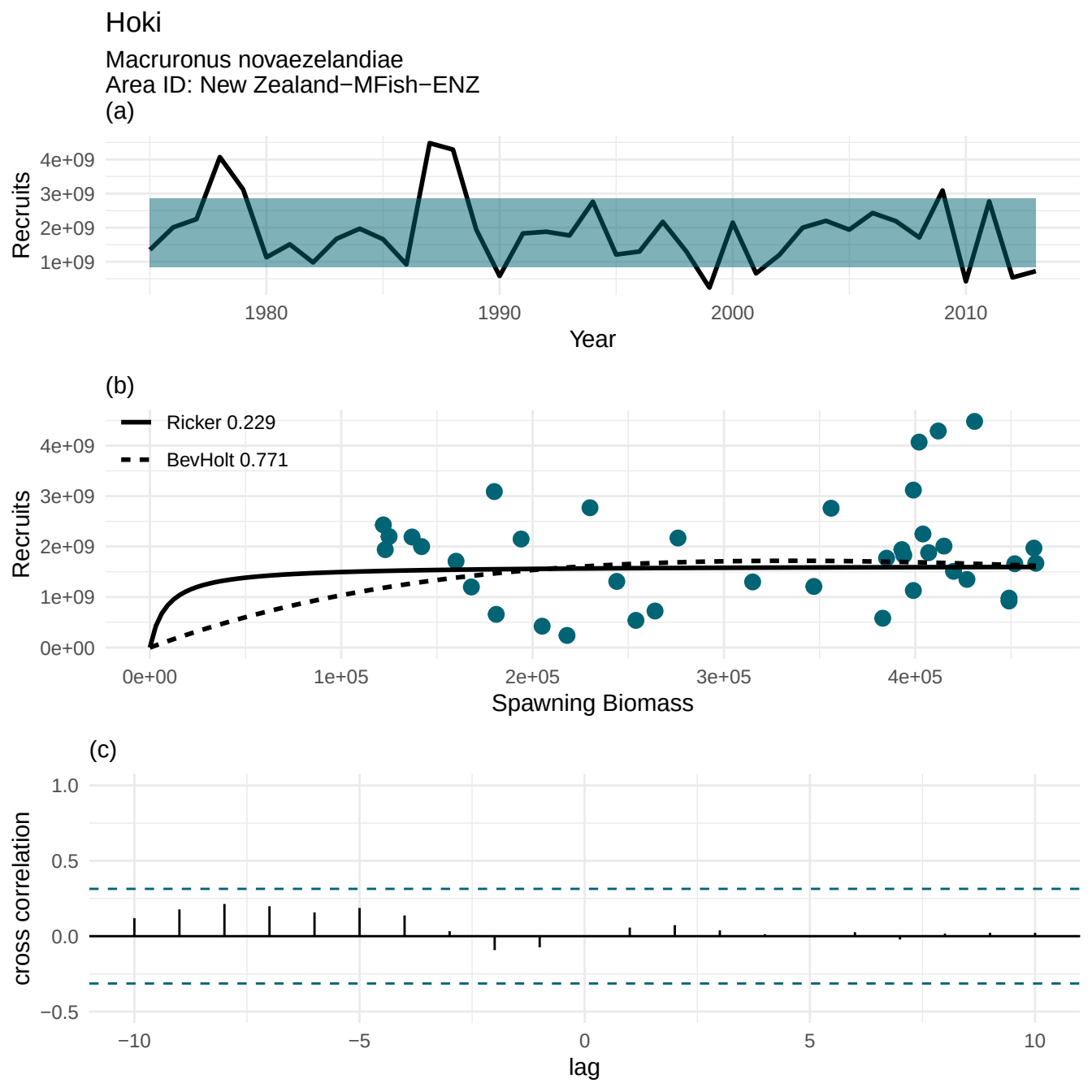

Herring
Clupea harengus
Area ID: multinational−ICES−VIa
(a)
Recruits
1.0e+10
7.5e+09
5.0e+09
2.5e+09
0.0e+00
1960
1980
2000
Year
(b)
Ricker 0.479
BevHolt 0.521
Recruits
Spawning Biomass
0e+00
1e+05
2e+05
3e+05
4e+05
5e+0
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.61
0.49
−10
−5
0
5
10
lag

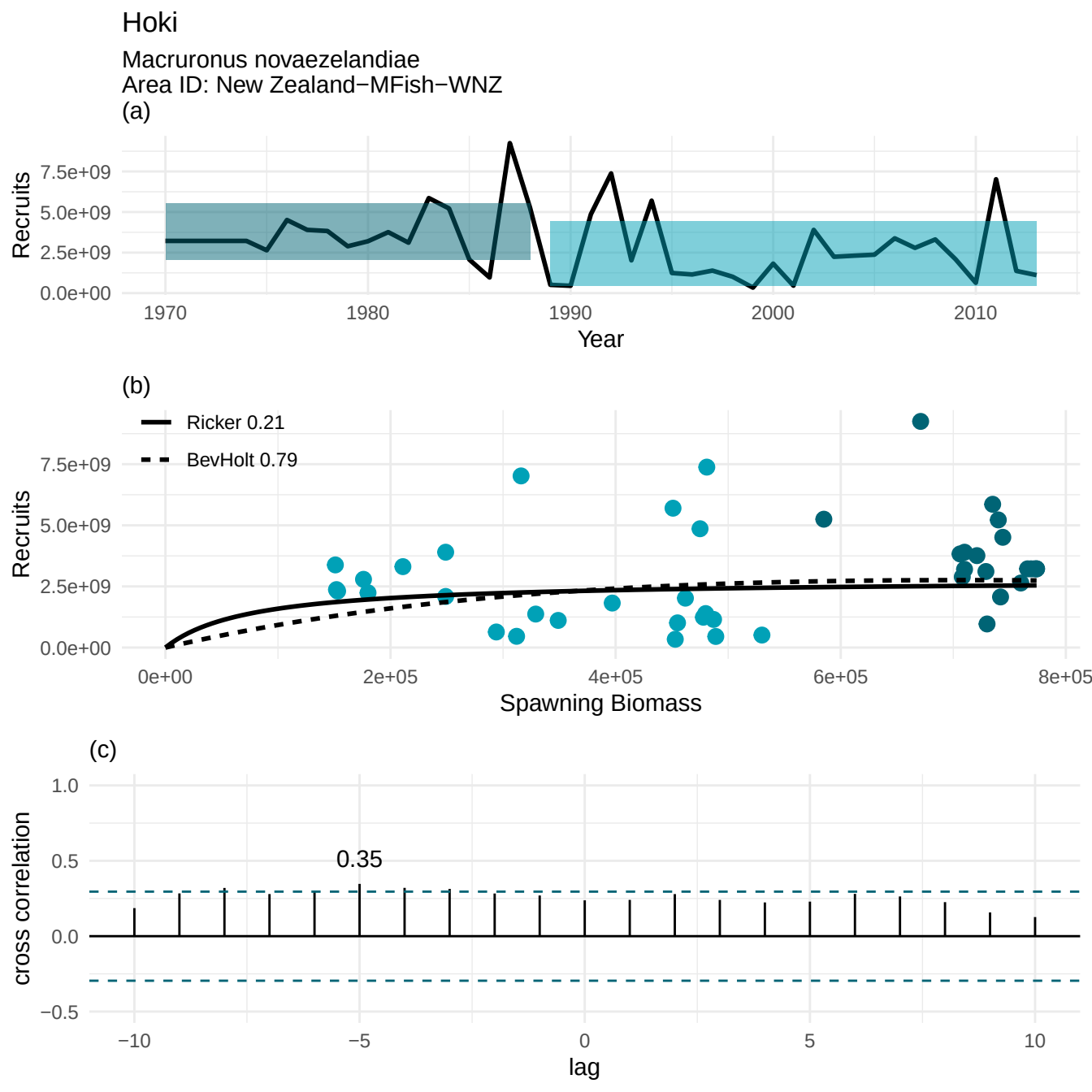

Herring
Clupea harengus
Area ID: multinational−ICES−VIa−VIIb−VIIc
(a)
Recruits
8e+09
6e+09
4e+09
2e+09
0e+00
1960
1980
2000
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
Spawning Biomass
0e+00
2e+05
4e+05
6e+05
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.5
0.49
−10
−5
0
5
10
lag

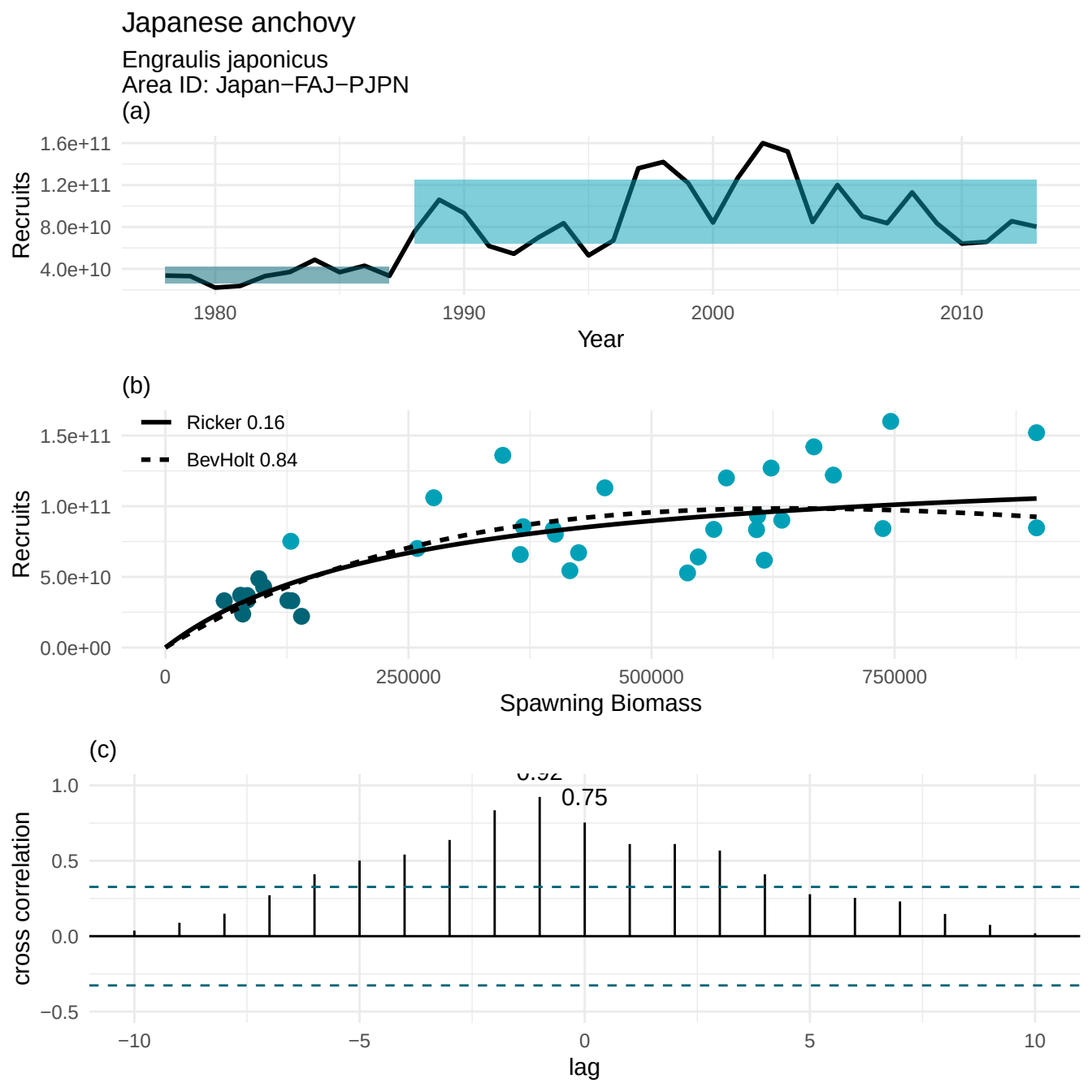

Pacific herring
Clupea pallasii
Area ID: Canada−DFO−WCVANI
(a)
Recruits
1.5e+09
1.0e+09
5.0e+08
1960
1980
2000
Year
(b)
Ricker 0.12
BevHolt 0.88
Recruits
1.5e+09
1.0e+09
5.0e+08
0.0e+00
0
25000
50000
75000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.42
−10
−5
0
5
10
lag

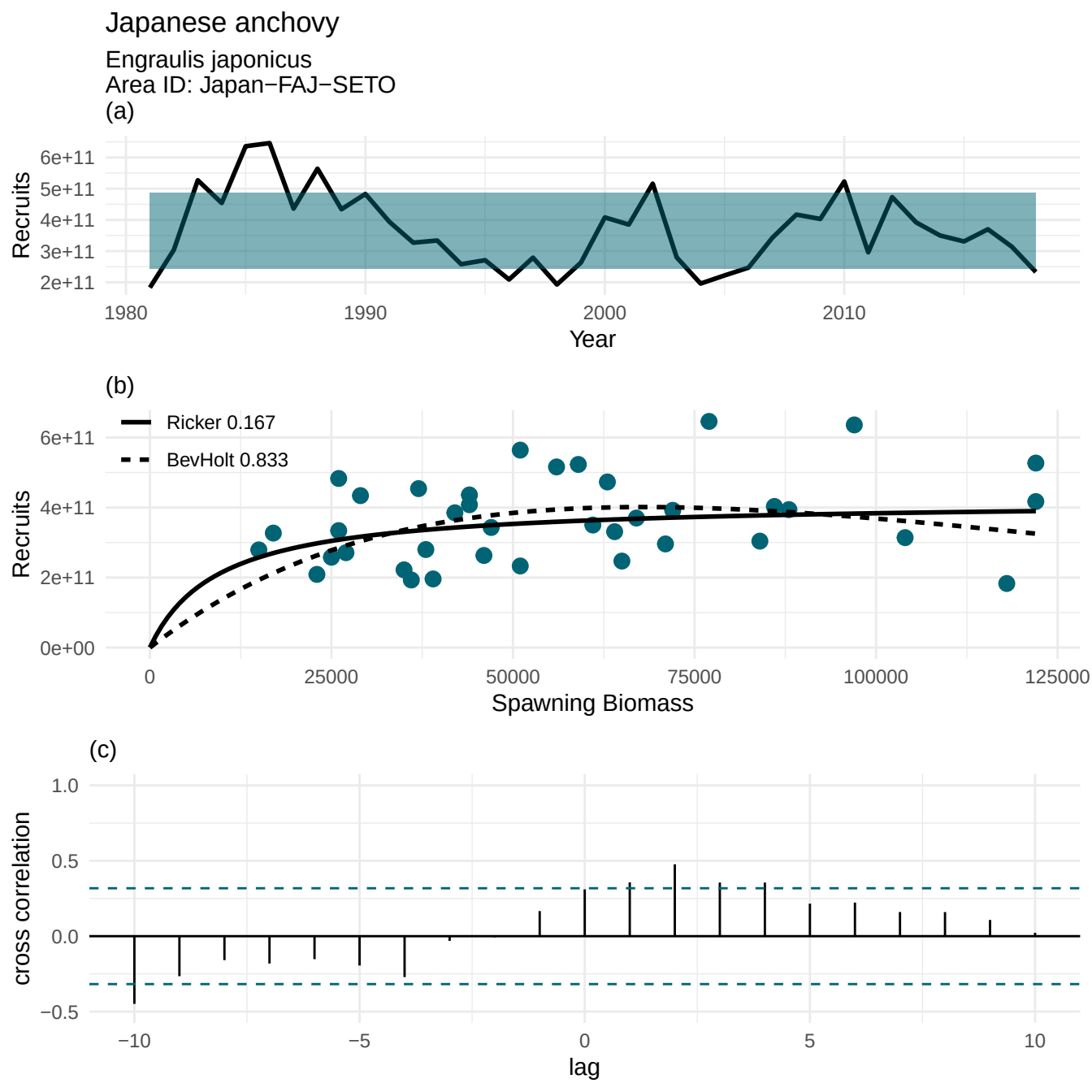

Horse mackerel
Trachurus trachurus
Area ID: multinational−ICES−IIa−IVa−Vb−VIa−VII−VIII
(a)
Recruits
1.5e+10
1.0e+10
5.0e+09
0.0e+00
1990
2000
2010
2020
Year
(b)
Ricker 0.219
BevHolt 0.781
Recruits
1.5e+10
1.0e+10
5.0e+09
0.0e+00
0e+00
2e+06
4e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

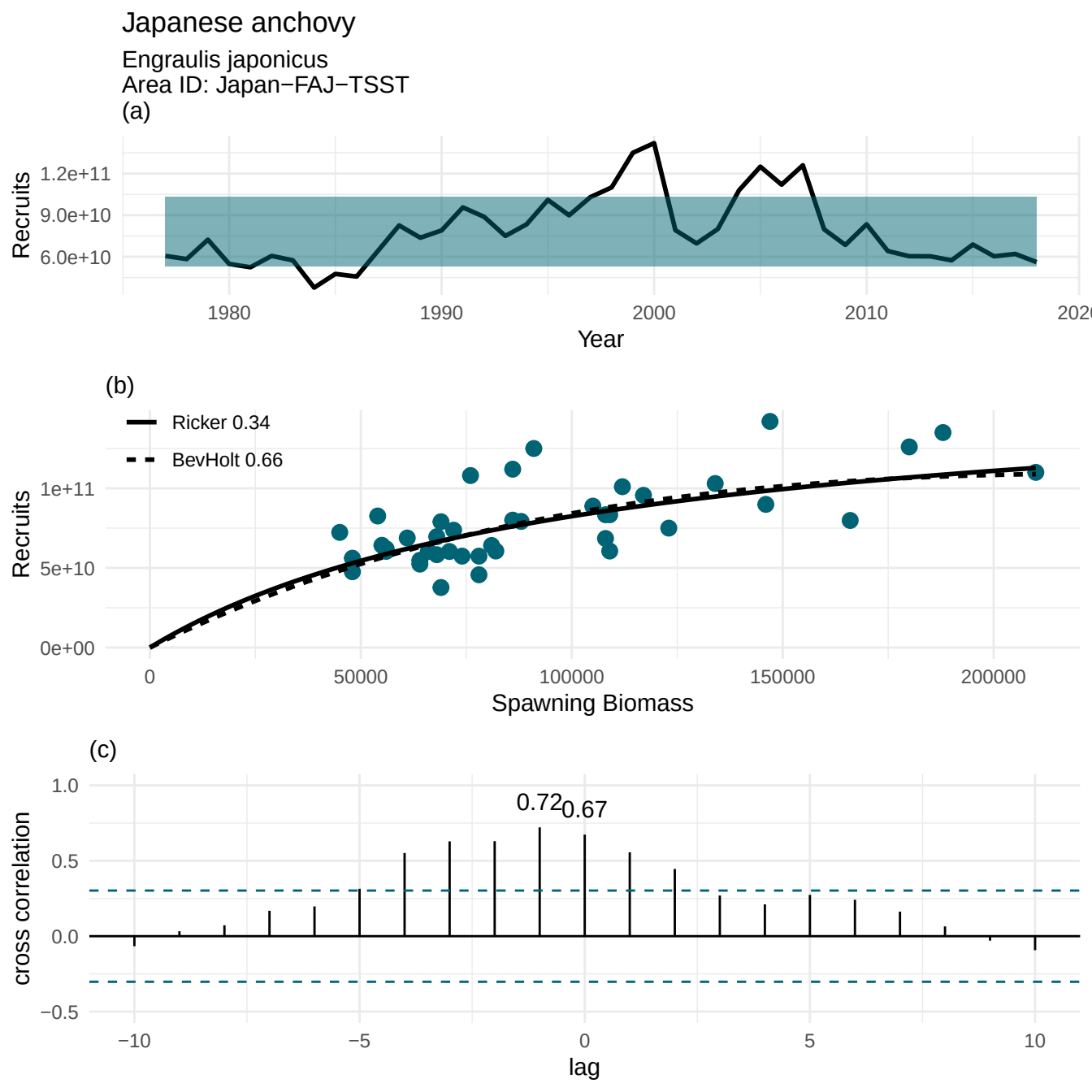

Horse mackerel
Trachurus trachurus
Area ID: multinational−ICES−IXa
(a)
Recruits
1e+10
5e+09
2000
2010
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
1e+10
5e+09
0e+00
0e+00
2e+05
4e+05
6e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.38
0.45
−10
−5
0
5
10
lag

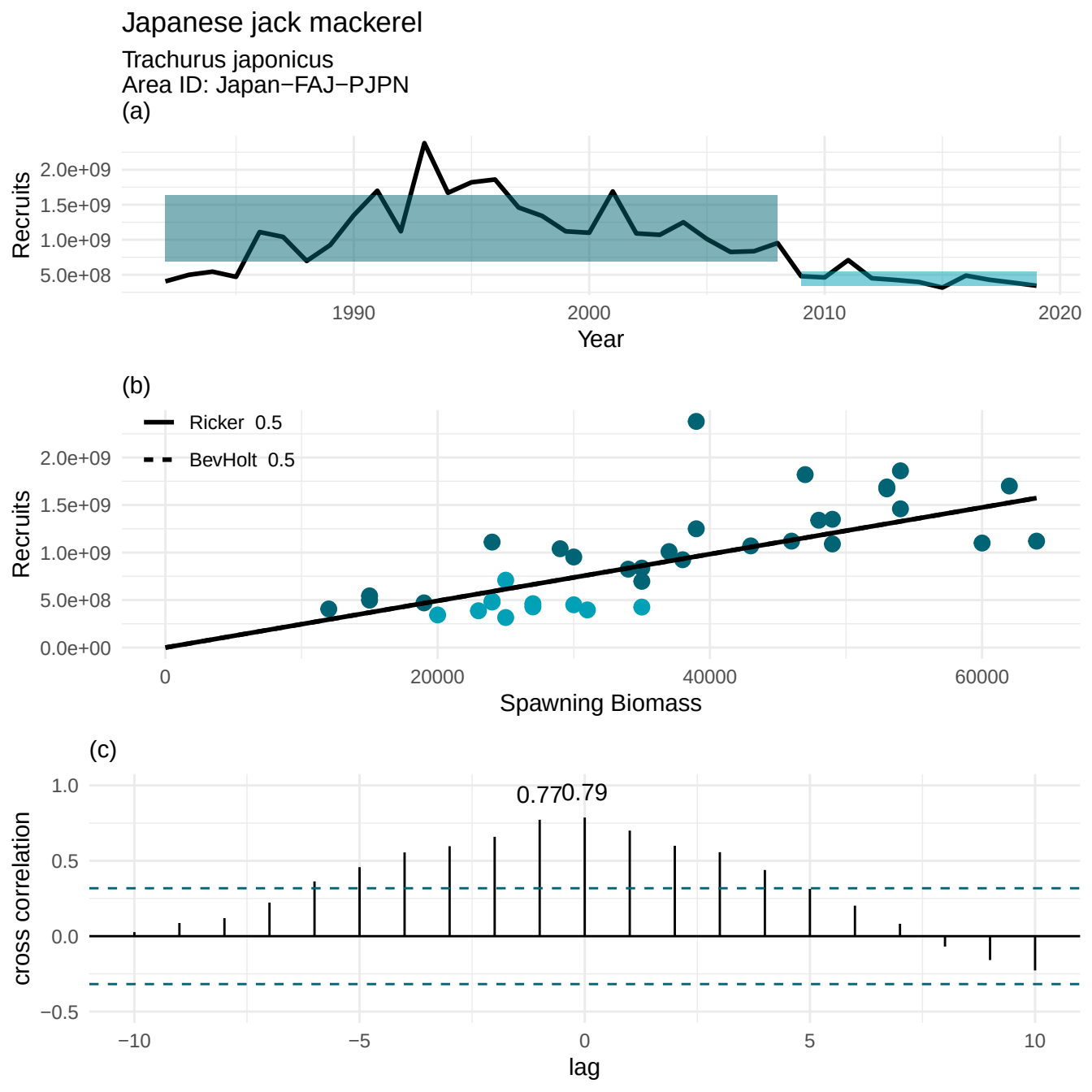

Hoki
Macruronus novaezelandiae
Area ID: New Zealand−MFish−ENZ
(a)
Recruits
4e+09
3e+09
2e+09
1e+09
1980
1990
2000
2010
Year
(b)
Ricker 0.229
BevHolt 0.771
Recruits
4e+09
3e+09
2e+09
1e+09
0e+00
0e+00
1e+05
2e+05
3e+05
4e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

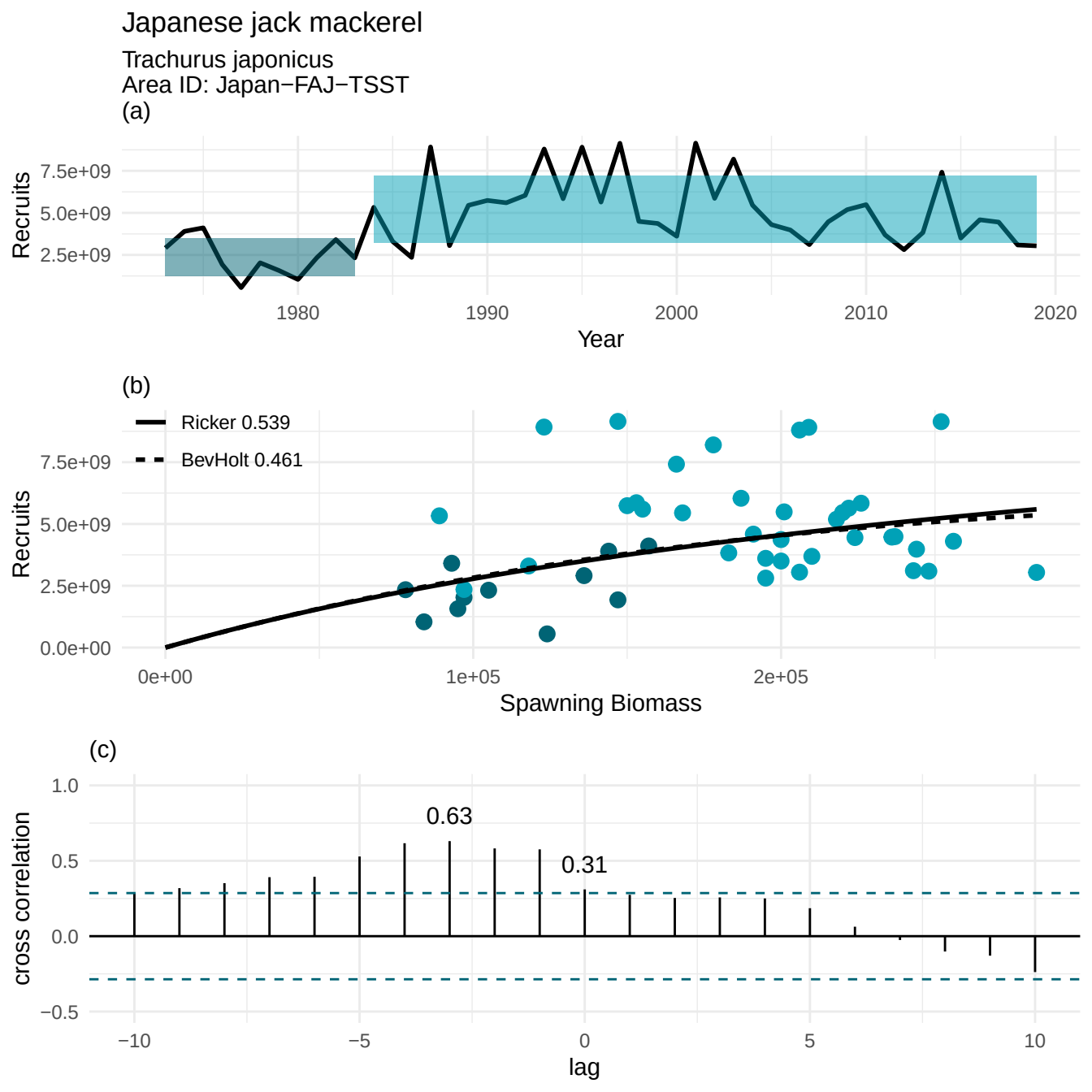

Hoki
Macruronus novaezelandiae
Area ID: New Zealand−MFish−WNZ
(a)
Recruits
7.5e+09
5.0e+09
2.5e+09
0.0e+00
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.21
BevHolt 0.79
Recruits
7.5e+09
5.0e+09
2.5e+09
0.0e+00
0e+00
2e+05
4e+05
6e+05
8e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.35
−10
−5
0
5
10
lag

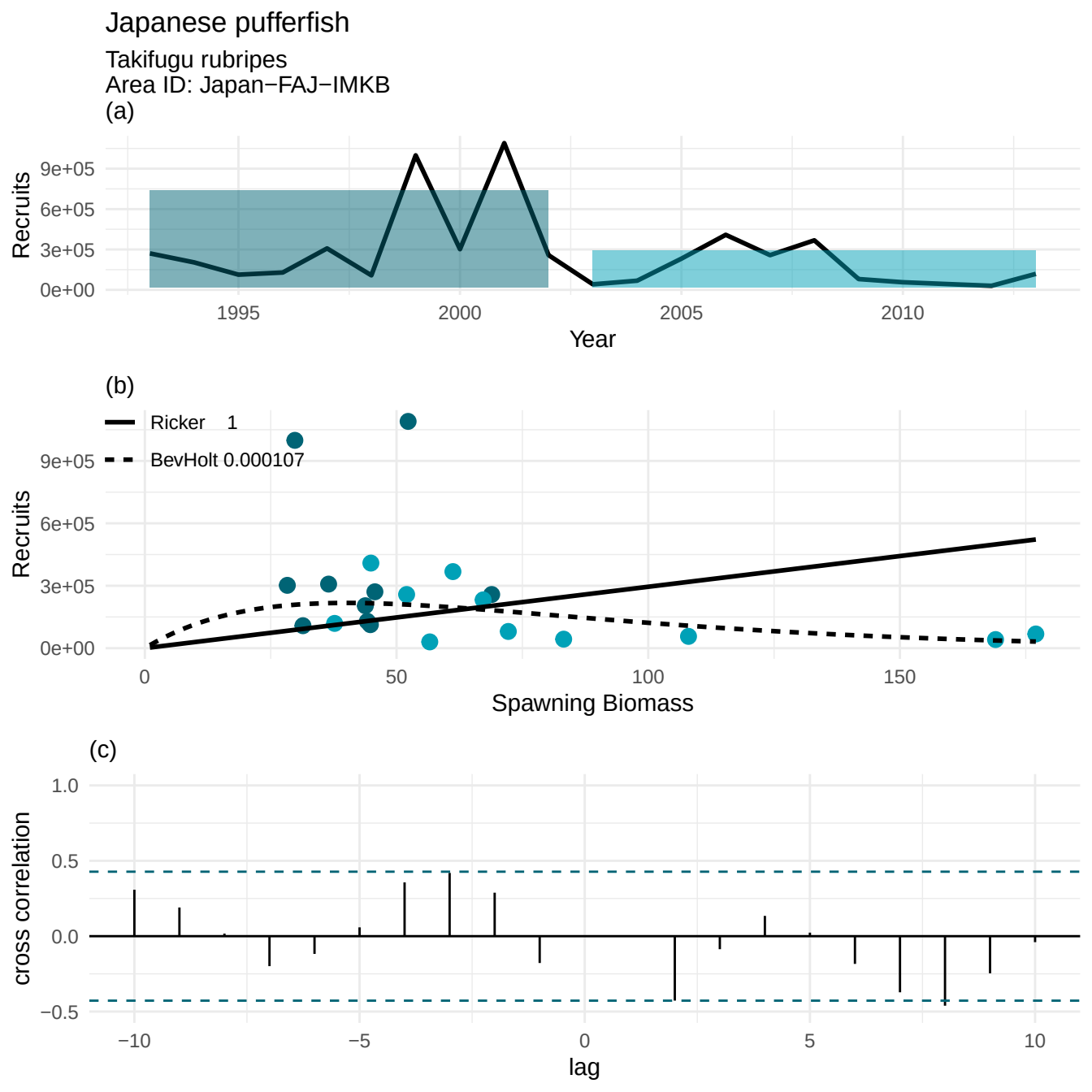

Japanese anchovy
Engraulis japonicus
Area ID: Japan−FAJ−PJPN
(a)
Recruits
1.6e+11
1.2e+11
8.0e+10
4.0e+10
1980
1990
2000
2010
Year
(b)
Ricker 0.16
BevHolt 0.84
Recruits
1.5e+11
1.0e+11
5.0e+10
0.0e+00
0
250000
500000
750000
Spawning Biomass
(c)
0.75
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

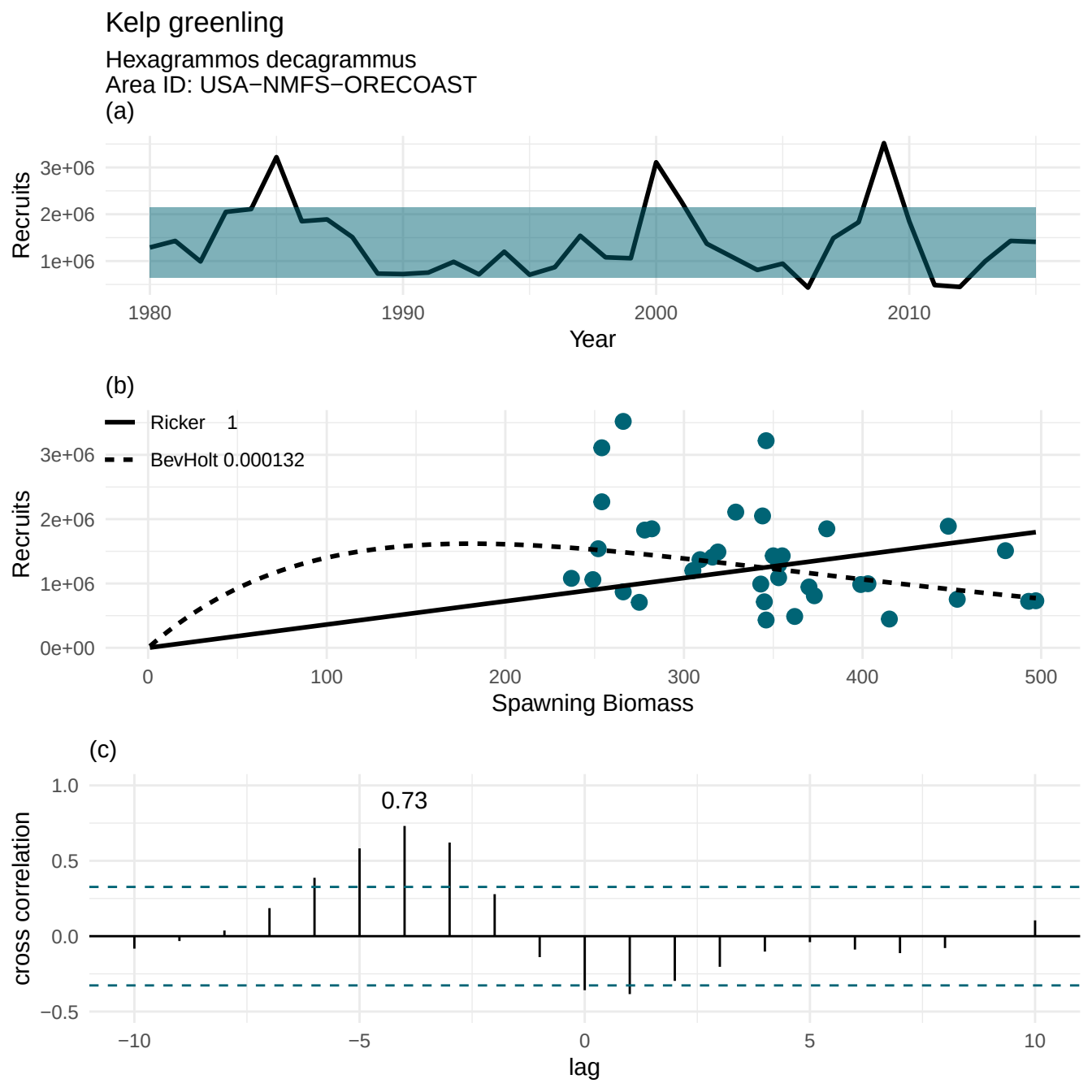

Japanese anchovy
Engraulis japonicus
Area ID: Japan−FAJ−SETO
(a)
Recruits
6e+11
5e+11
4e+11
3e+11
2e+11
1980
1990
2000
2010
Year
(b)
Ricker 0.167
BevHolt 0.833
Recruits
6e+11
4e+11
2e+11
0e+00
0
25000
50000
75000
100000
125000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

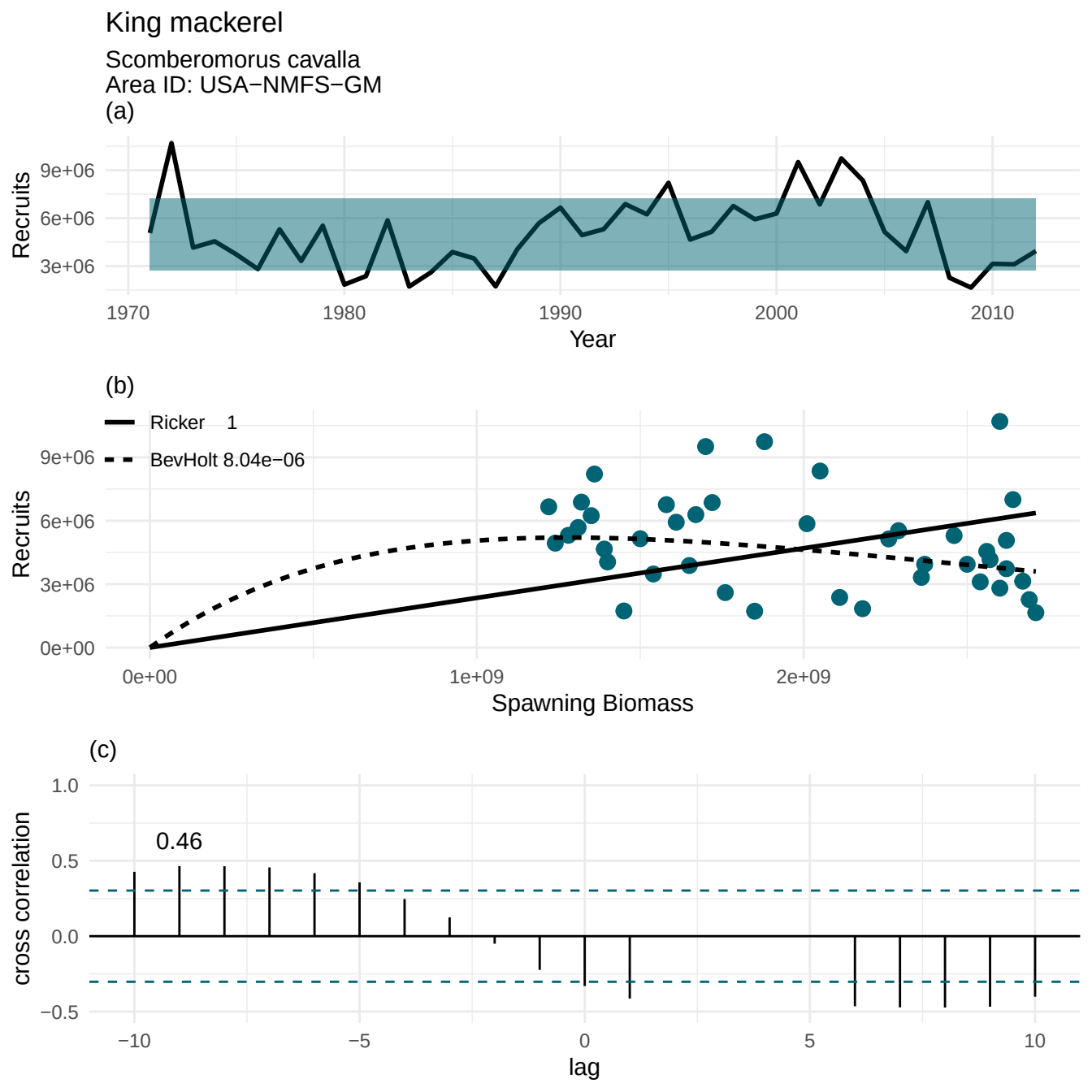

Japanese anchovy
Engraulis japonicus
Area ID: Japan−FAJ−TSST
(a)
Recruits
1.2e+11
9.0e+10
6.0e+10
1980
1990
2000
2010
Year
(b)
Ricker 0.34
BevHolt 0.66
Recruits
1e+11
5e+10
0e+00
0
50000
100000
150000
200000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.72
0.67
−10
−5
0
5
10
lag

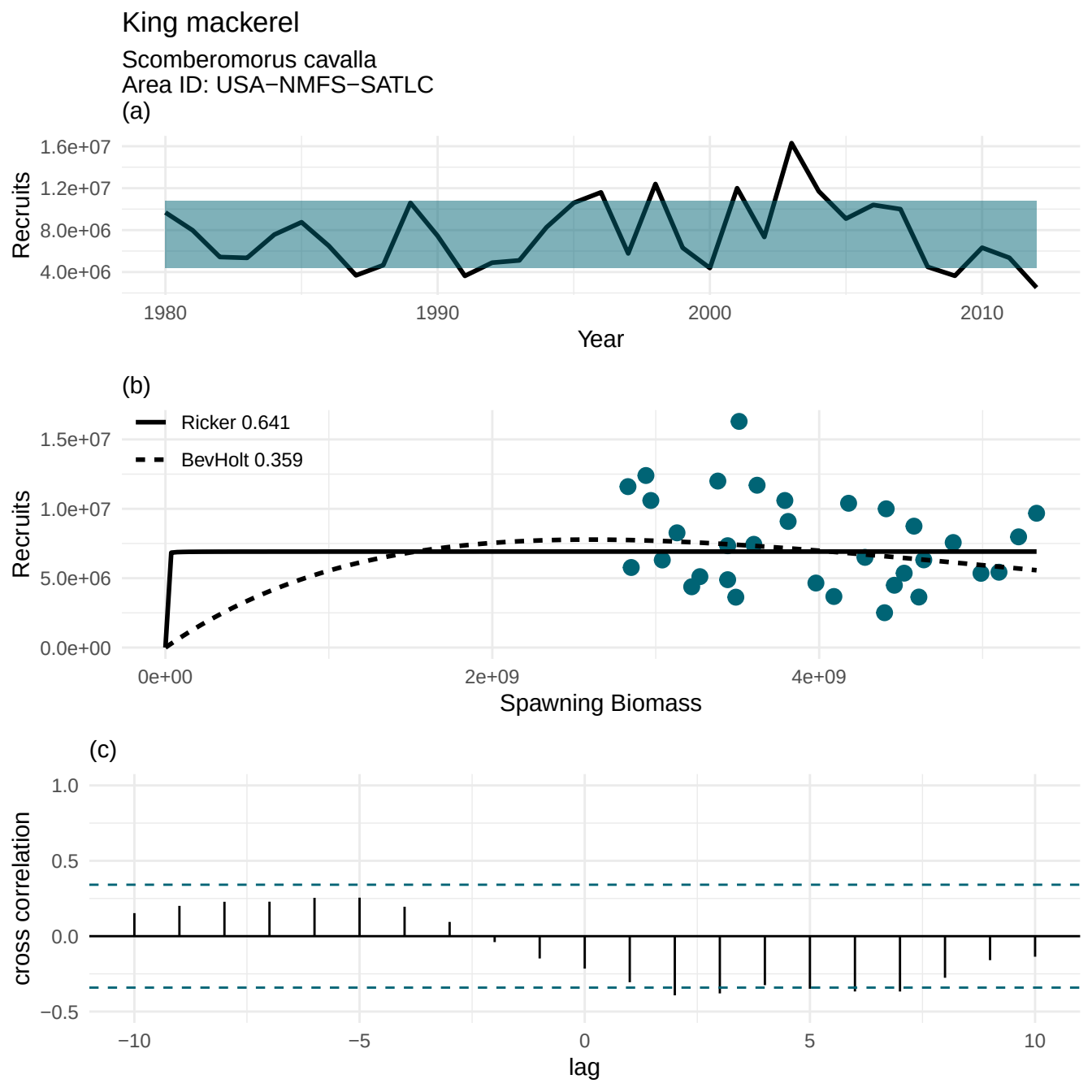

Japanese jack mackerel
Trachurus japonicus
Area ID: Japan−FAJ−PJPN
(a)
Recruits
2.0e+09
1.5e+09
1.0e+09
5.0e+08
1990
2000
2010
2020
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
2.0e+09
1.5e+09
1.0e+09
5.0e+08
0.0e+00
0
20000
40000
60000
Spawning Biomass
(c)
0.77
0.79
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

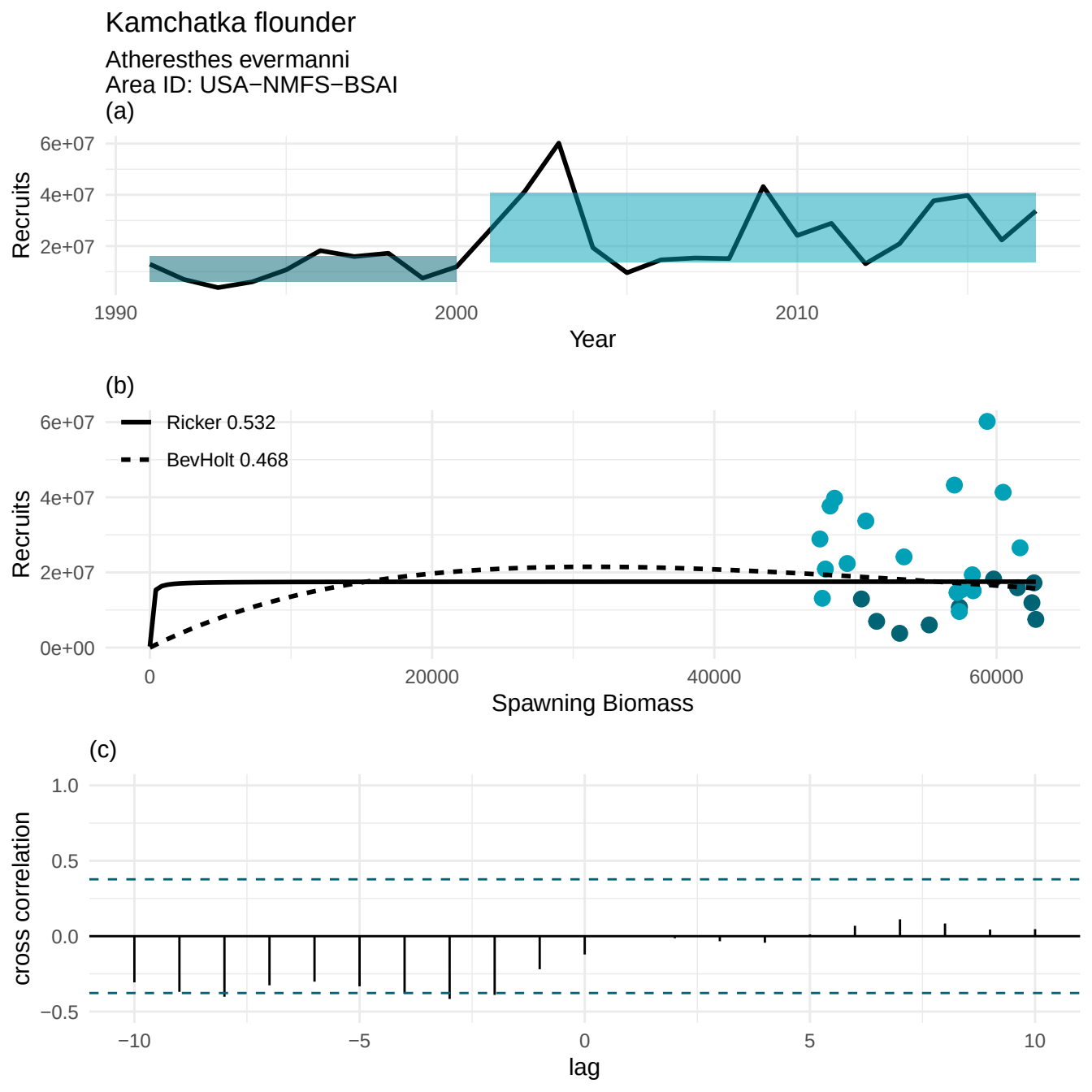

Japanese jack mackerel
Trachurus japonicus
Area ID: Japan−FAJ−TSST
(a)
Recruits
7.5e+09
5.0e+09
2.5e+09
1980
1990
2000
2010
2020
Year
(b)
Ricker 0.539
BevHolt 0.461
Recruits
7.5e+09
5.0e+09
2.5e+09
0.0e+00
0e+00
1e+05
2e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.63
0.31
−10
−5
0
5
10
lag

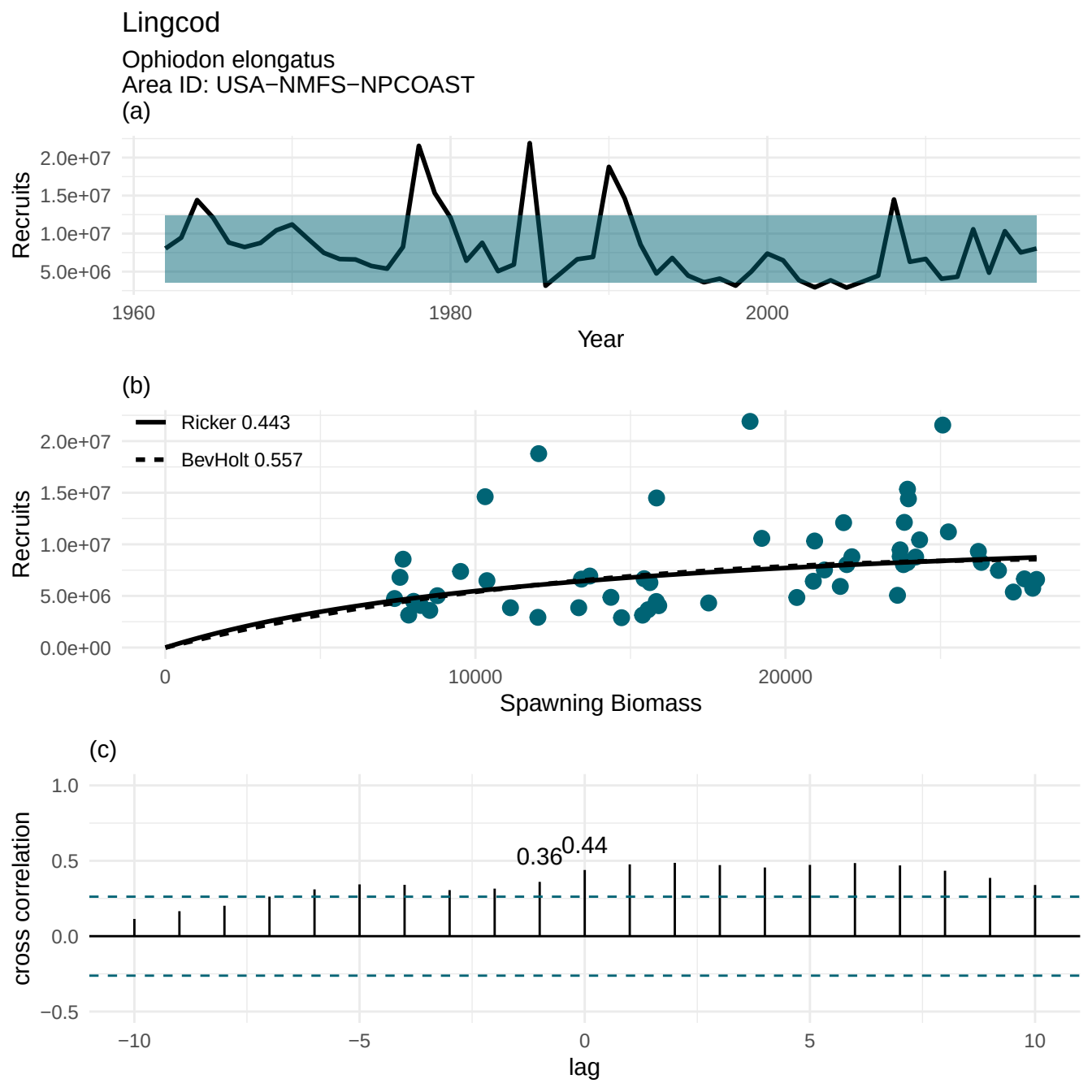

Japanese pufferfish
Takifugu rubripes
Area ID: Japan−FAJ−IMKB
(a)
Recruits
9e+05
6e+05
3e+05
0e+00
1995
2000
2005
2010
Year
(b)
Ricker 1
BevHolt 0.000107
Recruits
9e+05
6e+05
3e+05
0e+00
0
50
100
150
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

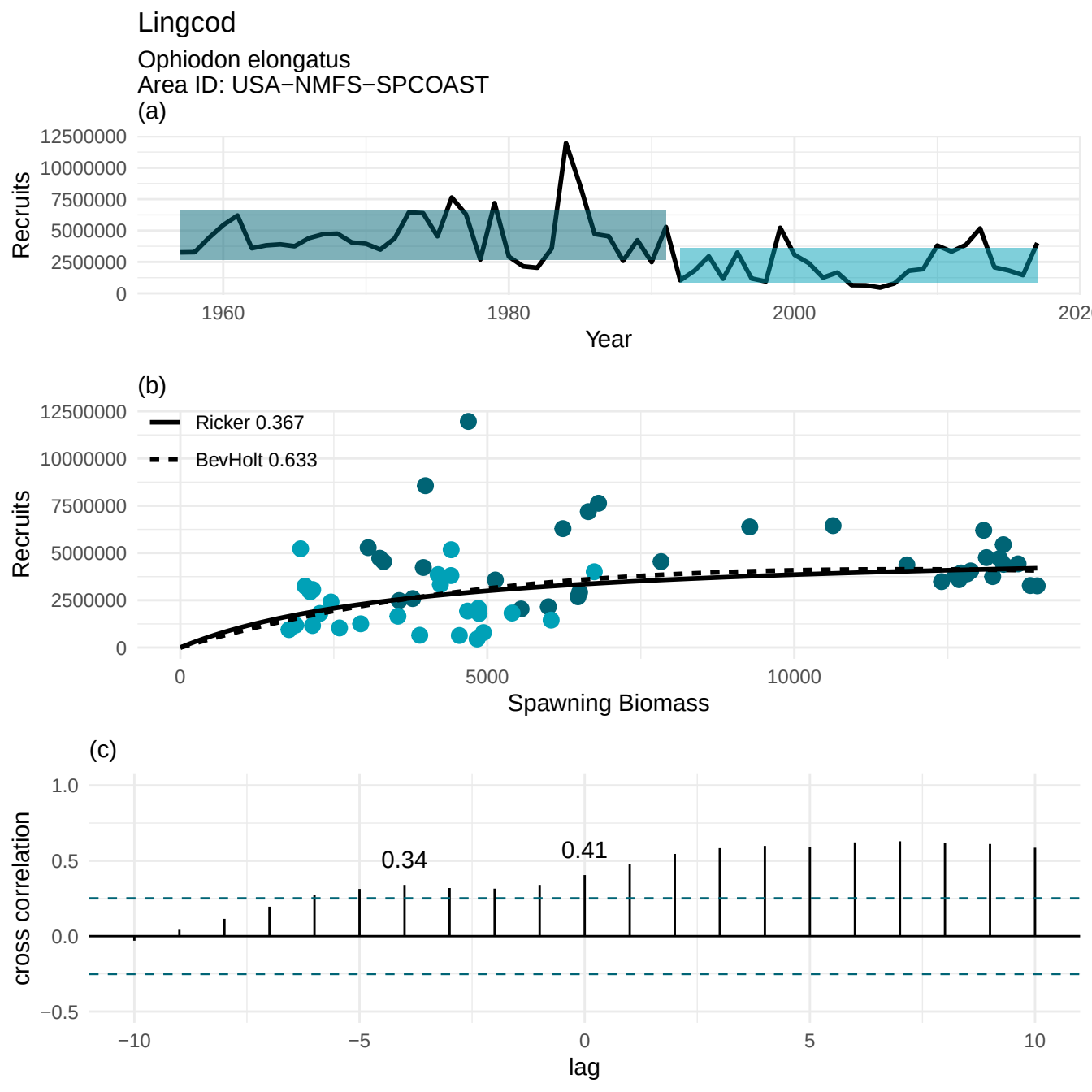

Kelp greenling
Hexagrammos decagrammus
Area ID: USA−NMFS−ORECOAST
(a)
Recruits
3e+06
2e+06
1e+06
1980
1990
2000
2010
Year
(b)
Ricker 1
BevHolt 0.000132
Recruits
3e+06
2e+06
1e+06
0e+00
0
100
200
300
400
500
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.73
−10
−5
0
5
10
lag

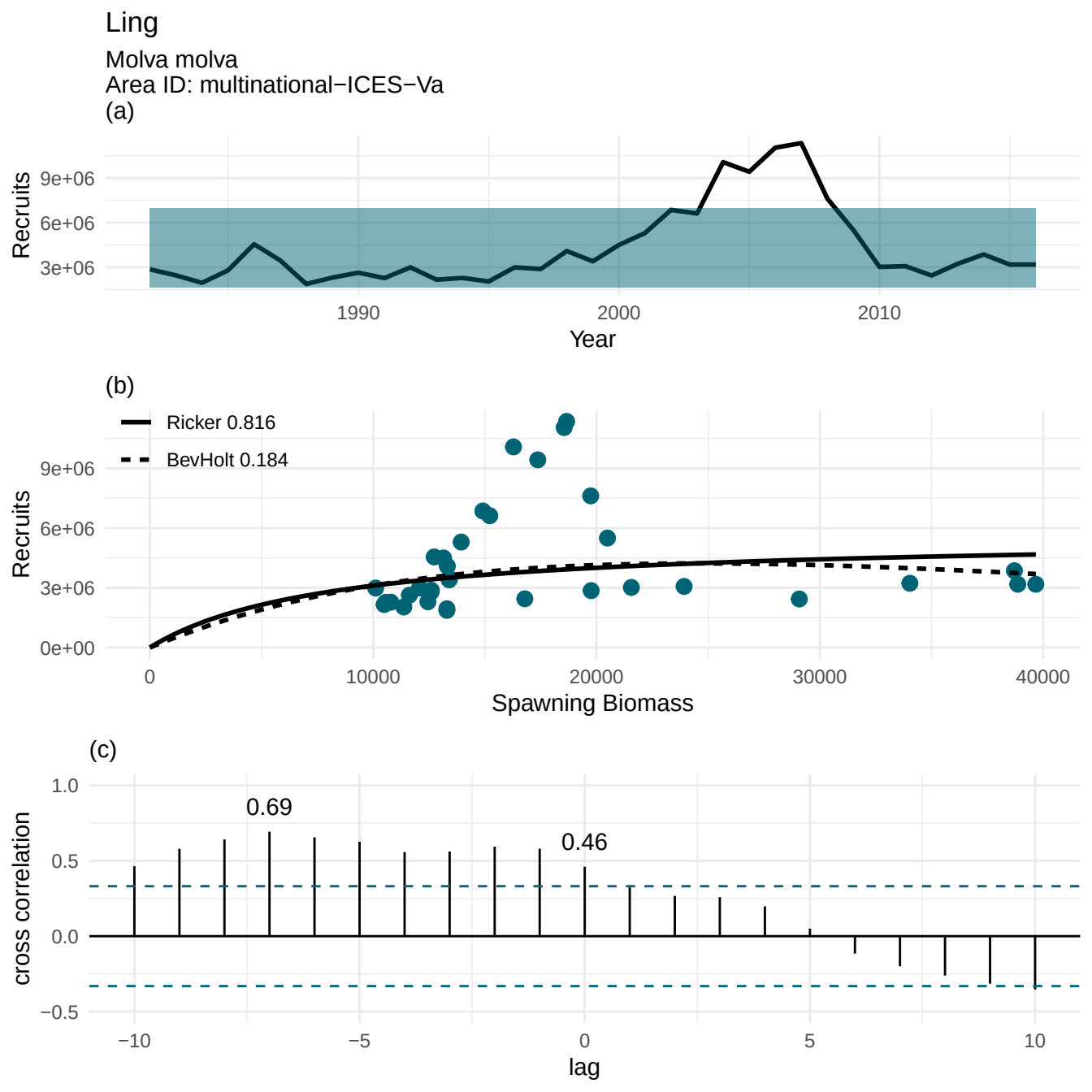

King mackerel
Scomberomorus cavalla
Area ID: USA−NMFS−GM
(a)
Recruits
9e+06
6e+06
3e+06
1970
1980
1990
2000
2010
Year
(b)
Ricker 1
BevHolt 8.04e−06
Recruits
9e+06
6e+06
3e+06
0e+00
0e+00
1e+09
2e+09
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.46
−10
−5
0
5
10
lag

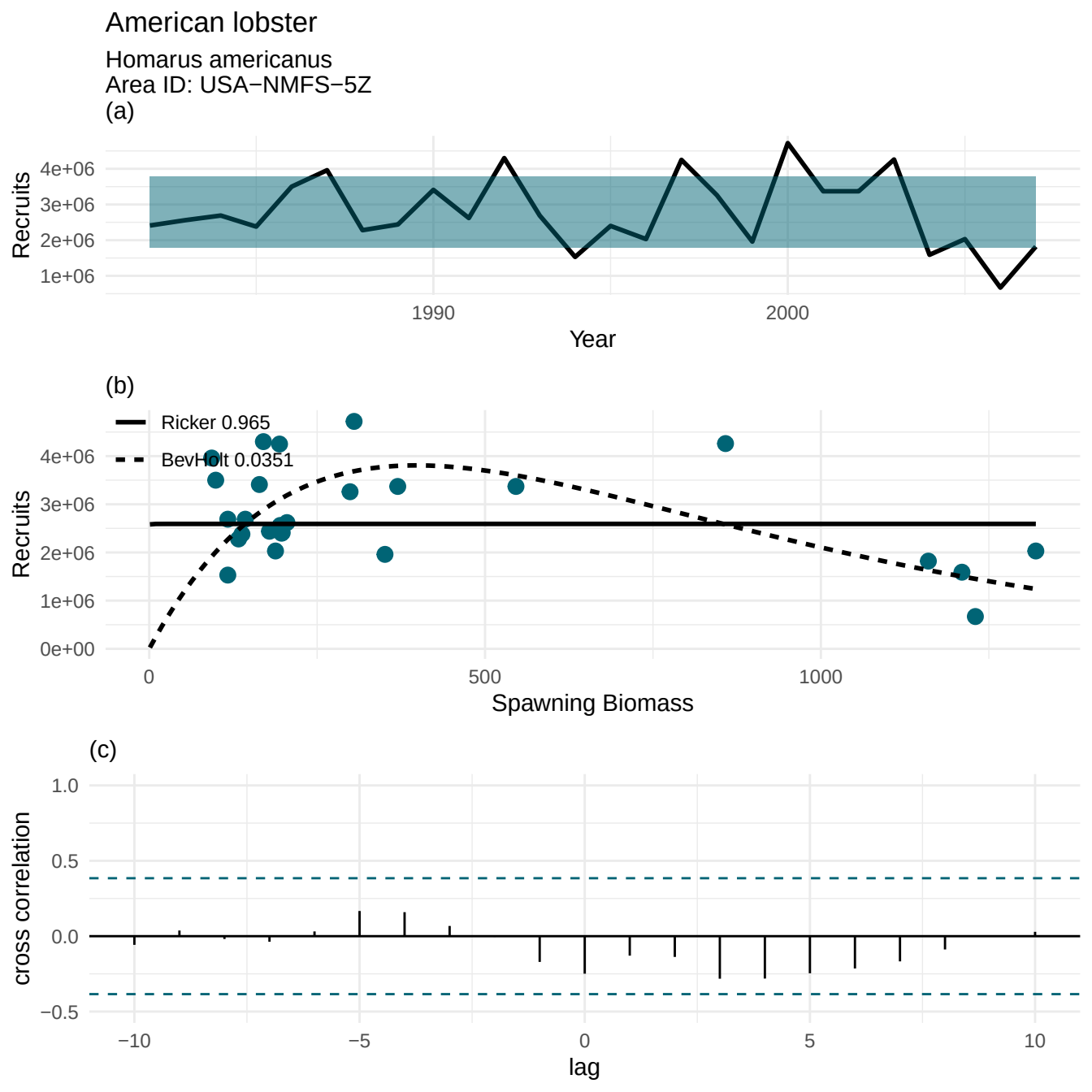

King mackerel
Scomberomorus cavalla
Area ID: USA−NMFS−SATLC
(a)
Recruits
1.6e+07
1.2e+07
8.0e+06
4.0e+06
1980
1990
2000
2010
Year
(b)
Ricker 0.641
BevHolt 0.359
Recruits
1.5e+07
1.0e+07
5.0e+06
0.0e+00
0e+00
2e+09
4e+09
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

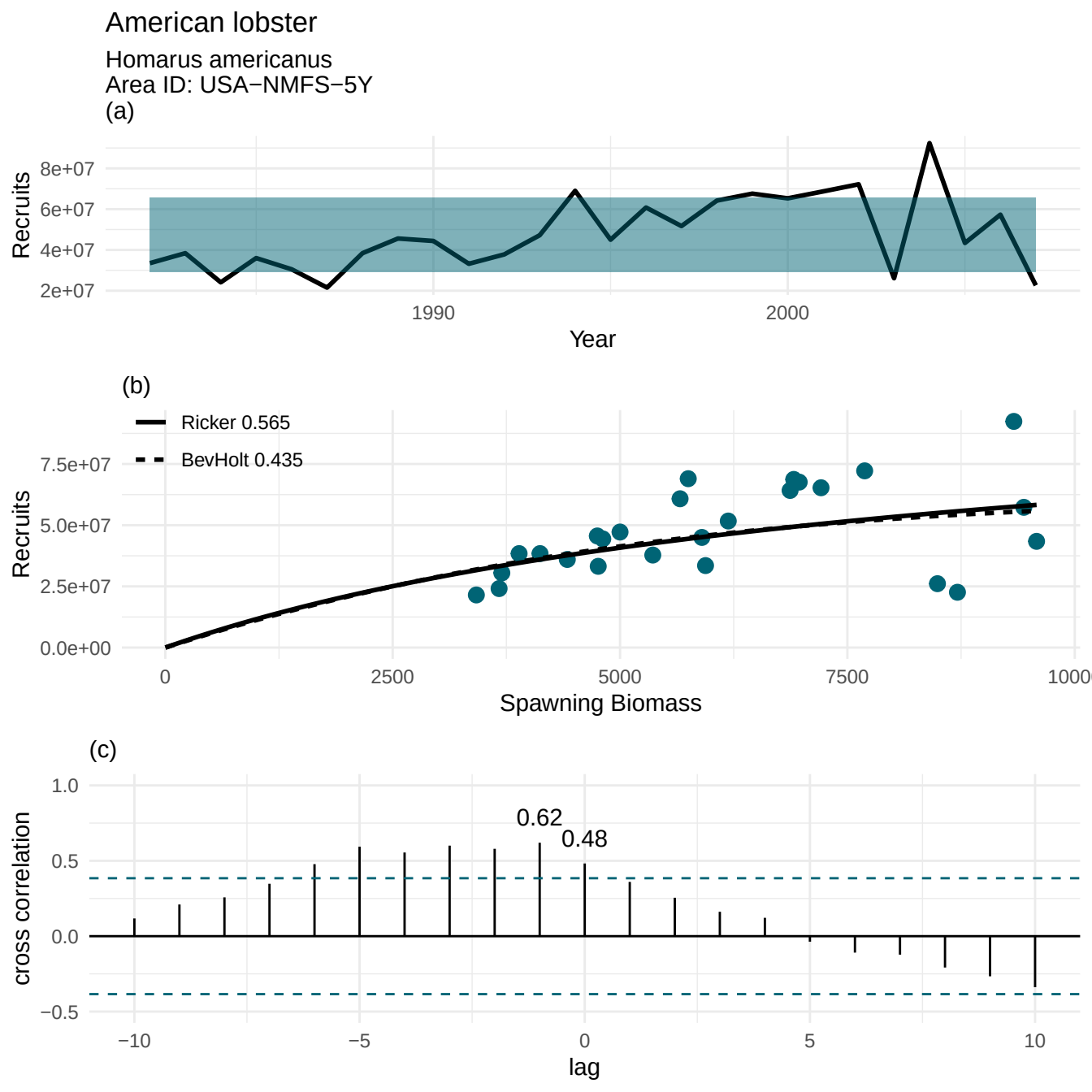

Kamchatka flounder
Atheresthes evermanni
Area ID: USA−NMFS−BSAI
(a)
Recruits
6e+07
4e+07
2e+07
1990
2000
2010
Year
(b)
Ricker 0.532
BevHolt 0.468
Recruits
6e+07
4e+07
2e+07
0e+00
0
20000
40000
60000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

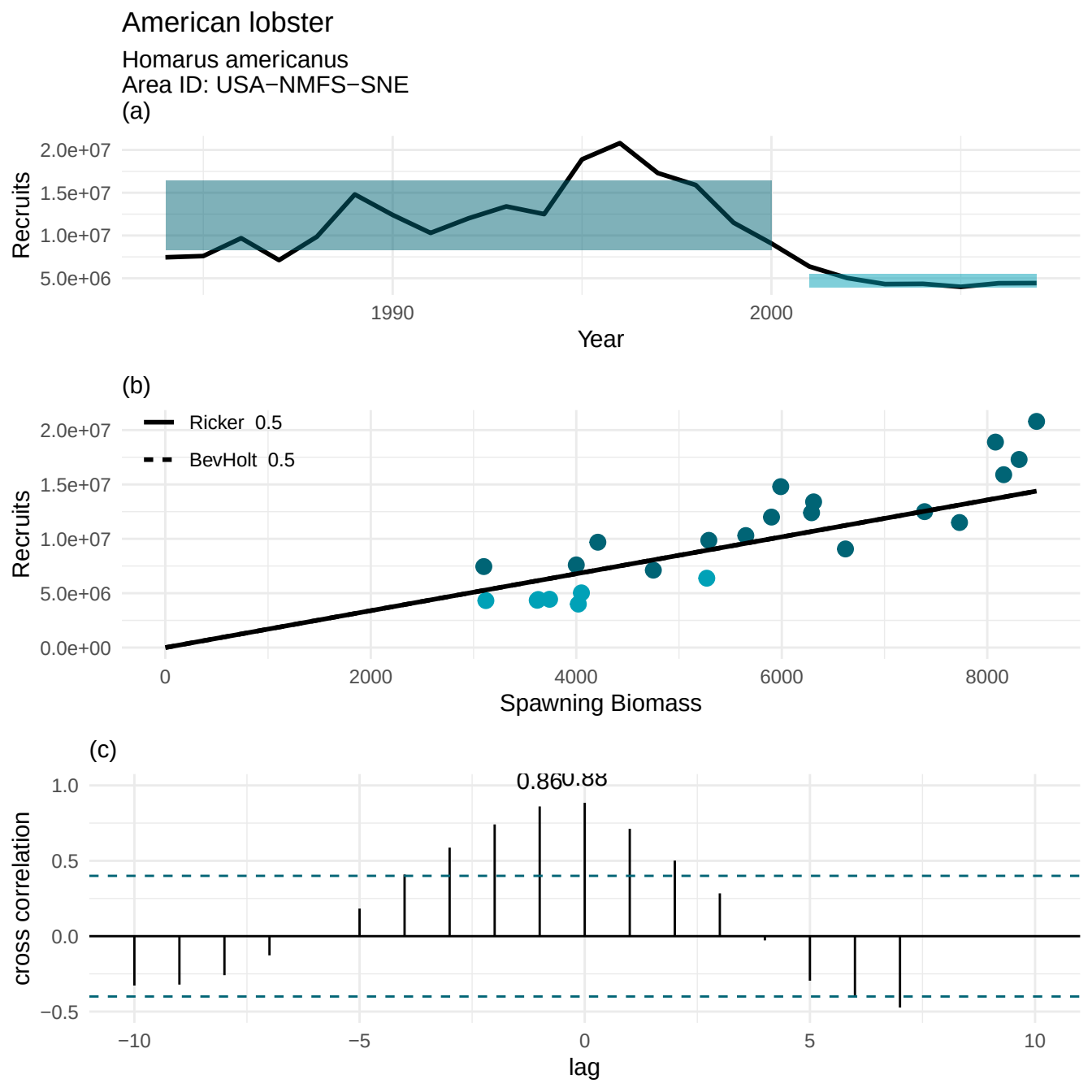

Lingcod
Ophiodon elongatus
Area ID: USA−NMFS−NPCOAST
(a)
Recruits
2.0e+07
1.5e+07
1.0e+07
5.0e+06
1960
1980
2000
Year
(b)
Ricker 0.443
BevHolt 0.557
Recruits
2.0e+07
1.5e+07
1.0e+07
5.0e+06
0.0e+00
0
10000
20000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.36
0.44
−10
−5
0
5
10
lag

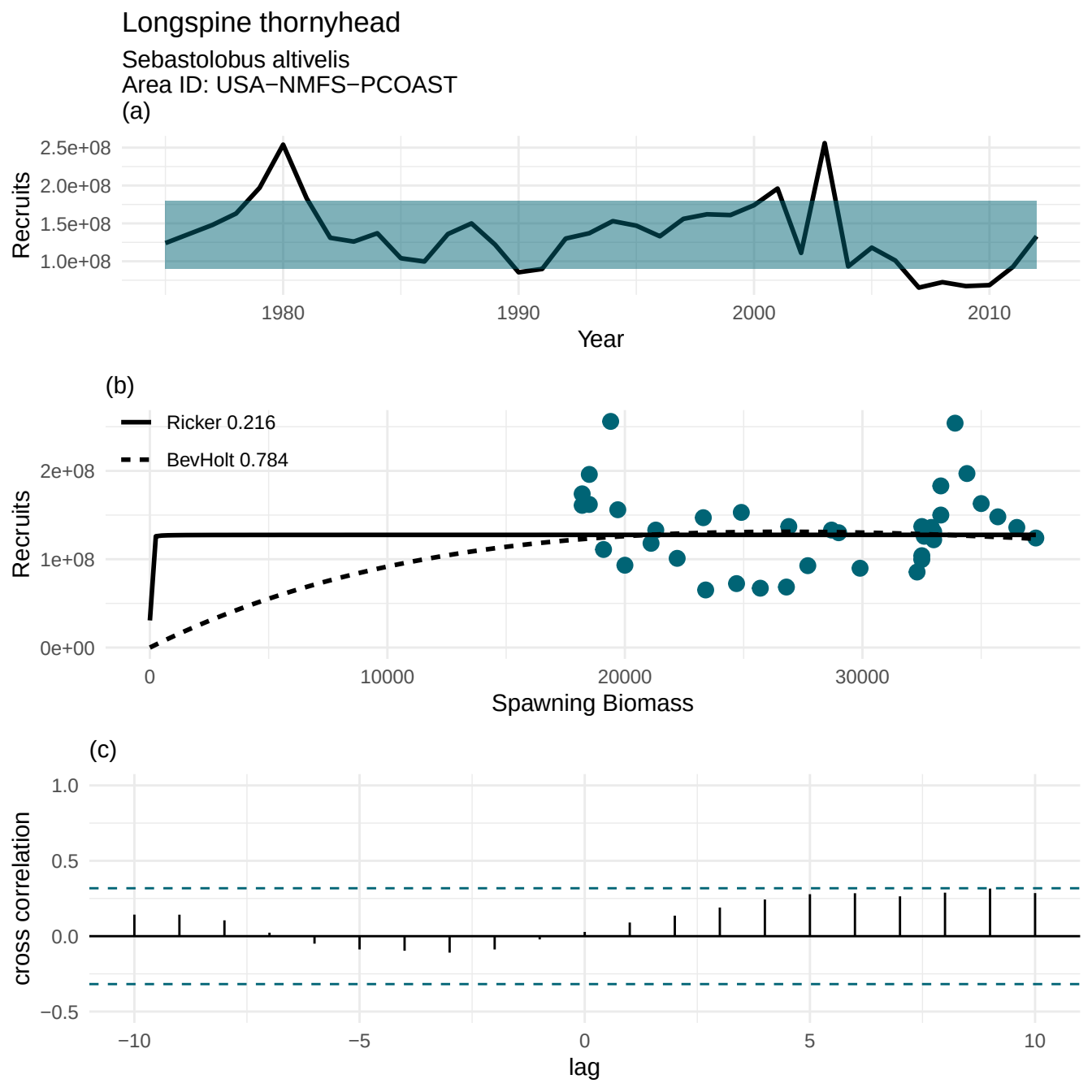

Lingcod
Ophiodon elongatus
Area ID: USA−NMFS−SPCOAST
(a)
Recruits
12500000
10000000
7500000
5000000
2500000
0
1960
1980
2000
202
Year
(b)
Ricker 0.367
BevHolt 0.633
Recruits
0
5000
10000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.34
0.41
−10
−5
0
5
10
lag

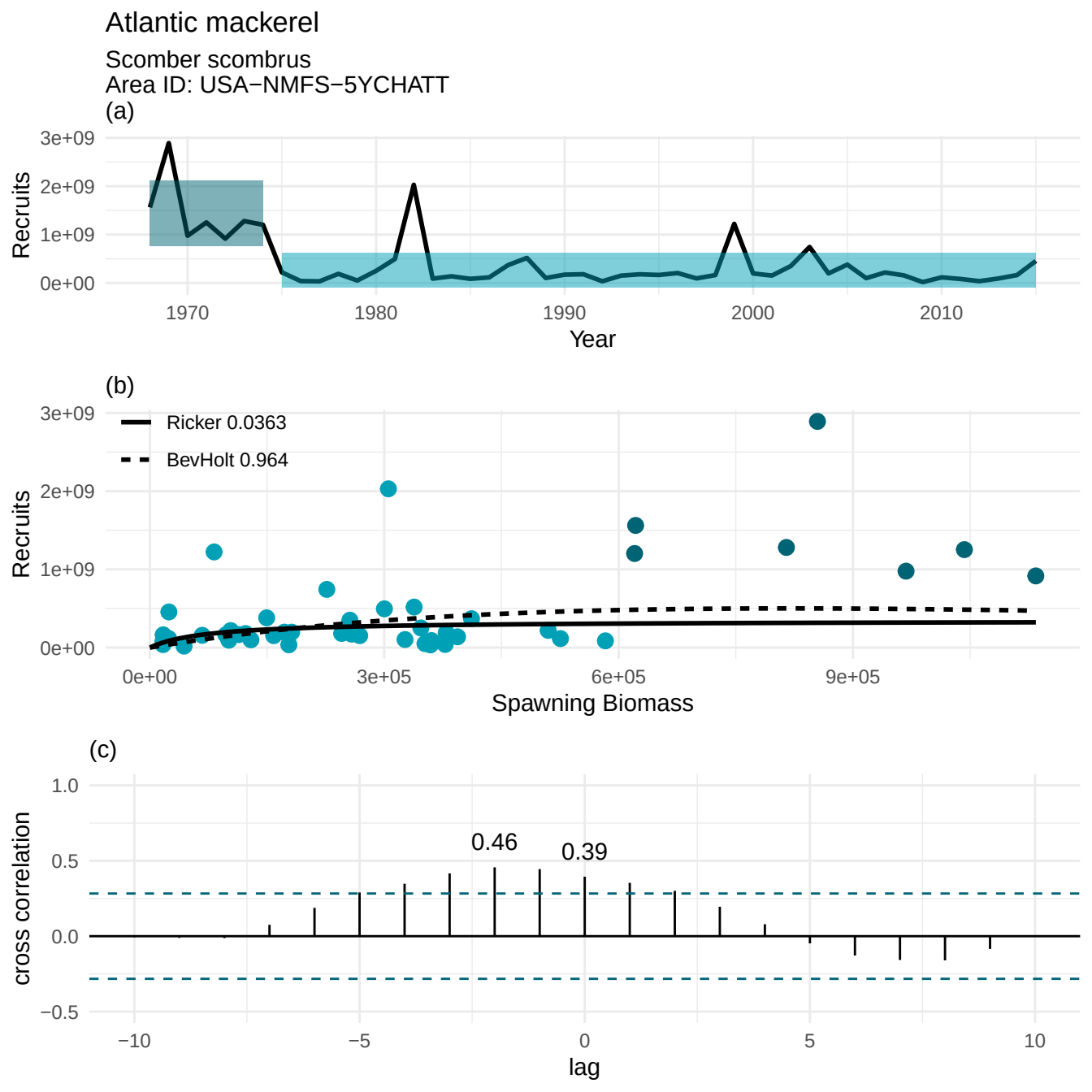

Ling
Molva molva
Area ID: multinational−ICES−Va
(a)
Recruits
9e+06
6e+06
3e+06
1990
2000
2010
Year
(b)
Ricker 0.816
BevHolt 0.184
Recruits
9e+06
6e+06
3e+06
0e+00
0
10000
20000
30000
40000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.69
0.46
−10
−5
0
5
10
lag


American lobster
Homarus americanus
Area ID: USA−NMFS−5Z
(a)
Recruits
4e+06
3e+06
2e+06
1e+06
1990
2000
Year
(b)
Ricker 0.965
BevHolt 0.0351
Recruits
4e+06
3e+06
2e+06
1e+06
0e+00
0
500
1000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag


American lobster
Homarus americanus
Area ID: USA−NMFS−5Y
(a)
Recruits
8e+07
6e+07
4e+07
2e+07
1990
2000
Year
(b)
Ricker 0.565
BevHolt 0.435
Recruits
7.5e+07
5.0e+07
2.5e+07
0.0e+00
0
2500
5000
7500
1000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.62
0.48
−10
−5
0
5
10
lag


American lobster
Homarus americanus
Area ID: USA−NMFS−SNE
(a)
Recruits
2.0e+07
1.5e+07
1.0e+07
5.0e+06
1990
2000
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
2.0e+07
1.5e+07
1.0e+07
5.0e+06
0.0e+00
0
2000
4000
6000
8000
Spawning Biomass
(c)
0.86
0.88
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

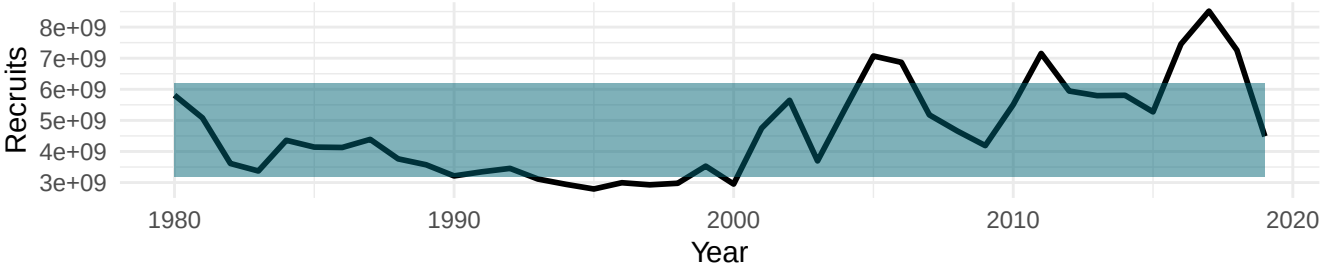

Longspine thornyhead
Sebastolobus altivelis
Area ID: USA−NMFS−PCOAST
(a)
Recruits
2.5e+08
2.0e+08
1.5e+08
1.0e+08
1980
1990
2000
2010
Year
(b)
Ricker 0.216
BevHolt 0.784
Recruits
2e+08
1e+08
0e+00
0
10000
20000
30000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag


Atlantic mackerel
Scomber scombrus
Area ID: USA−NMFS−5YCHATT
(a)
Recruits
3e+09
2e+09
1e+09
0e+00
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.0363
BevHolt 0.964
Recruits
3e+09
2e+09
1e+09
0e+00
0e+00
3e+05
6e+05
9e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.46
0.39
−10
−5
0
5
10
lag

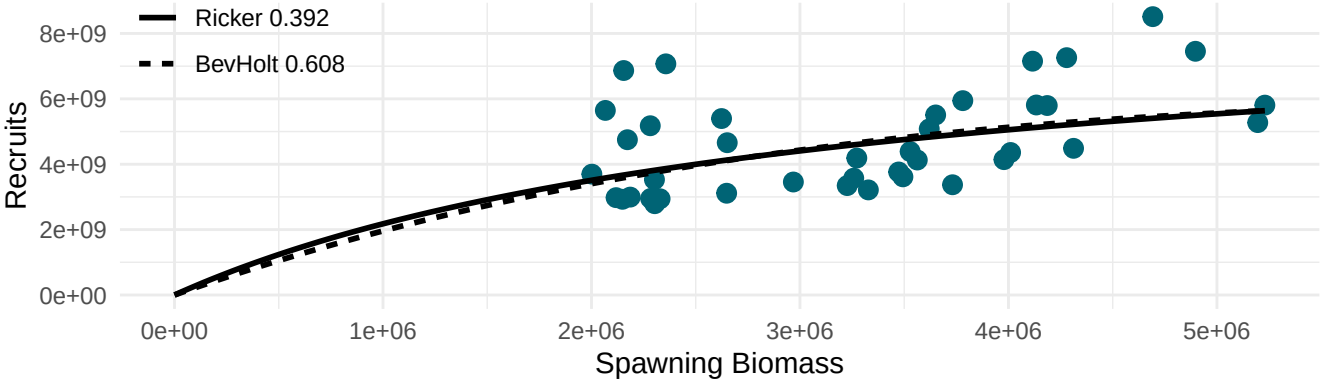
Mackerel

Scomber scombrus
Area ID: multinational−ICES−IIa−IIIabd−IV−Vb−VI−VII−VIIIabcde−XII−XIV−Ixa

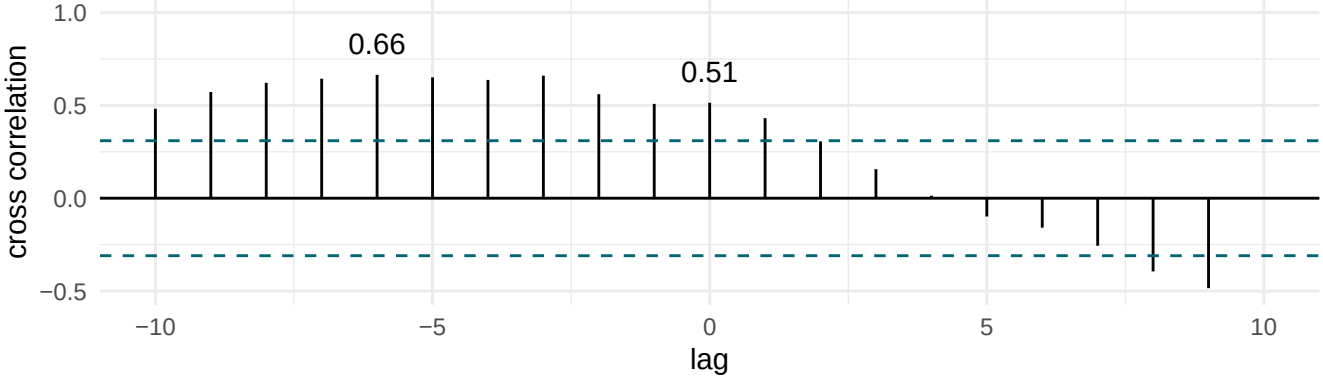
(a)

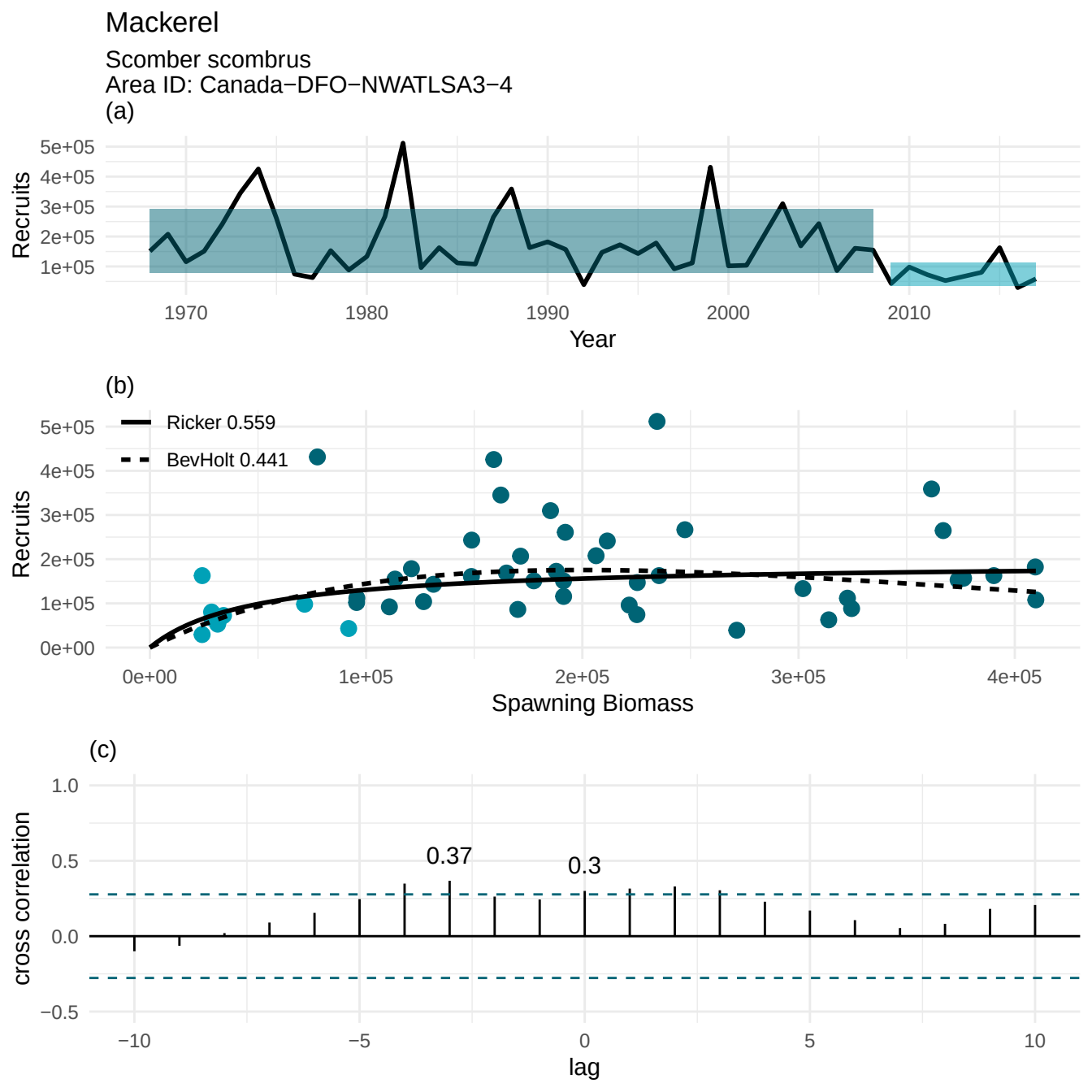


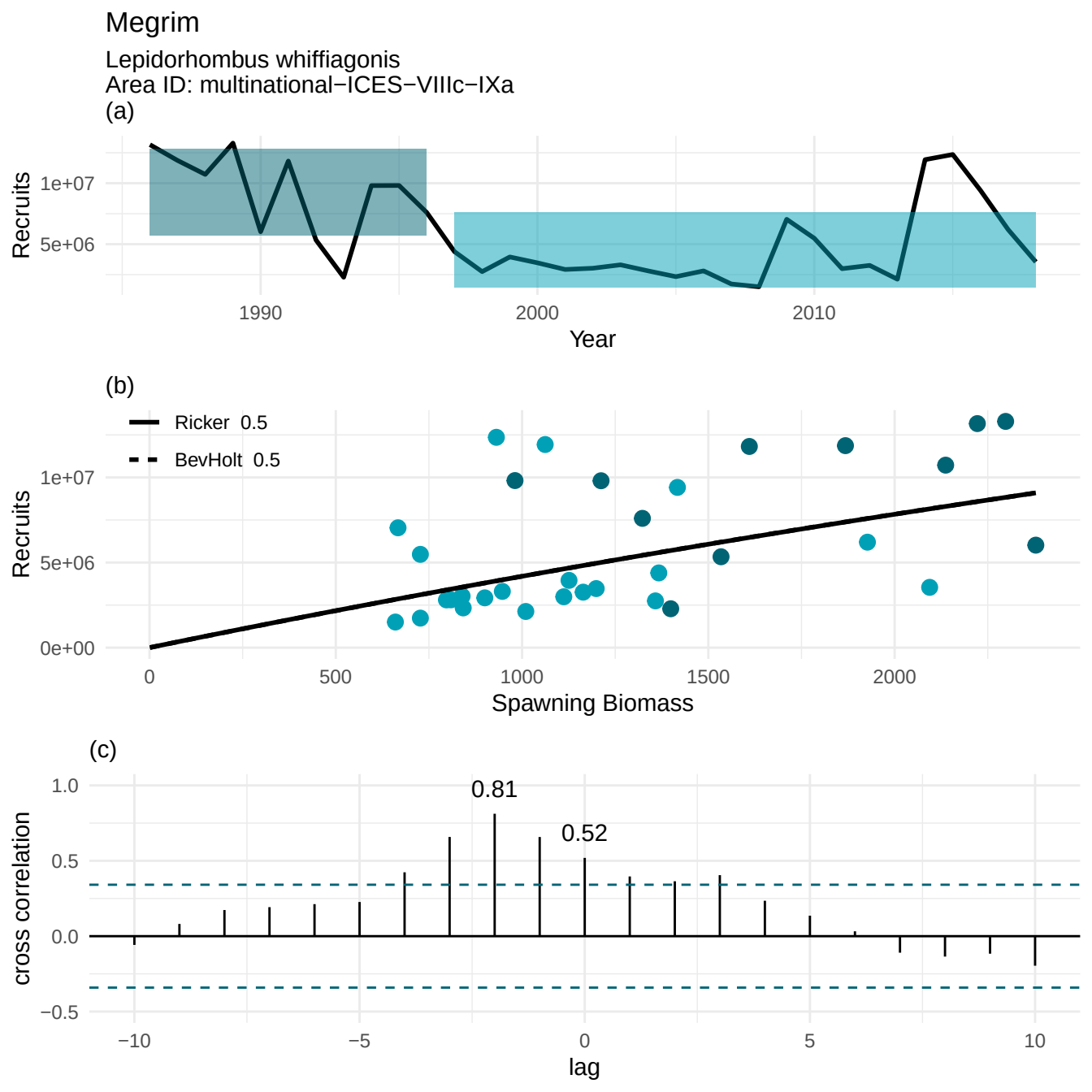
(b)

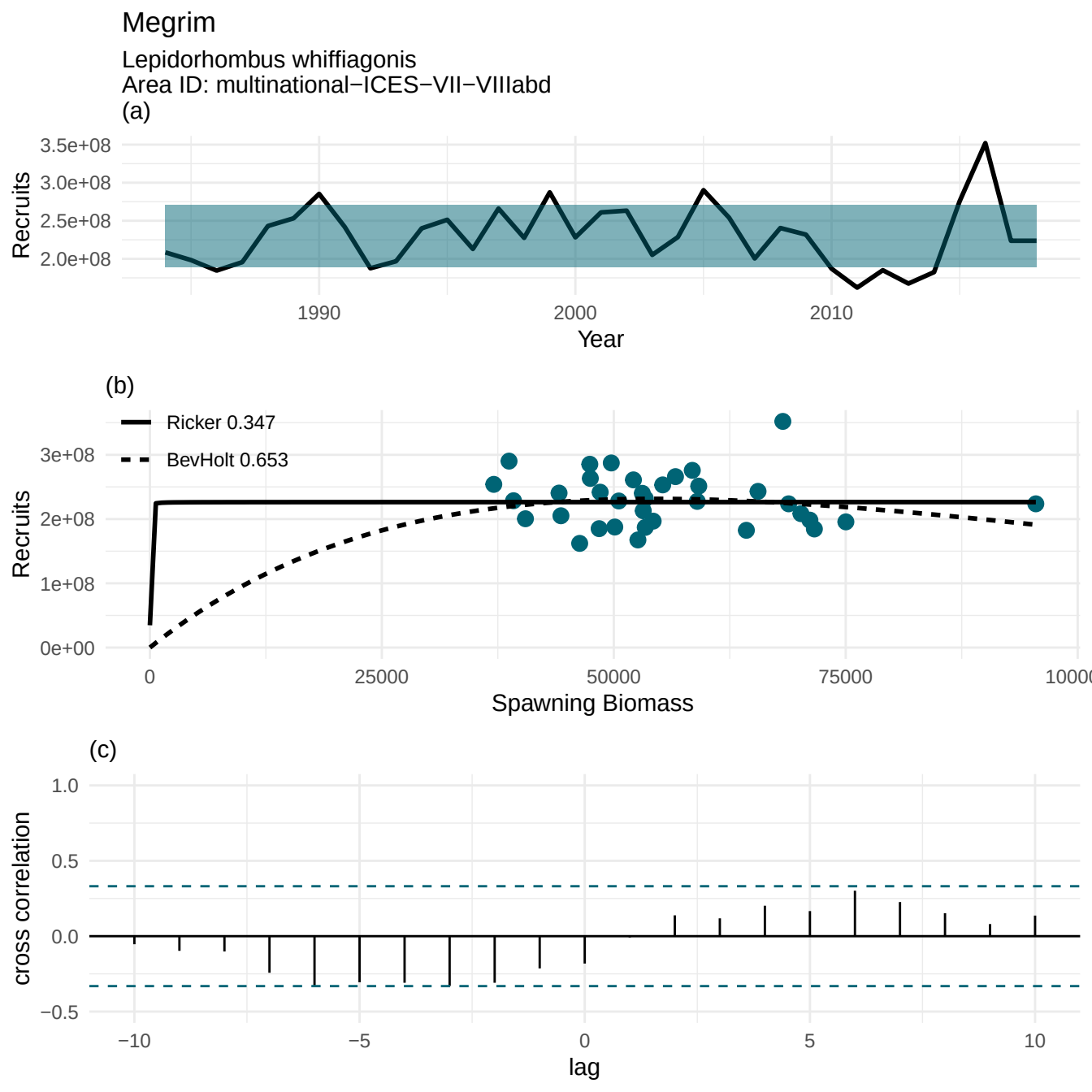


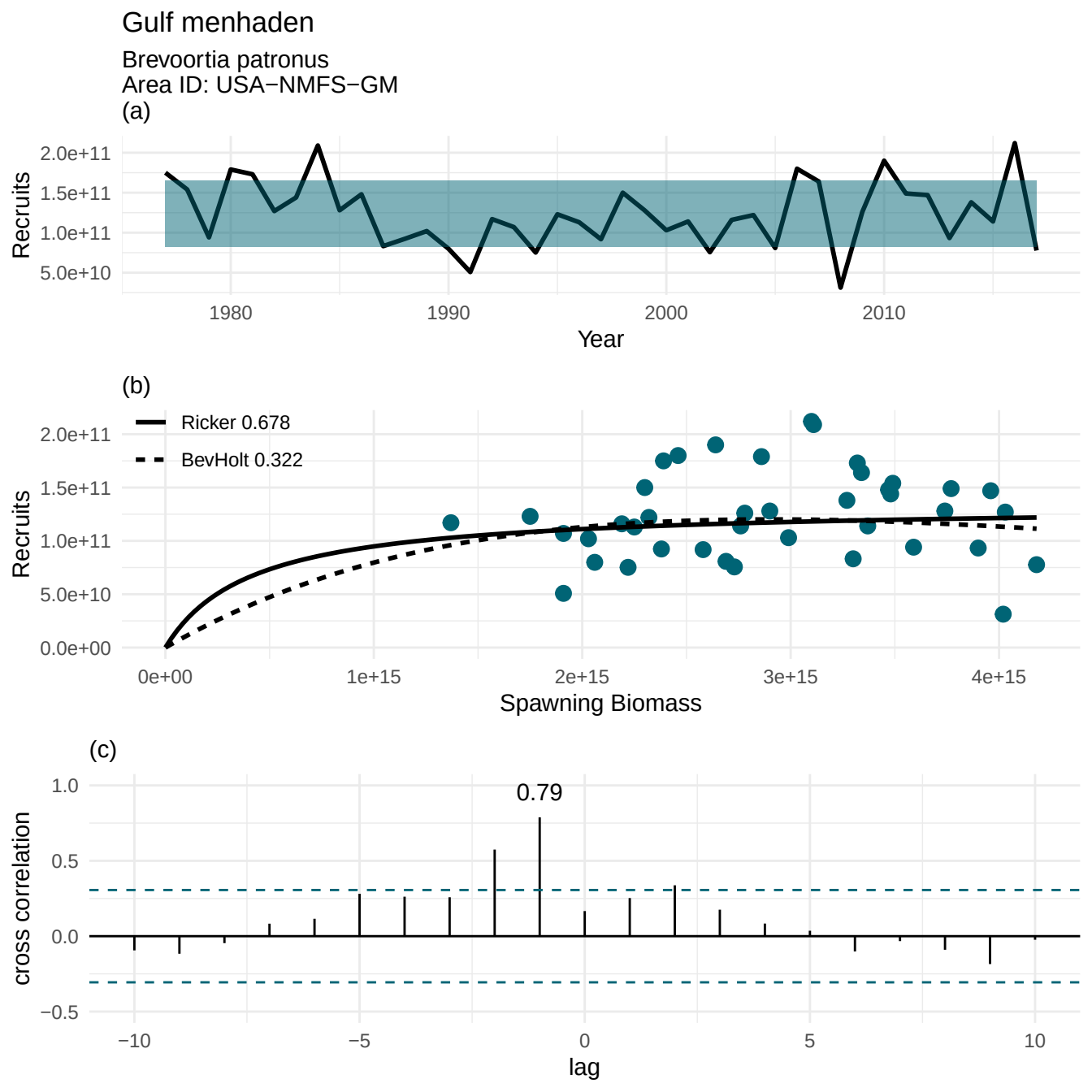
(c)

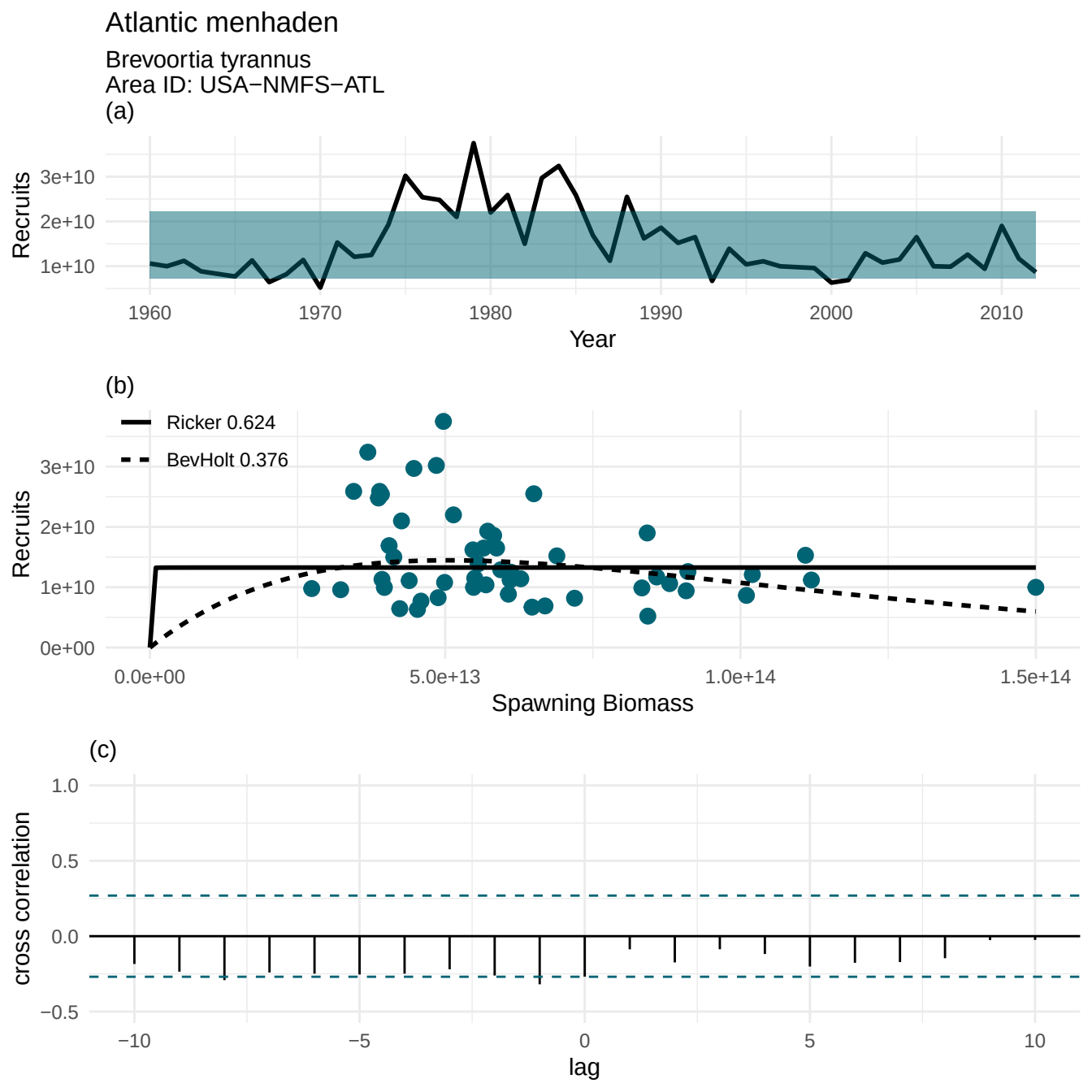


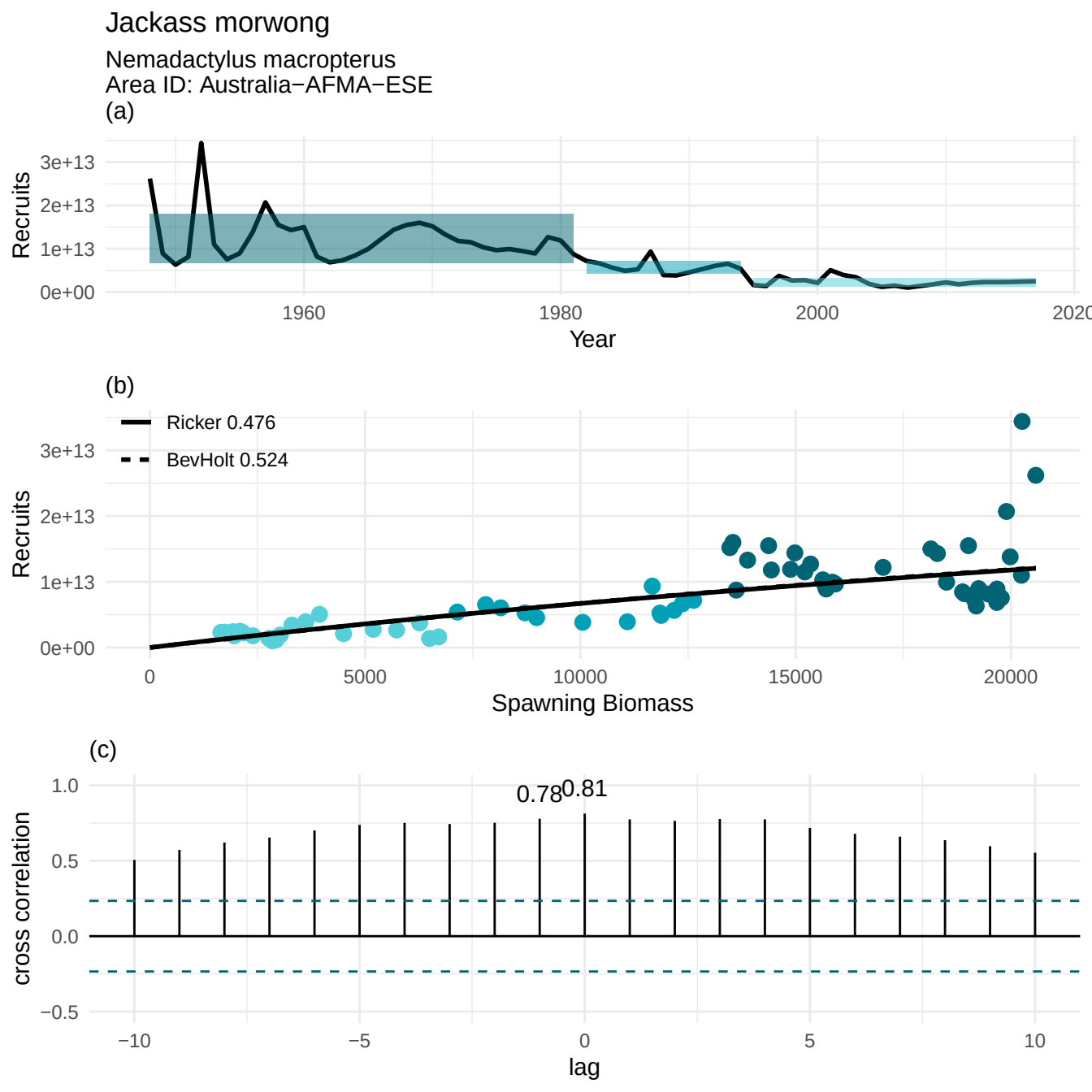

Mackerel
Scomber scombrus
Area ID: Canada−DFO−NWATLSA3−4
(a)
Recruits
5e+05
4e+05
3e+05
2e+05
1e+05
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.559
BevHolt 0.441
Recruits
5e+05
4e+05
3e+05
2e+05
1e+05
0e+00
0e+00
1e+05
2e+05
3e+05
4e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.37
0.3
−10
−5
0
5
10
lag

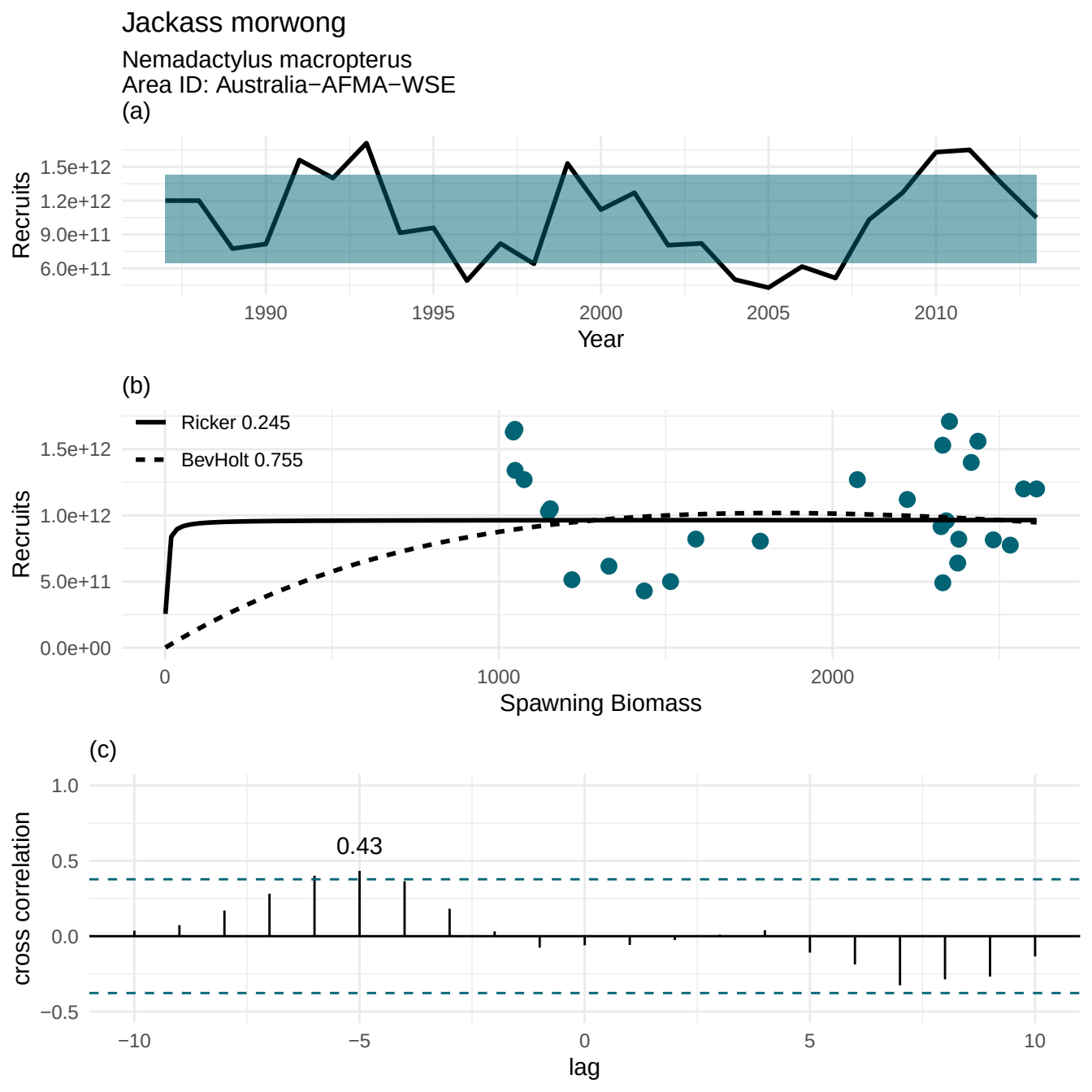

Megrim
Lepidorhombus whiffiagonis
Area ID: multinational−ICES−VIIIc−IXa
(a)
Recruits
1e+07
5e+06
1990
2000
2010
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
1e+07
5e+06
0e+00
0
500
1000
1500
2000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.81
0.52
−10
−5
0
5
10
lag

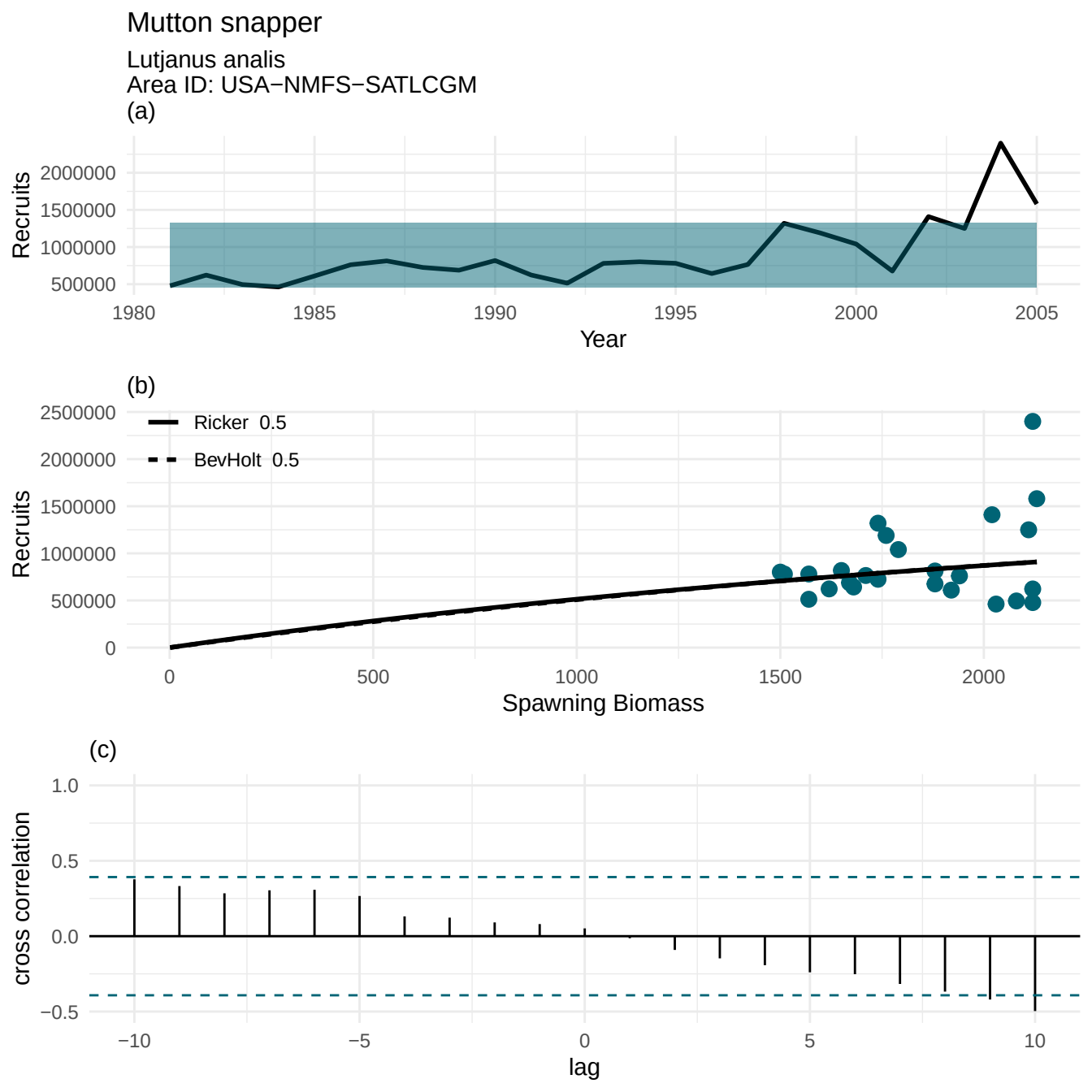

Megrim
Lepidorhombus whiffiagonis
Area ID: multinational−ICES−VII−VIIIabd
(a)
Recruits
3.5e+08
3.0e+08
2.5e+08
2.0e+08
1990
2000
2010
Year
(b)
Ricker 0.347
BevHolt 0.653
Recruits
3e+08
2e+08
1e+08
0e+00
0
25000
50000
75000
10000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

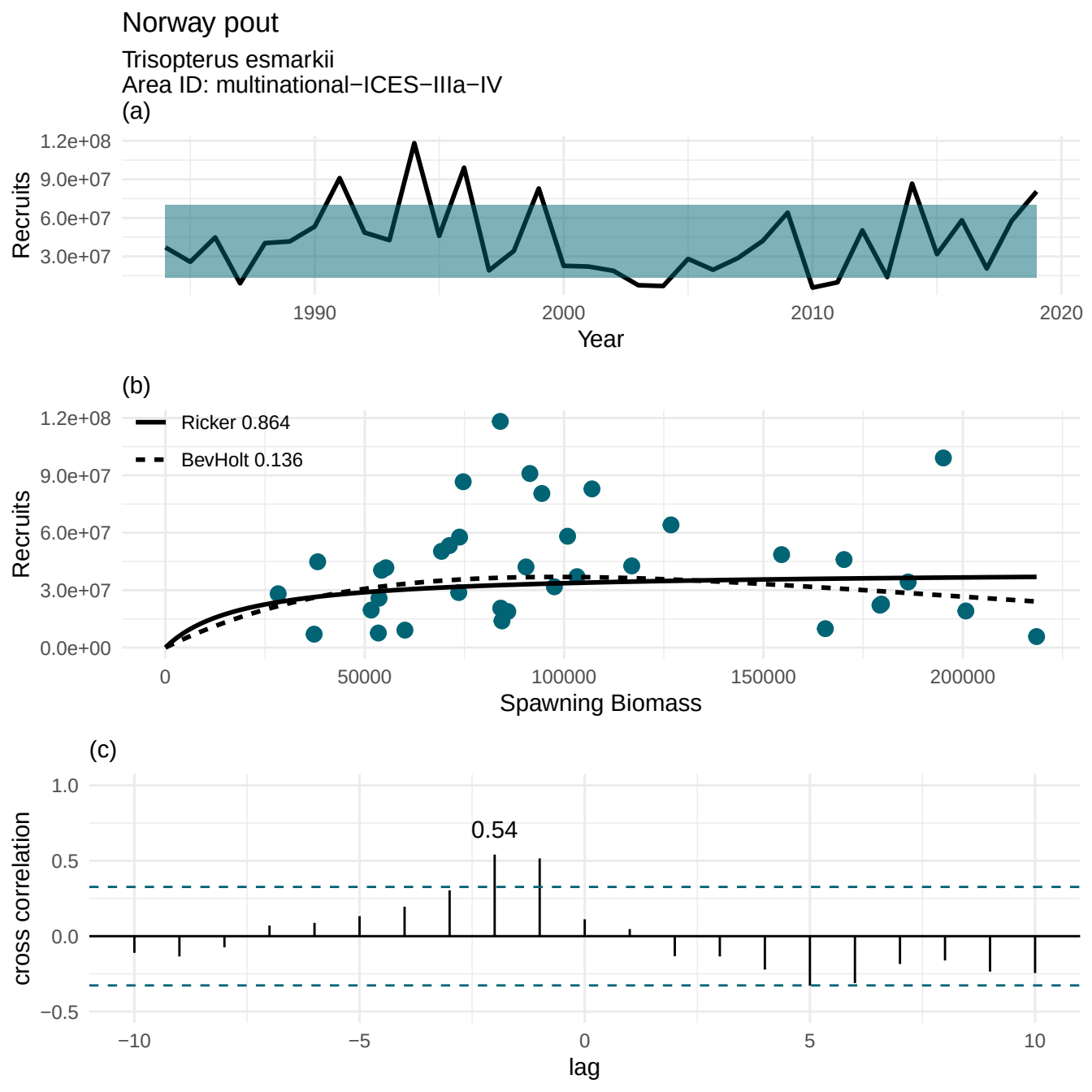

Gulf menhaden
Brevoortia patronus
Area ID: USA−NMFS−GM
(a)
Recruits
2.0e+11
1.5e+11
1.0e+11
5.0e+10
1980
1990
2000
2010
Year
(b)
Ricker 0.678
BevHolt 0.322
Recruits
2.0e+11
1.5e+11
1.0e+11
5.0e+10
0.0e+00
0e+00
1e+15
2e+15
3e+15
4e+15
Spawning Biomass
(c)
0.79
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

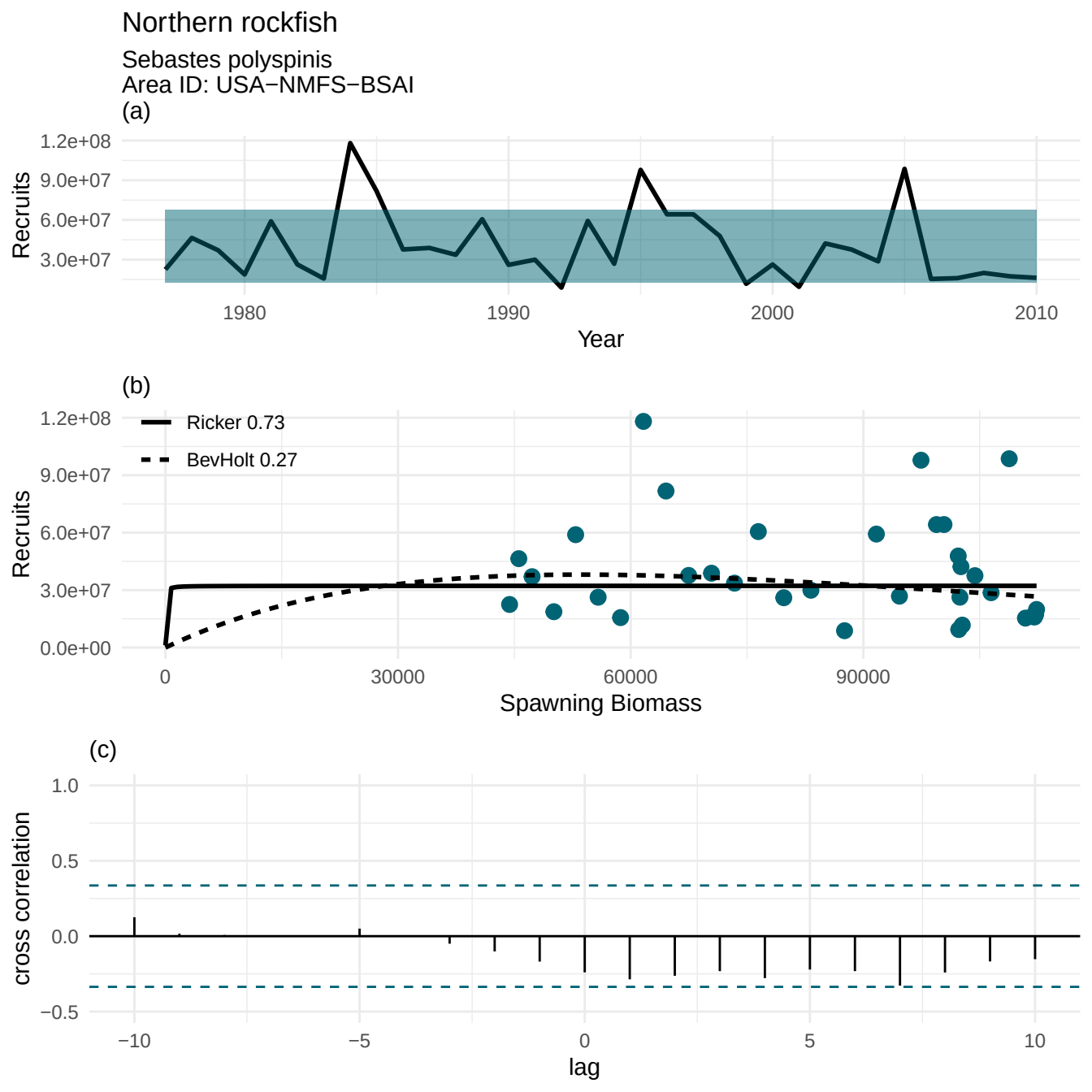

Atlantic menhaden
Brevoortia tyrannus
Area ID: USA−NMFS−ATL
(a)
Recruits
3e+10
2e+10
1e+10
1960
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.624
BevHolt 0.376
Recruits
3e+10
2e+10
1e+10
0e+00
0.0e+00
5.0e+13
1.0e+14
1.5e+14
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

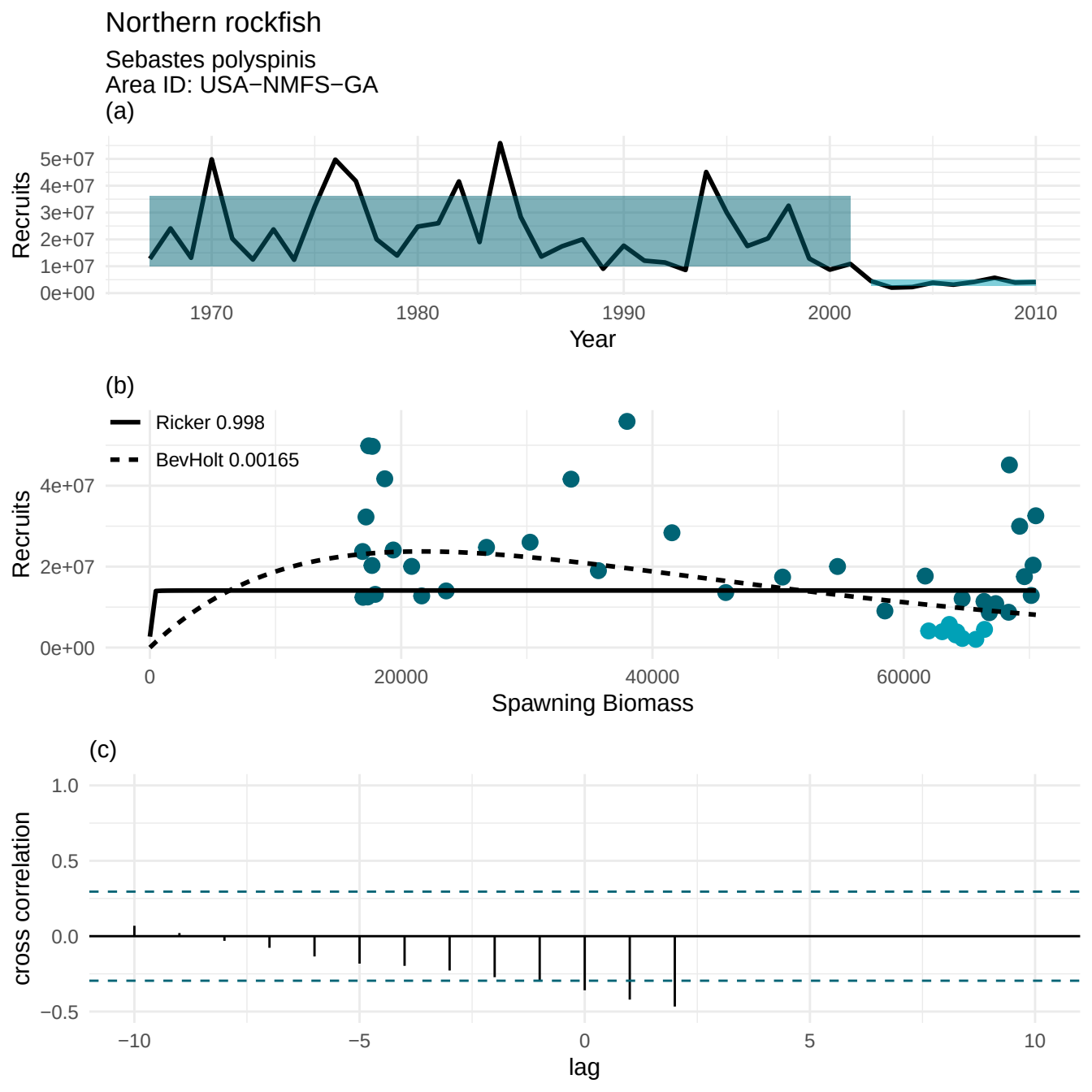

Jackass morwong
Nemadactylus macropterus
Area ID: Australia−AFMA−ESE
(a)
Recruits
3e+13
2e+13
1e+13
0e+00
1960
1980
2000
2020
Year
(b)
Ricker 0.476
BevHolt 0.524
Recruits
3e+13
2e+13
1e+13
0e+00
0
5000
10000
15000
20000
Spawning Biomass
(c)
0.78
0.81
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

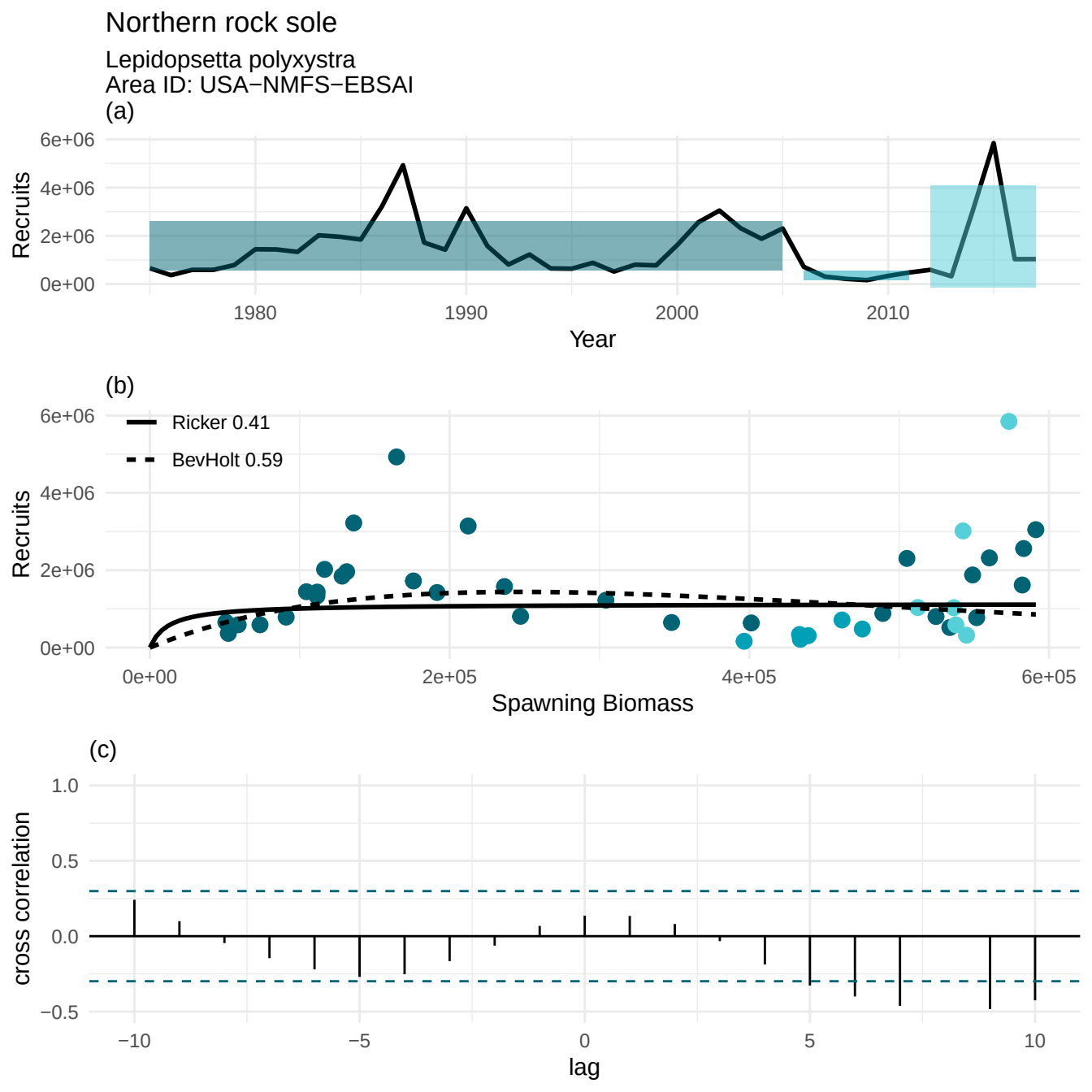

Jackass morwong
Nemadactylus macropterus
Area ID: Australia−AFMA−WSE
(a)
Recruits
1.5e+12
1.2e+12
9.0e+11
6.0e+11
1990
1995
2000
2005
2010
Year
(b)
Ricker 0.245
BevHolt 0.755
Recruits
1.5e+12
1.0e+12
5.0e+11
0.0e+00
0
1000
2000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.43
−10
−5
0
5
10
lag

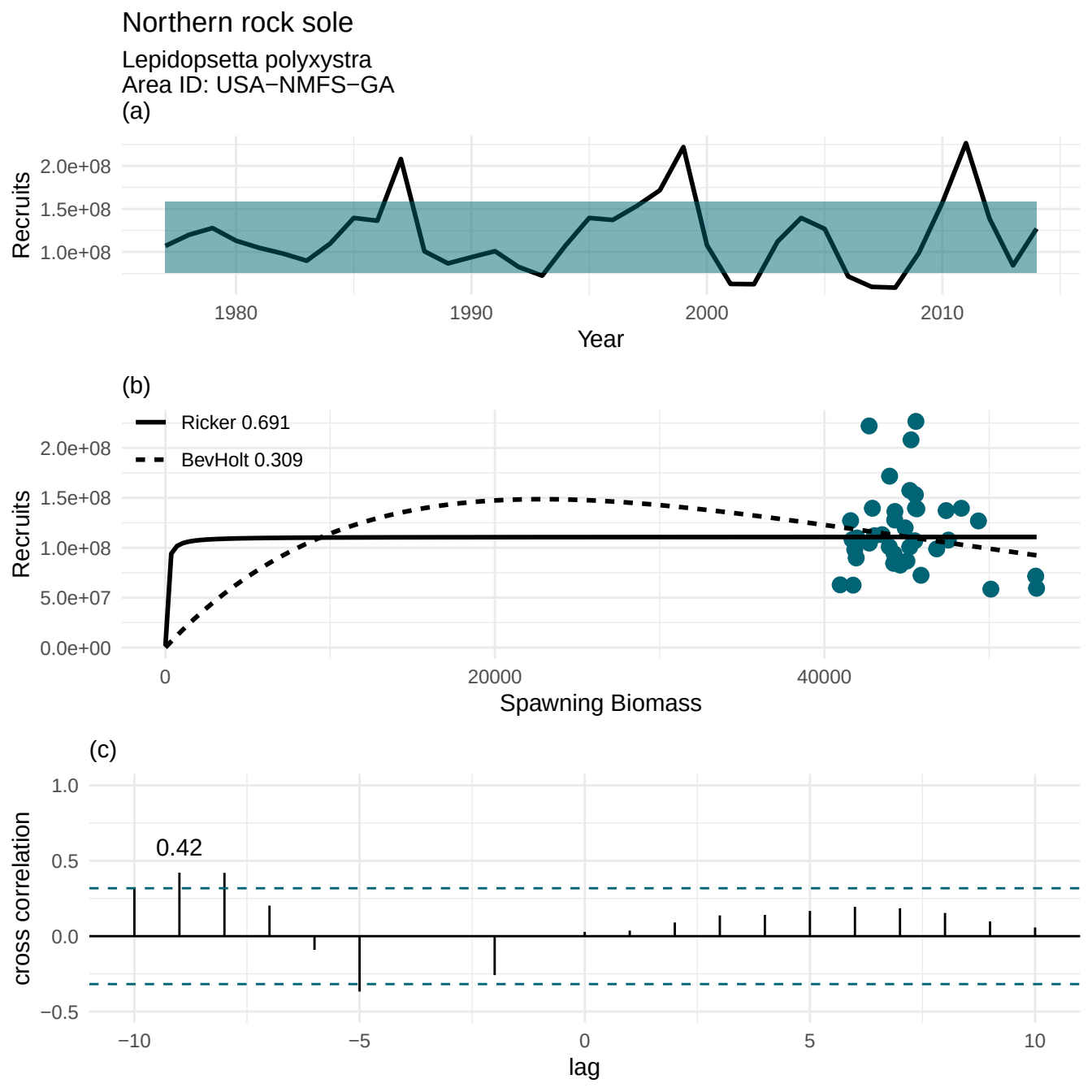

Mutton snapper
Lutjanus analis
Area ID: USA−NMFS−SATLCGM
(a)
Recruits
2000000
1500000
1000000
500000
1980
1985
1990
1995
2000
2005
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
2500000
2000000
1500000
1000000
500000
0
0
500
1000
1500
2000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

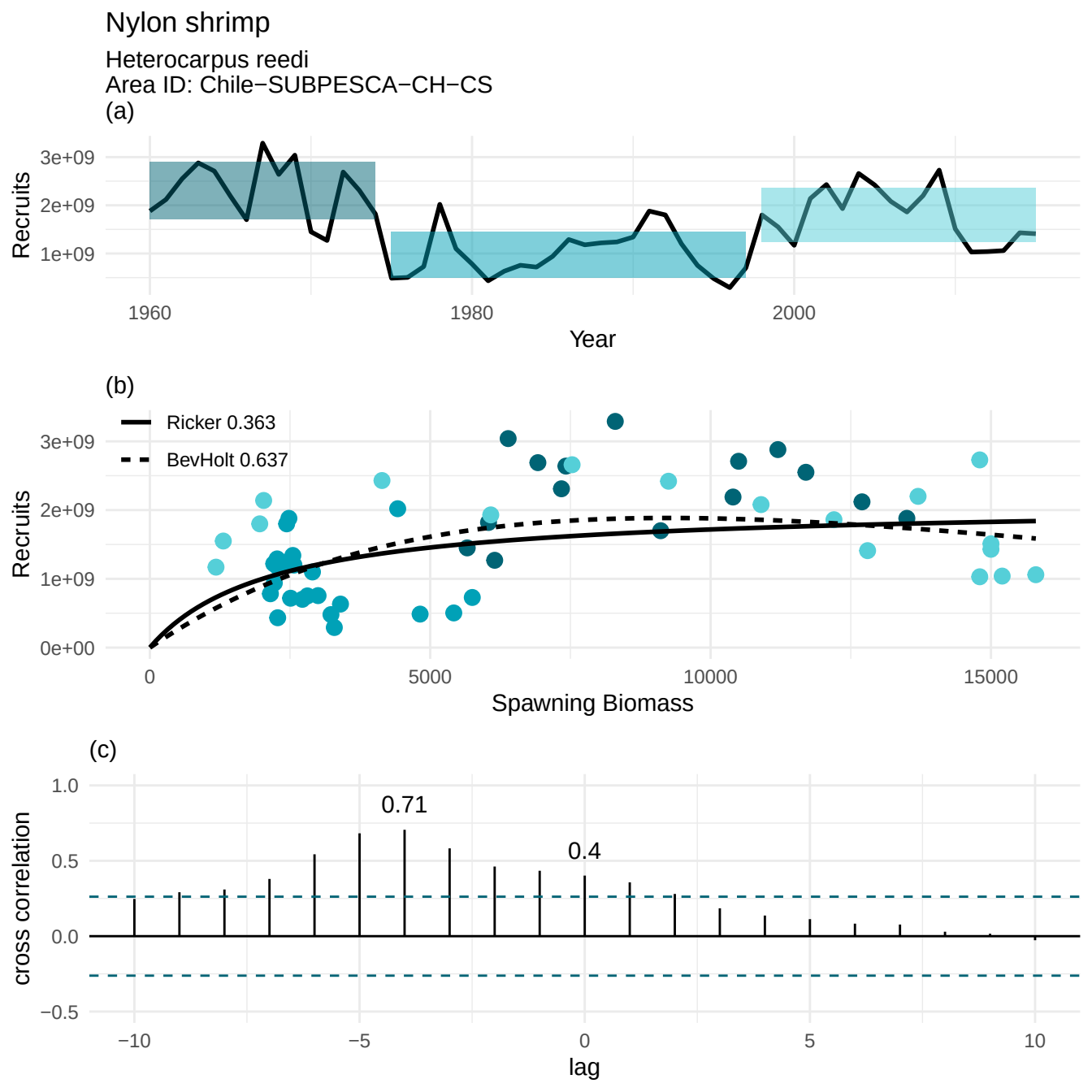

Norway pout
Trisopterus esmarkii
Area ID: multinational−ICES−IIIa−IV
(a)
Recruits
1.2e+08
9.0e+07
6.0e+07
3.0e+07
1990
2000
2010
2020
Year
(b)
Ricker 0.864
BevHolt 0.136
Recruits
1.2e+08
9.0e+07
6.0e+07
3.0e+07
0.0e+00
0
50000
100000
150000
200000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.54
−10
−5
0
5
10
lag

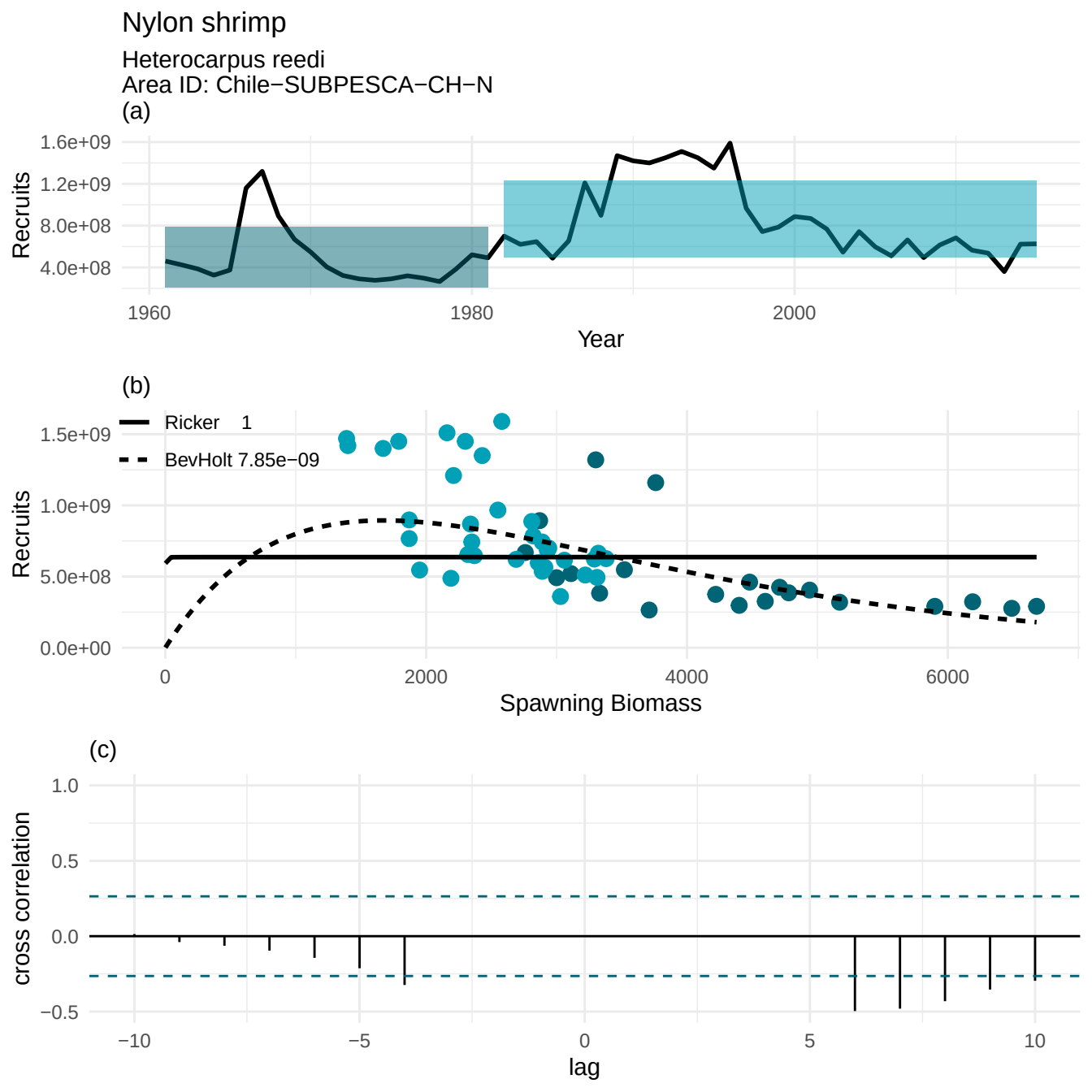

Northern rockfish
Sebastes polyspinis
Area ID: USA−NMFS−BSAI
(a)
Recruits
1.2e+08
9.0e+07
6.0e+07
3.0e+07
1980
1990
2000
2010
Year
(b)
Ricker 0.73
BevHolt 0.27
Recruits
1.2e+08
9.0e+07
6.0e+07
3.0e+07
0.0e+00
0
30000
60000
90000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

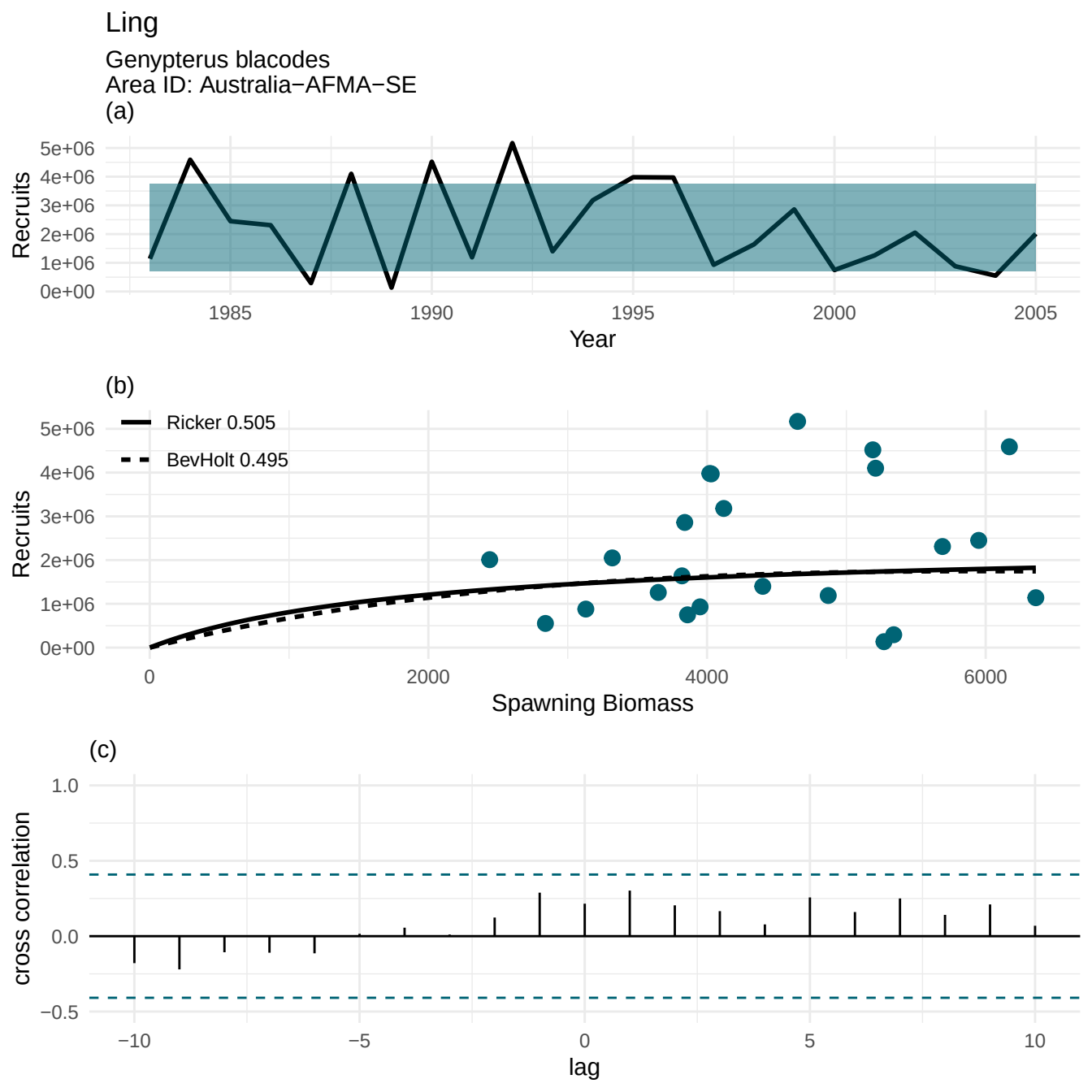

Northern rockfish
Sebastes polyspinis
Area ID: USA−NMFS−GA
(a)
Recruits
5e+07
4e+07
3e+07
2e+07
1e+07
0e+00
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.998
BevHolt 0.00165
Recruits
4e+07
2e+07
0e+00
0
20000
40000
60000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

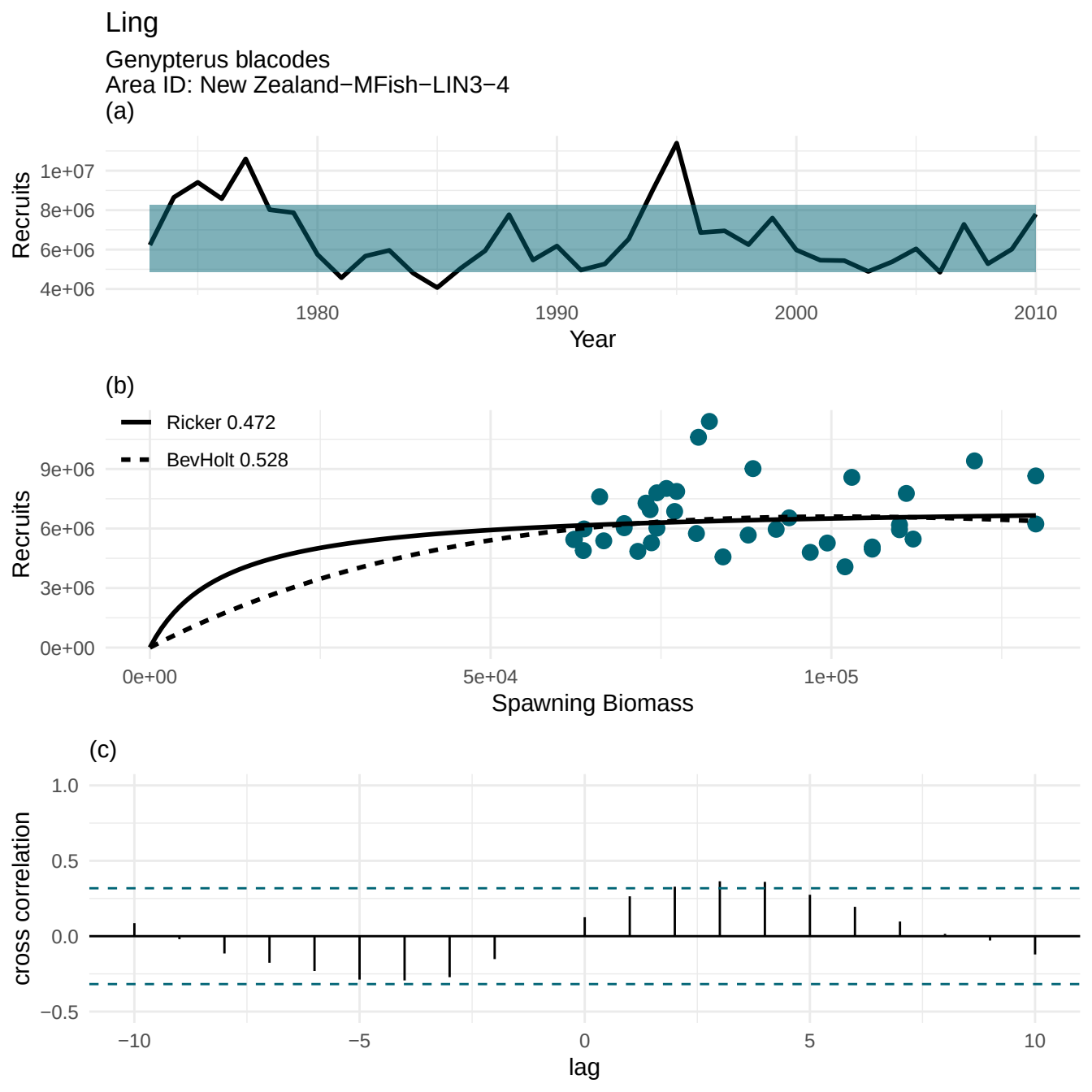

Northern rock sole
Lepidopsetta polyxystra
Area ID: USA−NMFS−EBSAI
(a)
Recruits
6e+06
4e+06
2e+06
0e+00
1980
1990
2000
2010
Year
(b)
Ricker 0.41
BevHolt 0.59
Recruits
6e+06
4e+06
2e+06
0e+00
0e+00
2e+05
4e+05
6e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

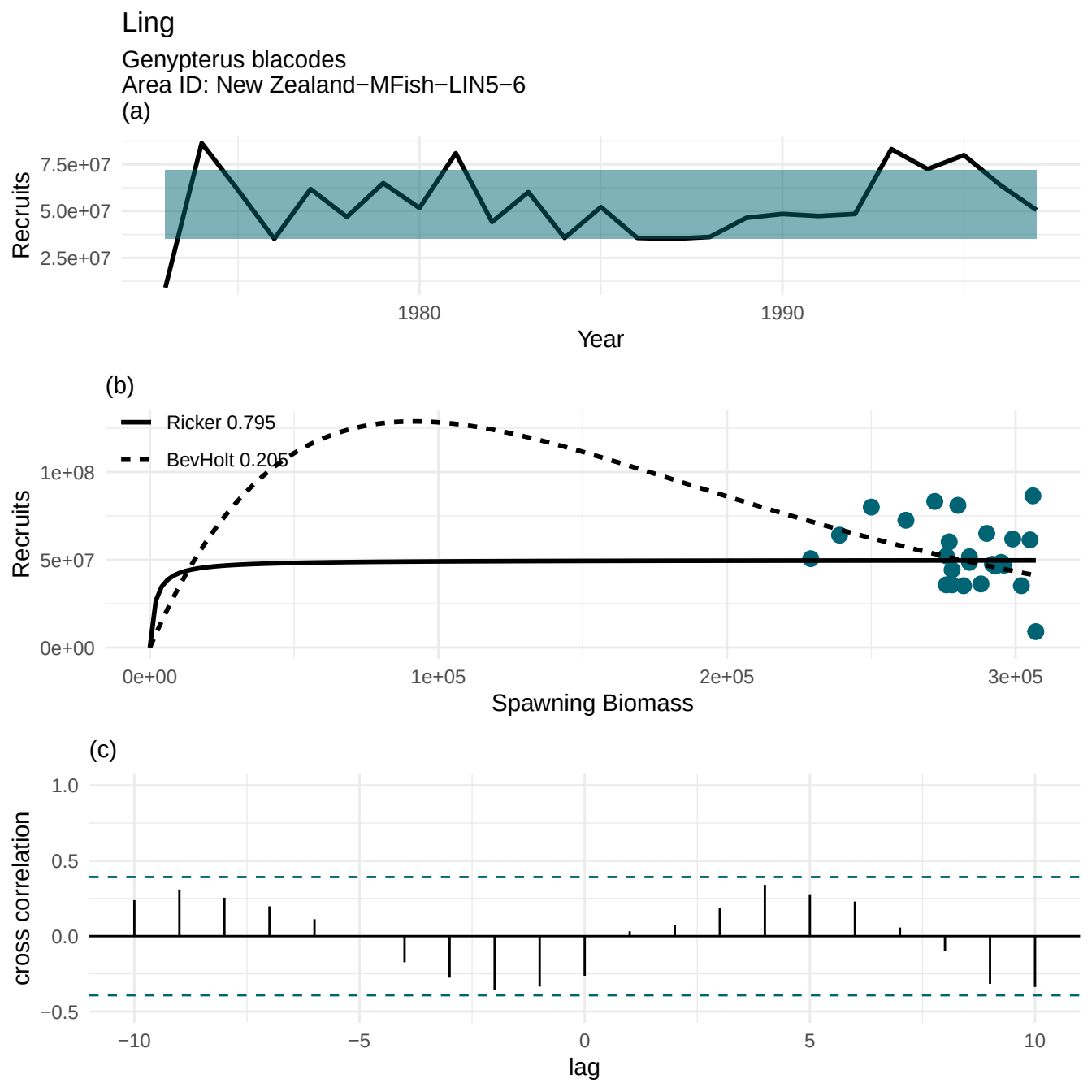

Northern rock sole
Lepidopsetta polyxystra
Area ID: USA−NMFS−GA
(a)
Recruits
2.0e+08
1.5e+08
1.0e+08
1980
1990
2000
2010
Year
(b)
Ricker 0.691
BevHolt 0.309
Recruits
2.0e+08
1.5e+08
1.0e+08
5.0e+07
0.0e+00
0
20000
40000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.42
−10
−5
0
5
10
lag

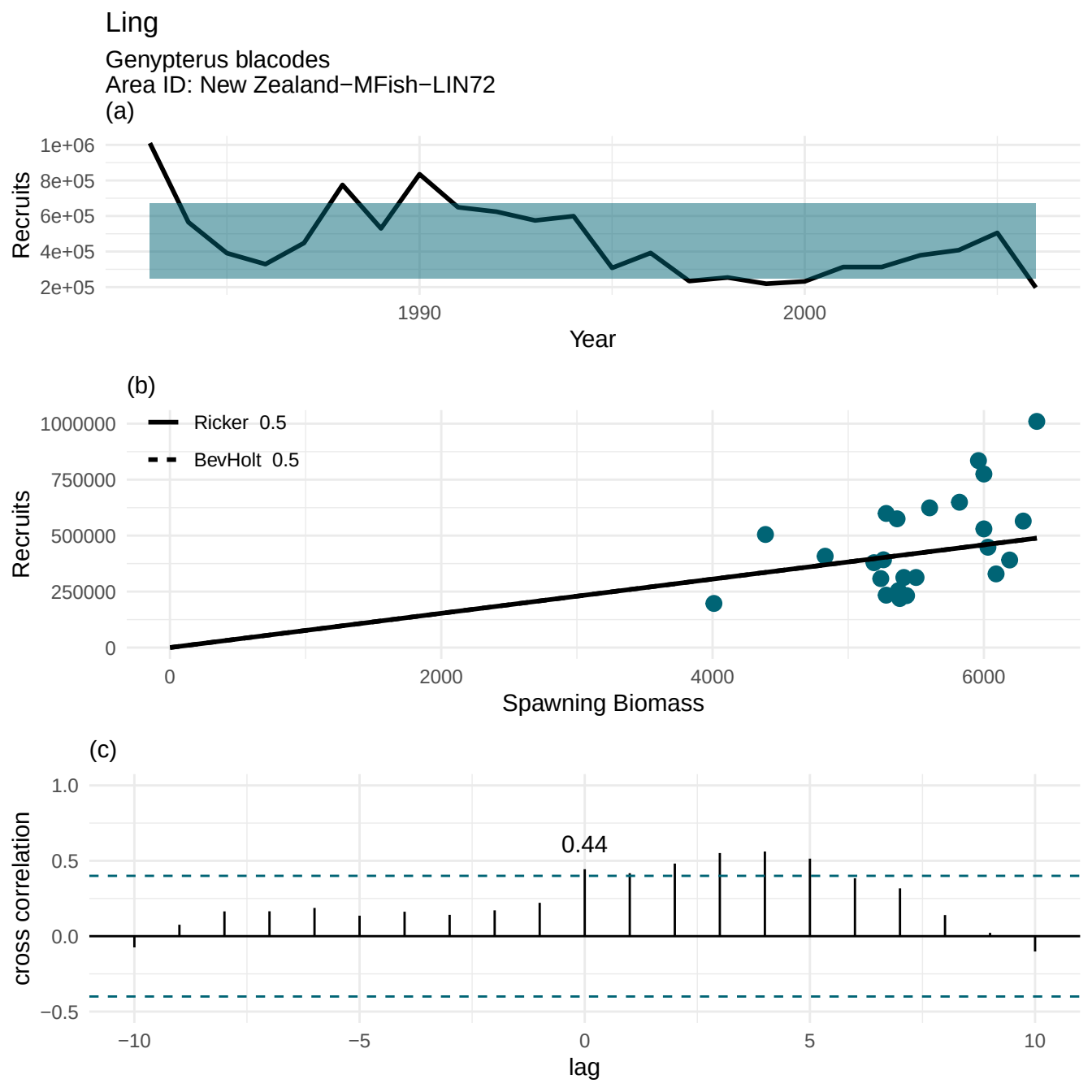

Nylon shrimp
Heterocarpus reedi
Area ID: Chile−SUBPESCA−CH−CS
(a)
Recruits
3e+09
2e+09
1e+09
1960
1980
2000
Year
(b)
Ricker 0.363
BevHolt 0.637
Recruits
3e+09
2e+09
1e+09
0e+00
0
5000
10000
15000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.71
0.4
−10
−5
0
5
10
lag

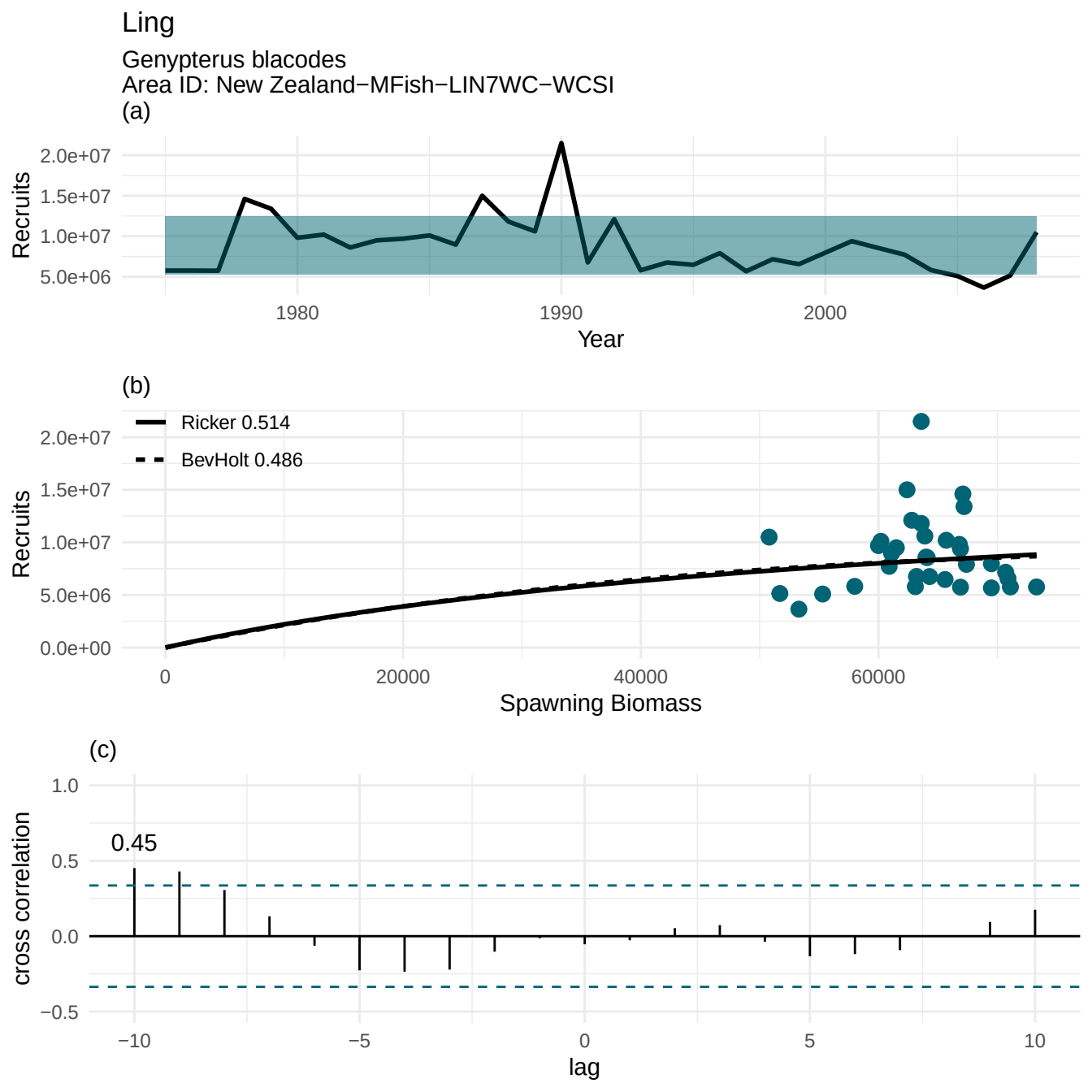

Nylon shrimp
Heterocarpus reedi
Area ID: Chile−SUBPESCA−CH−N
(a)
Recruits
1.6e+09
1.2e+09
8.0e+08
4.0e+08
1960
1980
2000
Year
(b)
Ricker 1
BevHolt 7.85e−09
Recruits
1.5e+09
1.0e+09
5.0e+08
0.0e+00
0
2000
4000
6000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

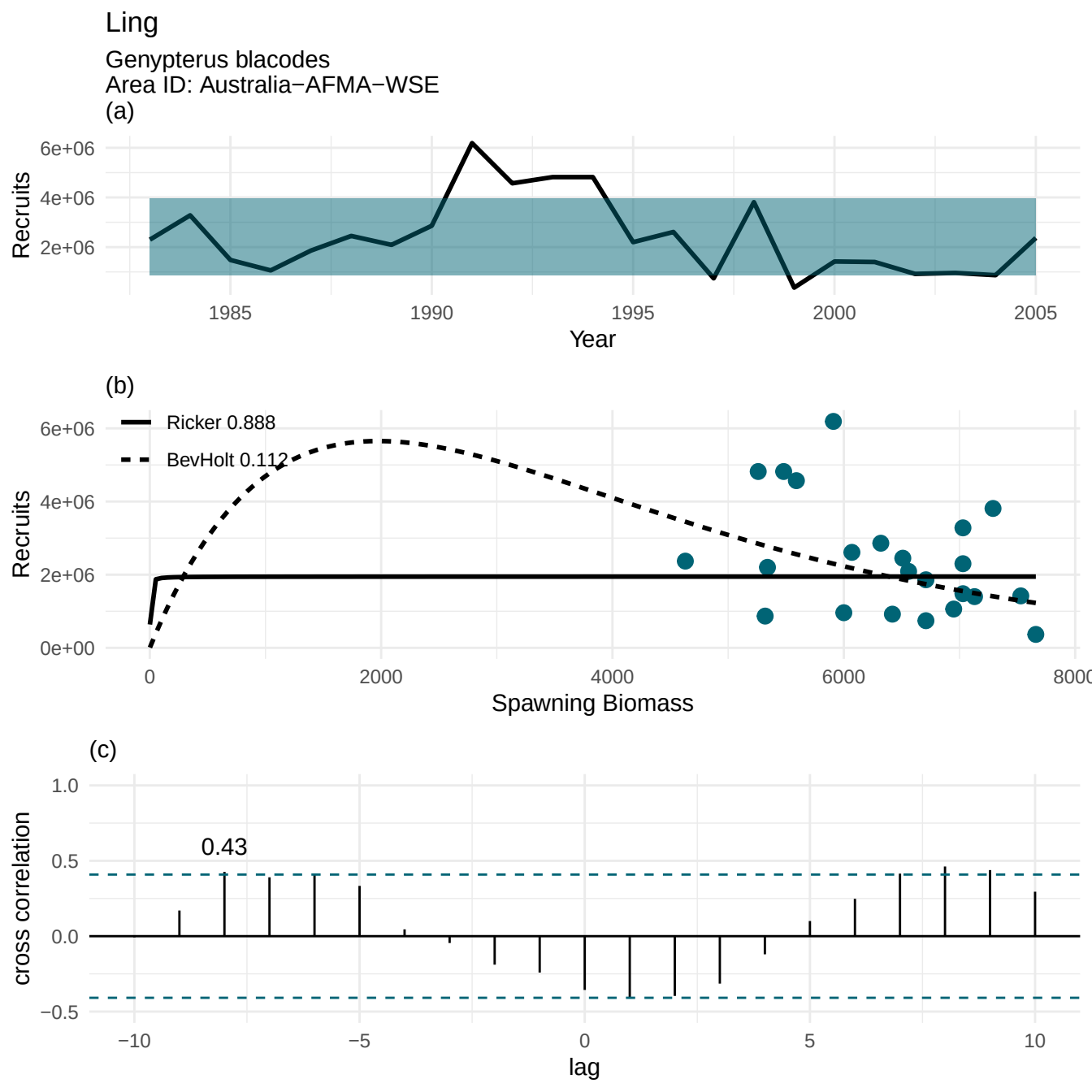

Ling
Genypterus blacodes
Area ID: Australia−AFMA−SE
(a)
Recruits
5e+06
4e+06
3e+06
2e+06
1e+06
0e+00
1985
1990
1995
2000
2005
Year
(b)
Ricker 0.505
BevHolt 0.495
Recruits
5e+06
4e+06
3e+06
2e+06
1e+06
0e+00
0
2000
4000
6000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

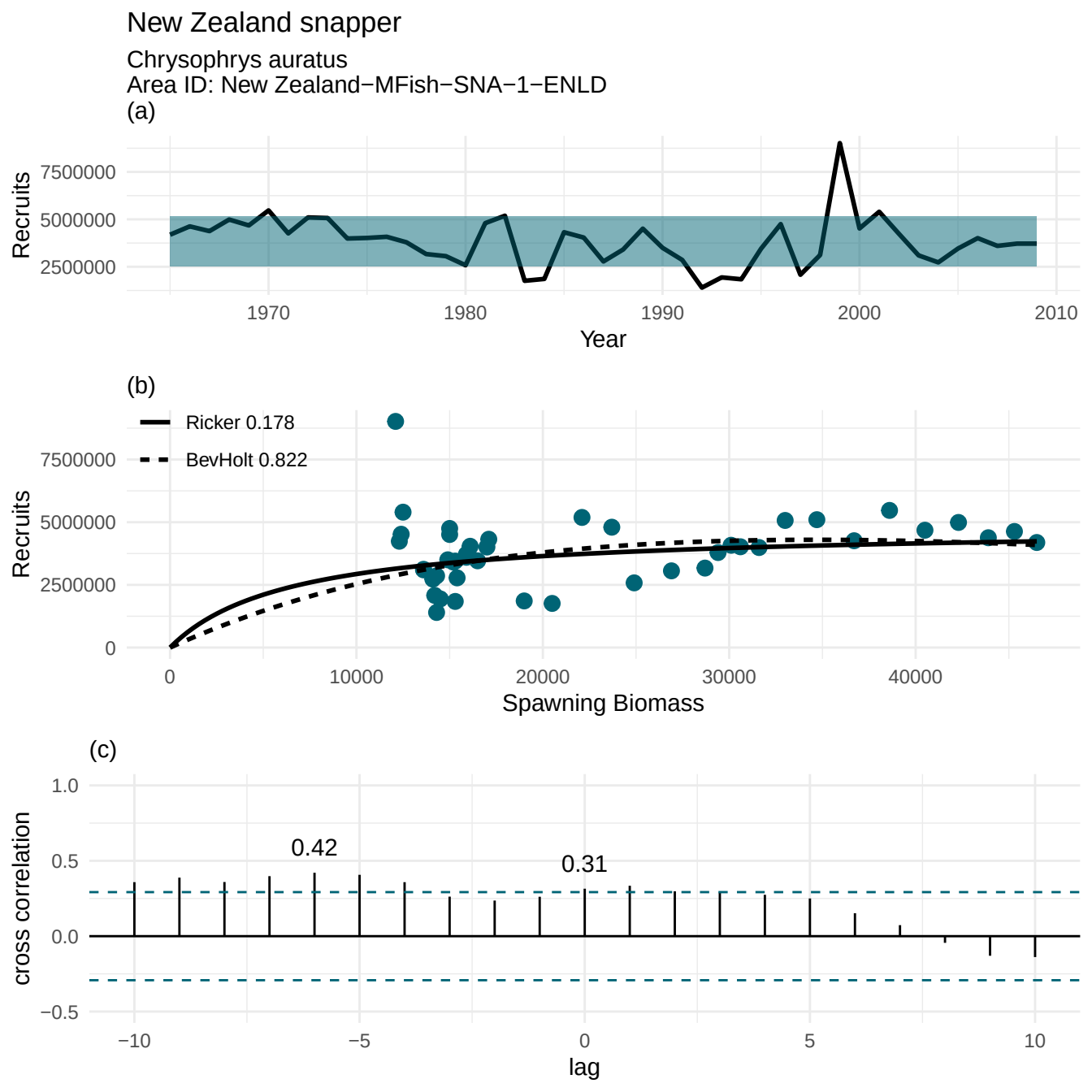

Ling
Genypterus blacodes
Area ID: New Zealand−MFish−LIN3−4
(a)
Recruits
1e+07
8e+06
6e+06
4e+06
1980
1990
2000
2010
Year
(b)
Ricker 0.472
BevHolt 0.528
Recruits
9e+06
6e+06
3e+06
0e+00
0e+00
5e+04
1e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

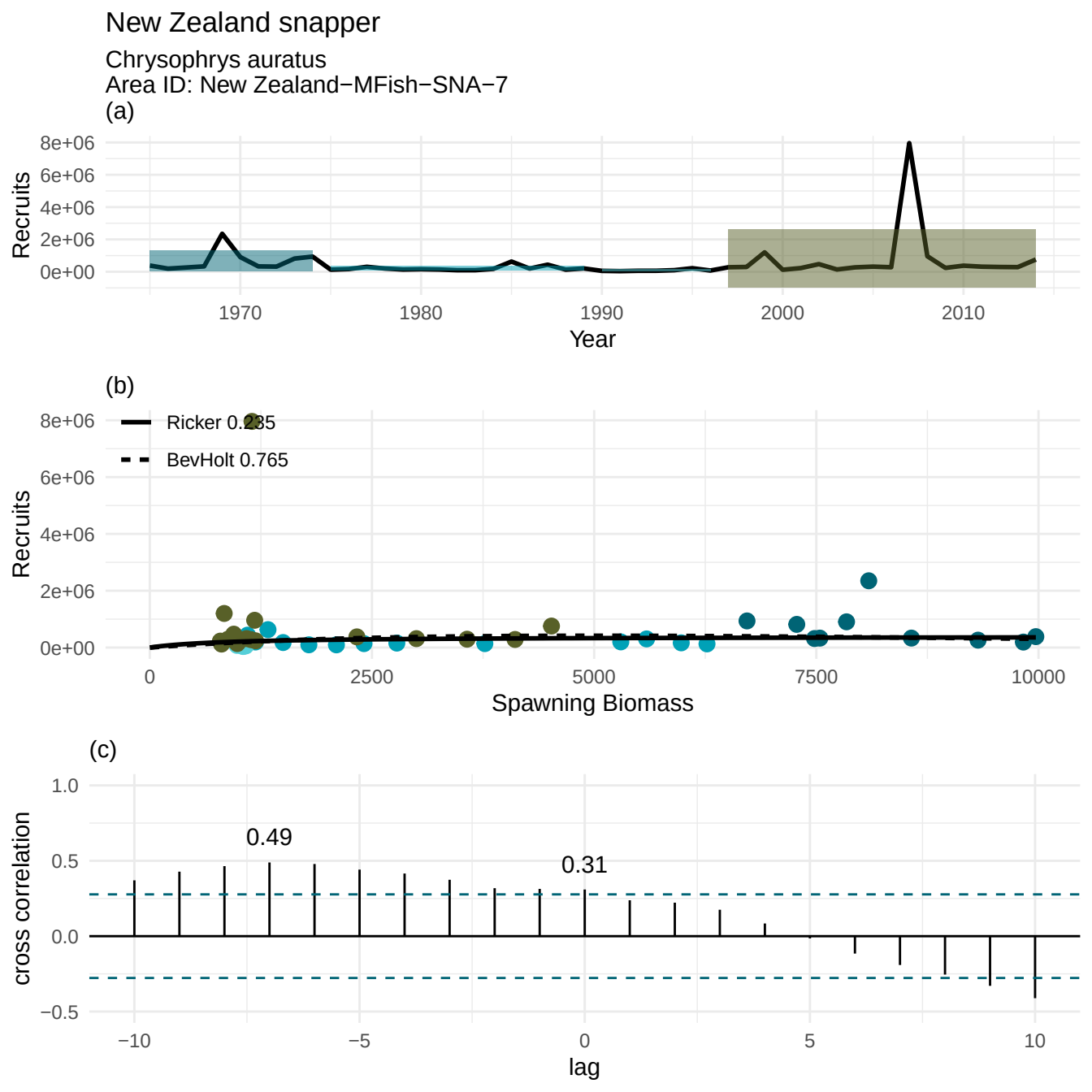

Ling
Genypterus blacodes
Area ID: New Zealand−MFish−LIN5−6
(a)
Recruits
7.5e+07
5.0e+07
2.5e+07
1980
1990
Year
(b)
Ricker 0.795
BevHolt 0.205
Recruits
1e+08
5e+07
0e+00
0e+00
1e+05
2e+05
3e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

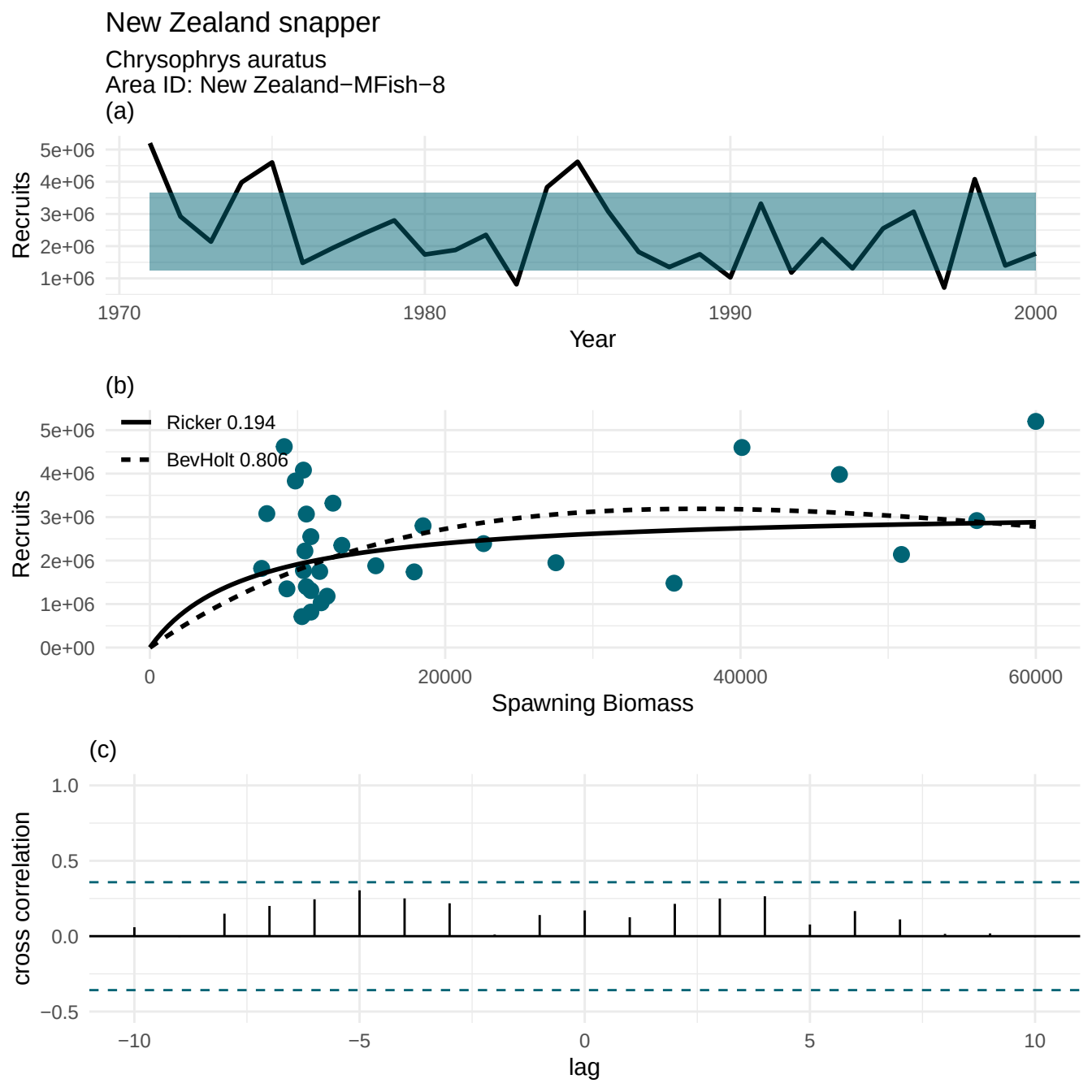

Ling
Genypterus blacodes
Area ID: New Zealand−MFish−LIN72
(a)
Recruits
1e+06
8e+05
6e+05
4e+05
2e+05
1990
2000
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
1000000
750000
500000
250000
0
0
2000
4000
6000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.44
−10
−5
0
5
10
lag

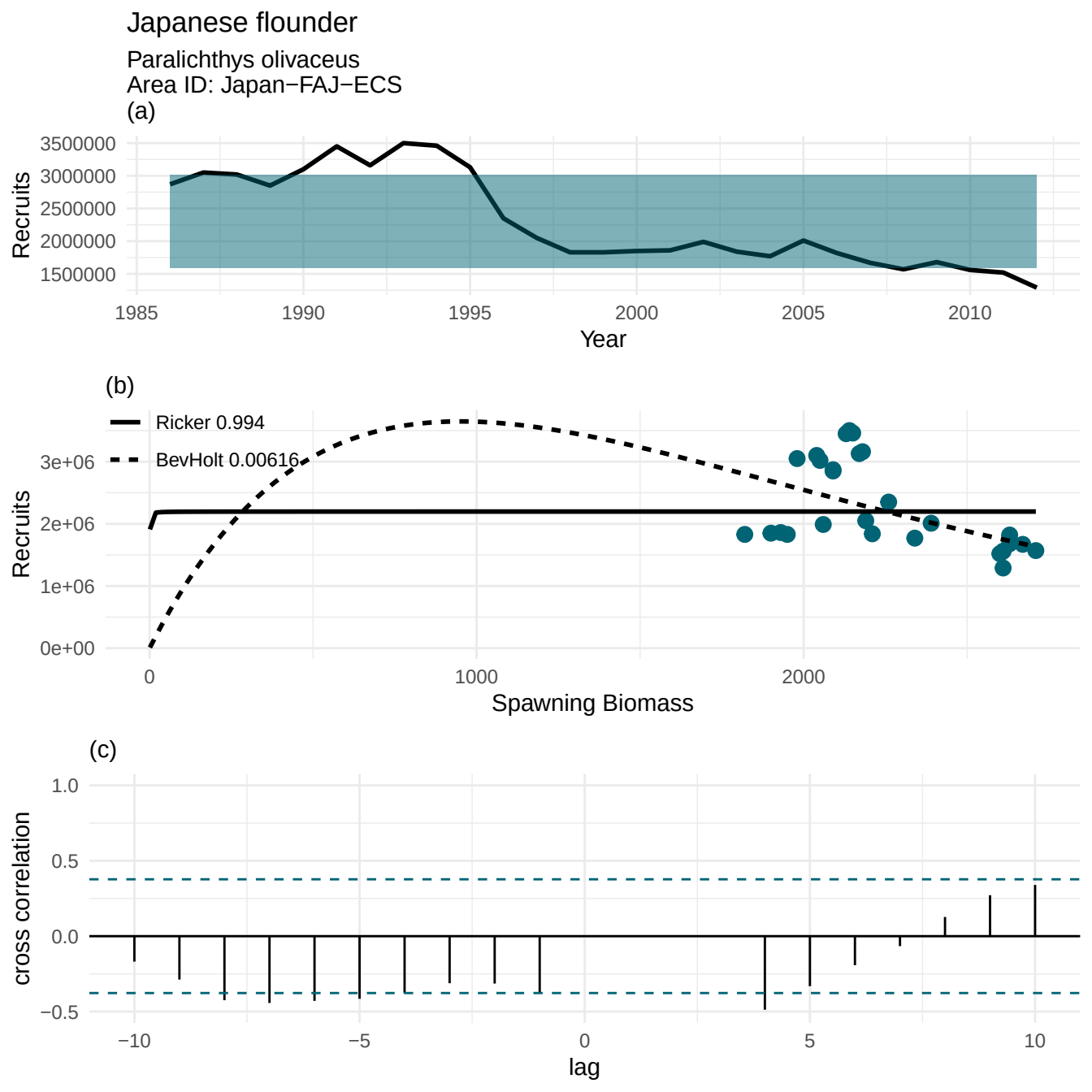

Ling
Genypterus blacodes
Area ID: New Zealand−MFish−LIN7WC−WCSI
(a)
Recruits
2.0e+07
1.5e+07
1.0e+07
5.0e+06
1980
1990
2000
Year
(b)
Ricker 0.514
BevHolt 0.486
Recruits
2.0e+07
1.5e+07
1.0e+07
5.0e+06
0.0e+00
0
20000
40000
60000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.45
−10
−5
0
5
10
lag

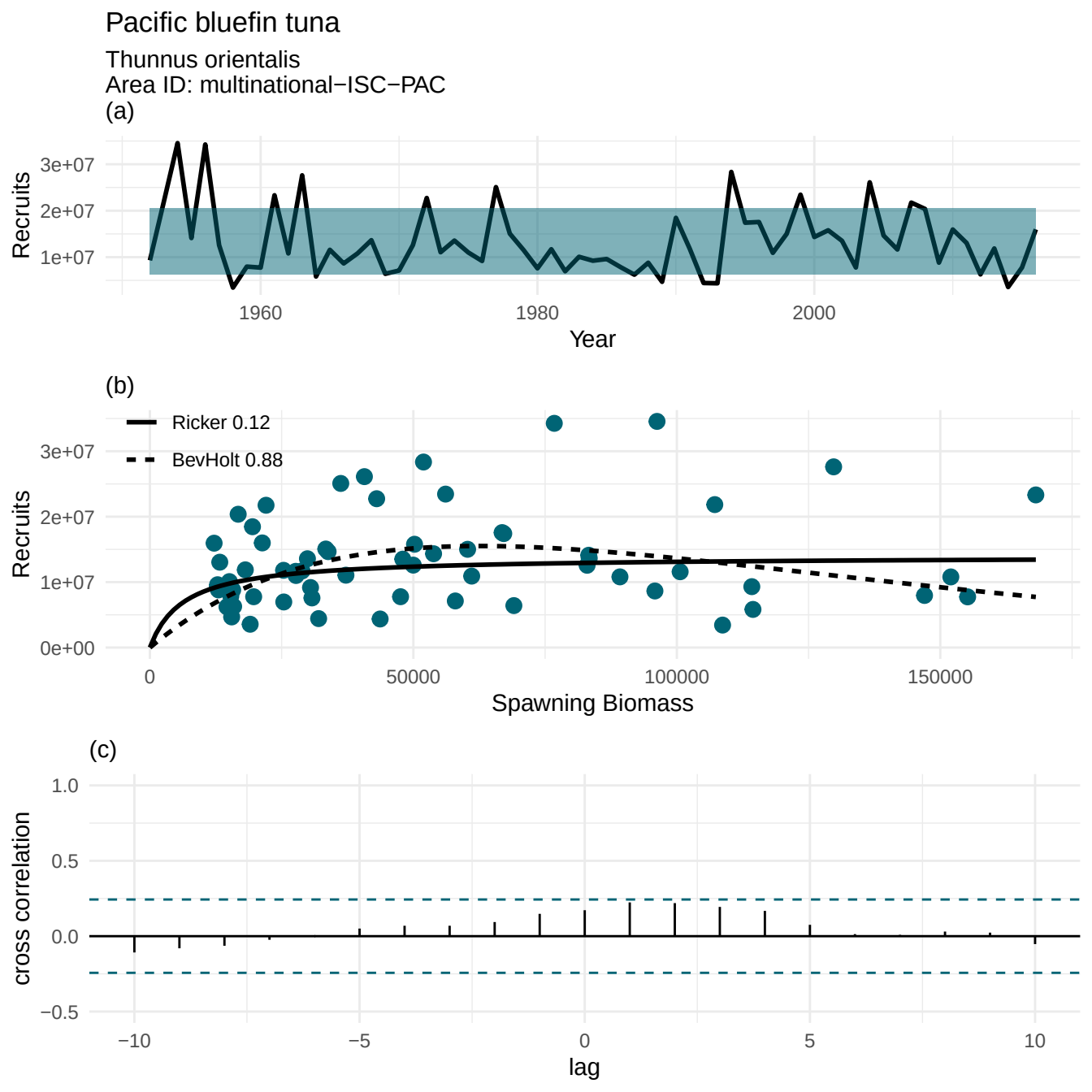

Ling
Genypterus blacodes
Area ID: Australia−AFMA−WSE
(a)
Recruits
6e+06
4e+06
2e+06
1985
1990
1995
2000
2005
Year
(b)
Ricker 0.888
BevHolt 0.112
Recruits
6e+06
4e+06
2e+06
0e+00
0
2000
4000
6000
8000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.43
−10
−5
0
5
10
lag

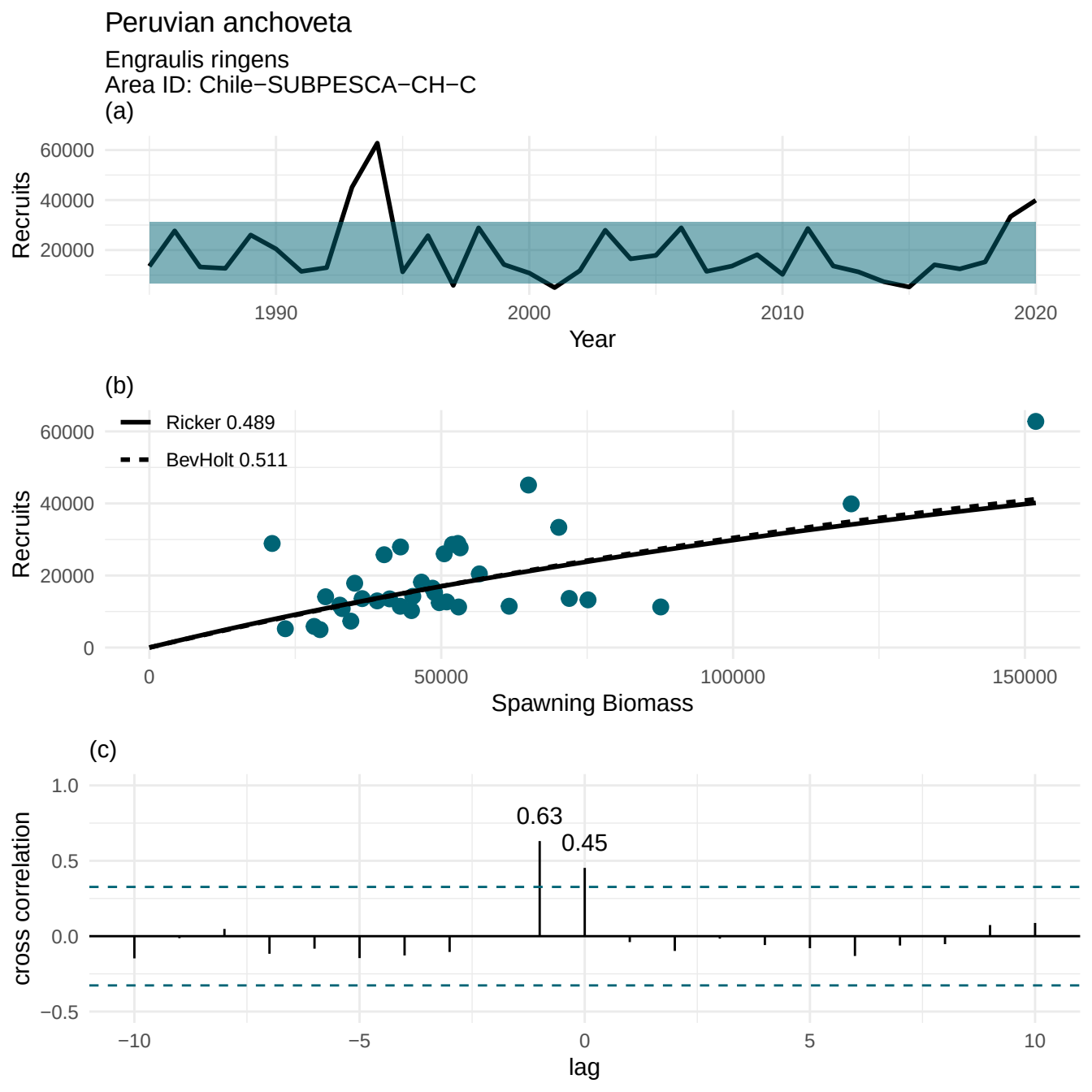

New Zealand snapper
Chrysophrys auratus
Area ID: New Zealand−MFish−SNA−1−ENLD
(a)
Recruits
7500000
5000000
2500000
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.178
BevHolt 0.822
Recruits
7500000
5000000
2500000
0
0
10000
20000
30000
40000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.42
0.31
−10
−5
0
5
10
lag

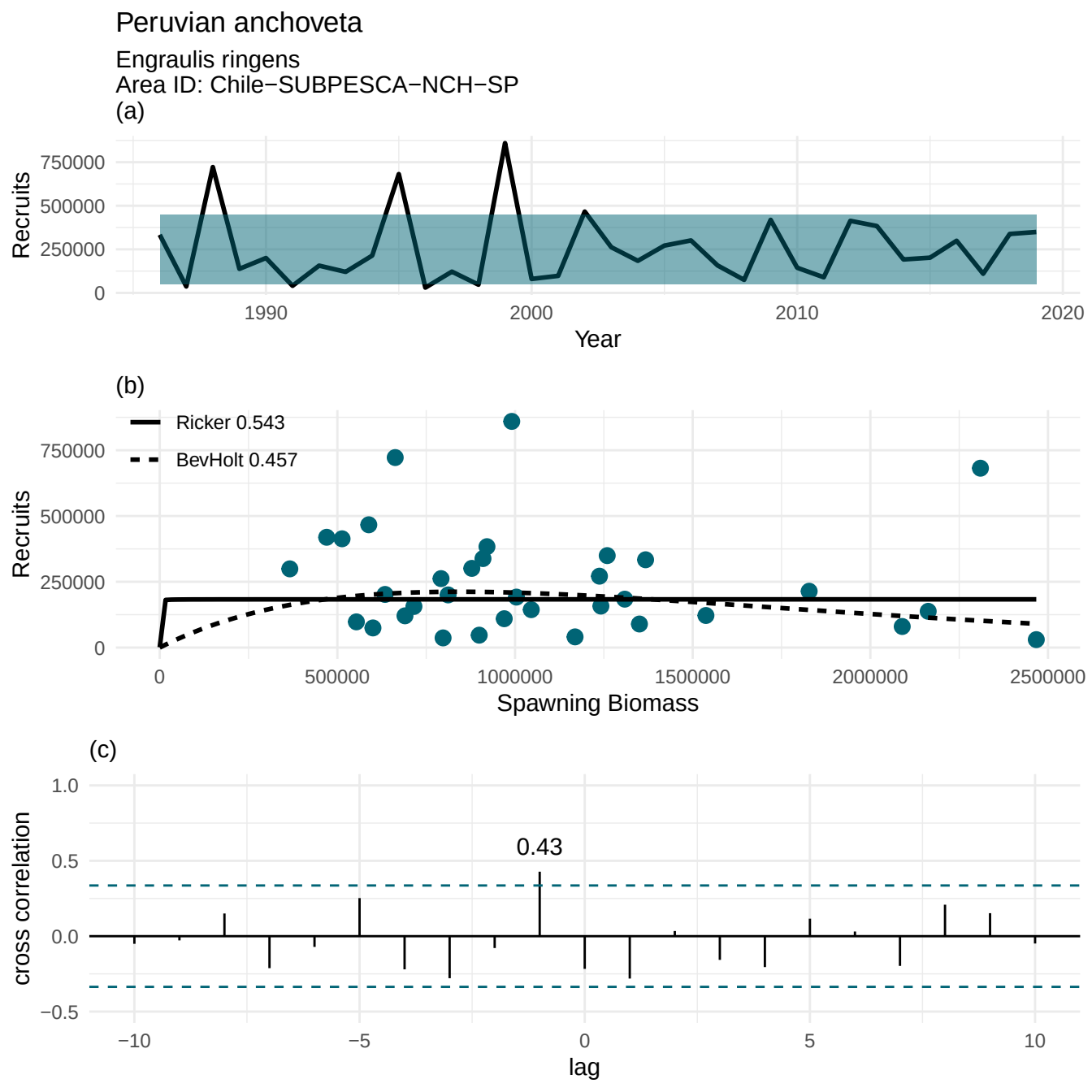

New Zealand snapper
Chrysophrys auratus
Area ID: New Zealand−MFish−SNA−7
(a)
Recruits
8e+06
6e+06
4e+06
2e+06
0e+00
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.235
BevHolt 0.765
Recruits
Spawning Biomass
0
2500
5000
7500
10000
(c)
cross correlation
0.49
0.31
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

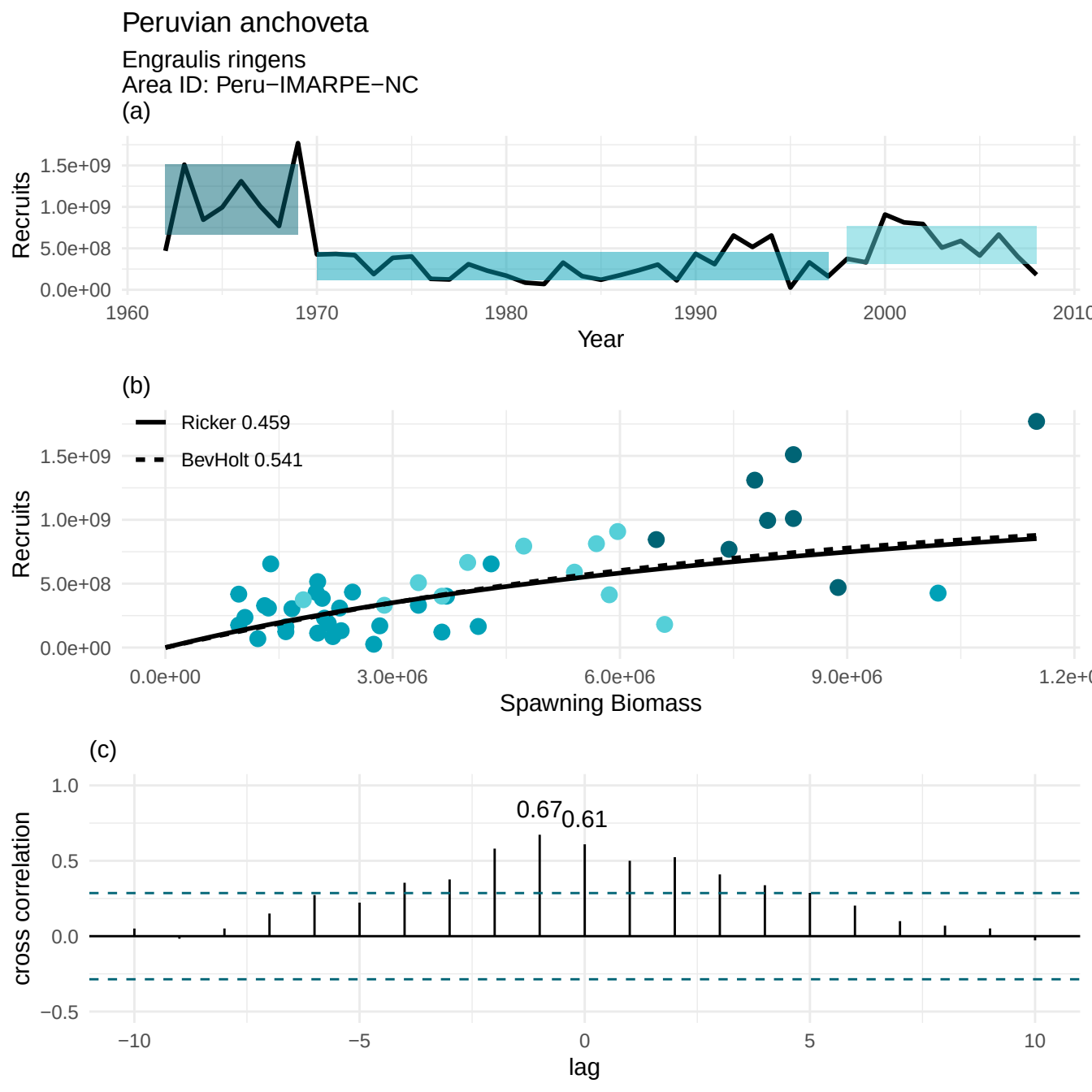

New Zealand snapper
Chrysophrys auratus
Area ID: New Zealand−MFish−8
(a)
Recruits
5e+06
4e+06
3e+06
2e+06
1e+06
1970
1980
1990
2000
Year
(b)
Ricker 0.194
BevHolt 0.806
Recruits
5e+06
4e+06
3e+06
2e+06
1e+06
0e+00
0
20000
40000
60000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

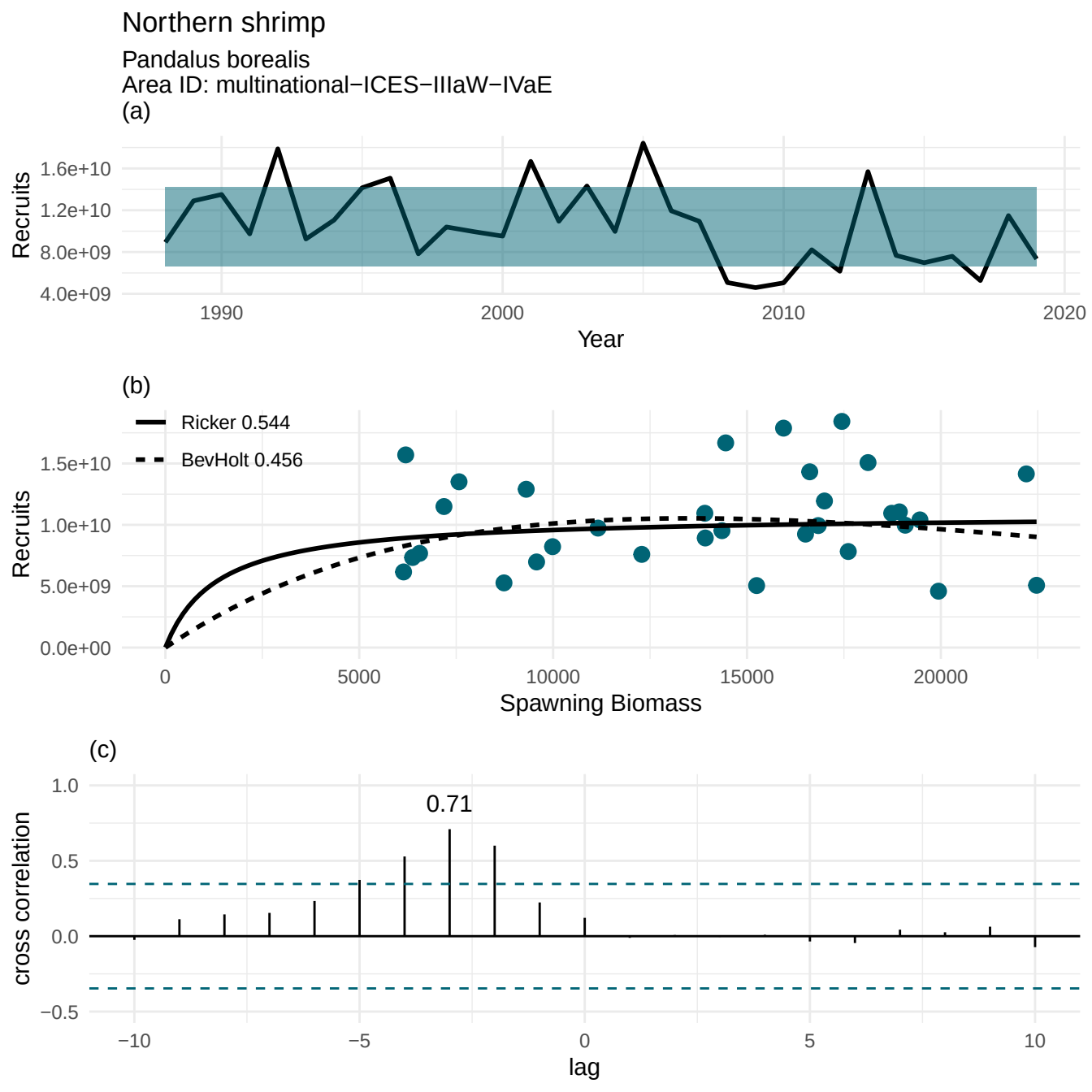

Japanese flounder
Paralichthys olivaceus
Area ID: Japan−FAJ−ECS
(a)
Recruits
3500000
3000000
2500000
2000000
1500000
1985
1990
1995
2000
2005
2010
Year
(b)
Ricker 0.994
BevHolt 0.00616
Recruits
3e+06
2e+06
1e+06
0e+00
0
1000
2000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

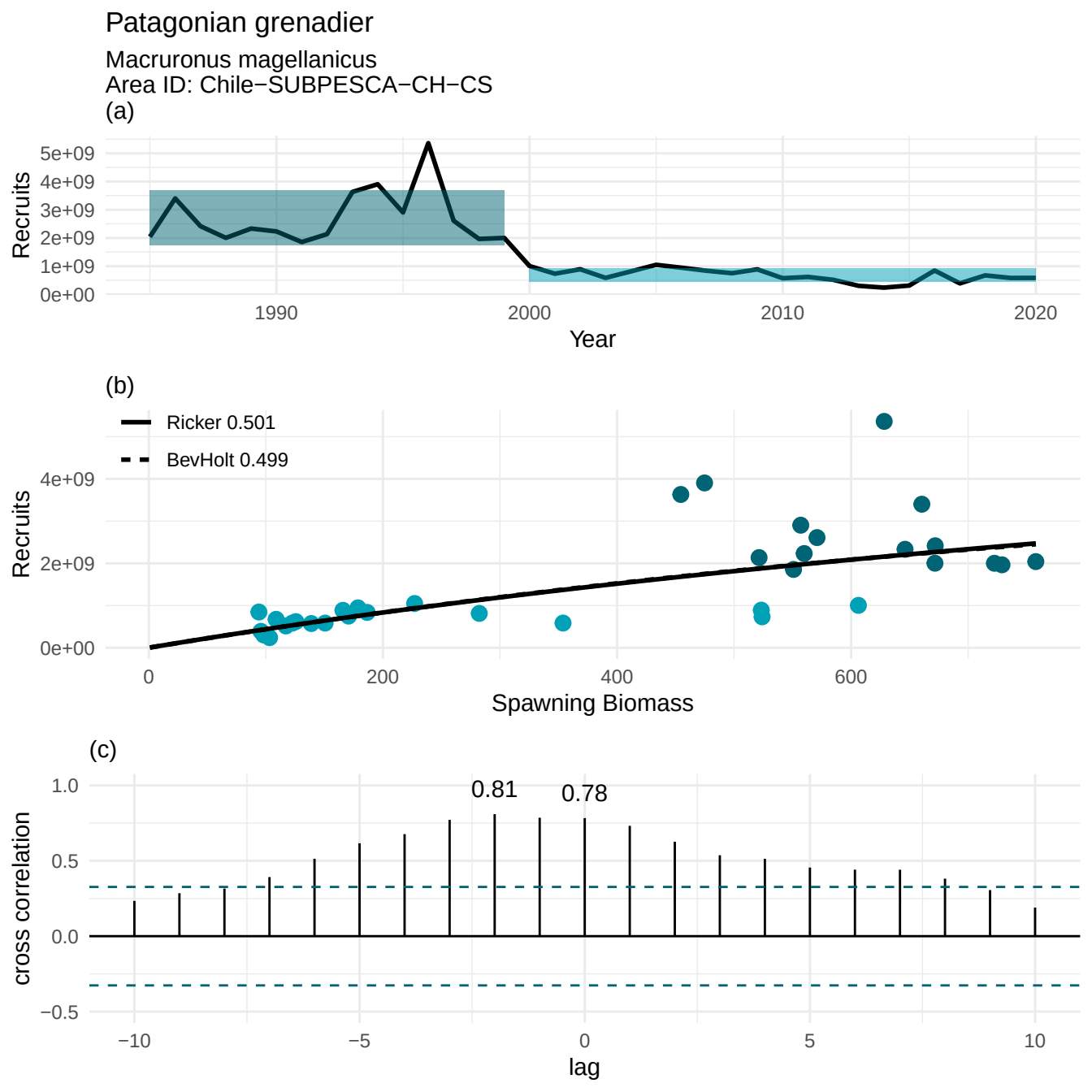

Pacific bluefin tuna
Thunnus orientalis
Area ID: multinational−ISC−PAC
(a)
Recruits
3e+07
2e+07
1e+07
1960
1980
2000
Year
(b)
Ricker 0.12
BevHolt 0.88
Recruits
3e+07
2e+07
1e+07
0e+00
0
50000
100000
150000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

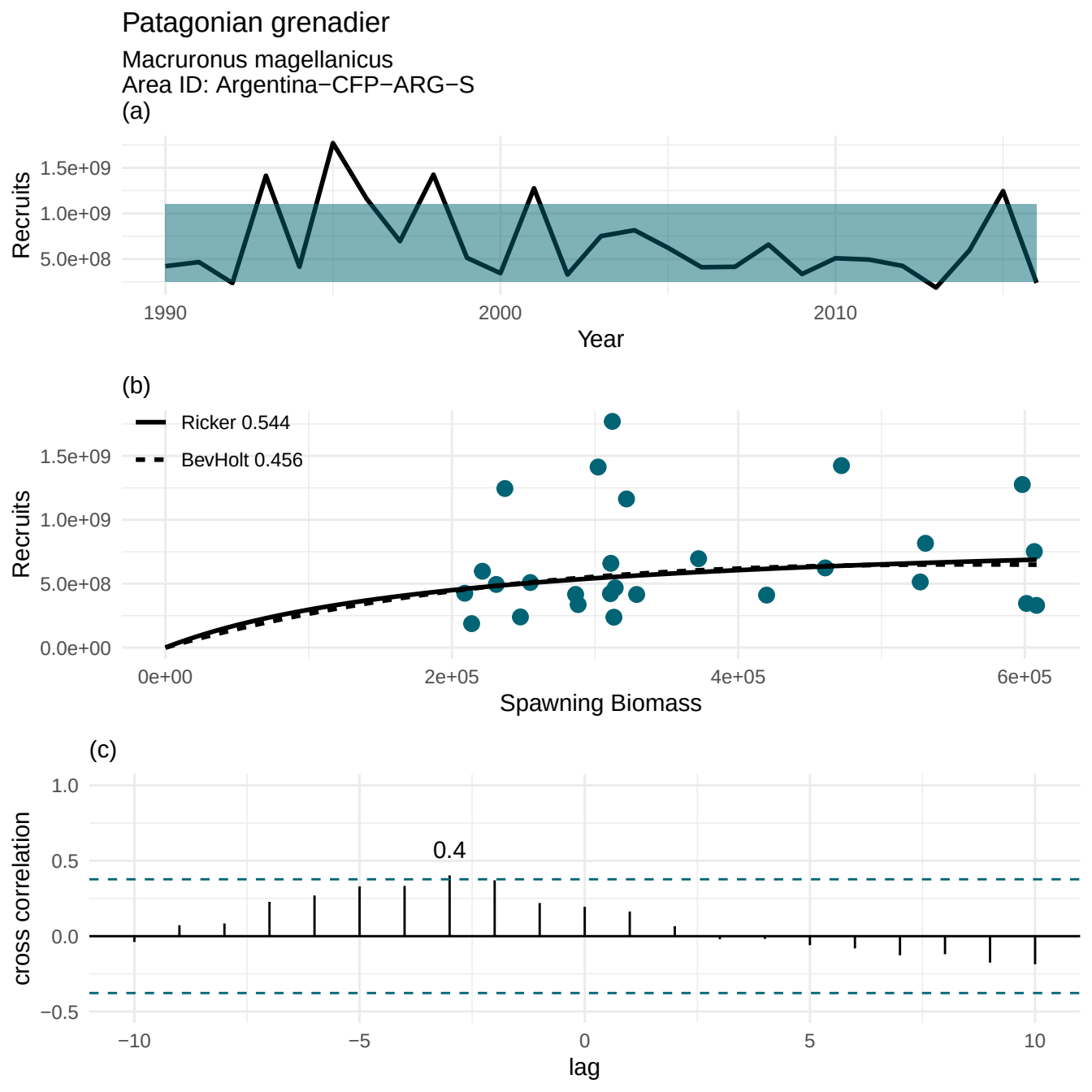

Peruvian anchoveta
Engraulis ringens
Area ID: Chile−SUBPESCA−CH−C
(a)
Recruits
60000
40000
20000
1990
2000
2010
2020
Year
(b)
Ricker 0.489
BevHolt 0.511
Recruits
60000
40000
20000
0
0
50000
100000
150000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.63
0.45
−10
−5
0
5
10
lag

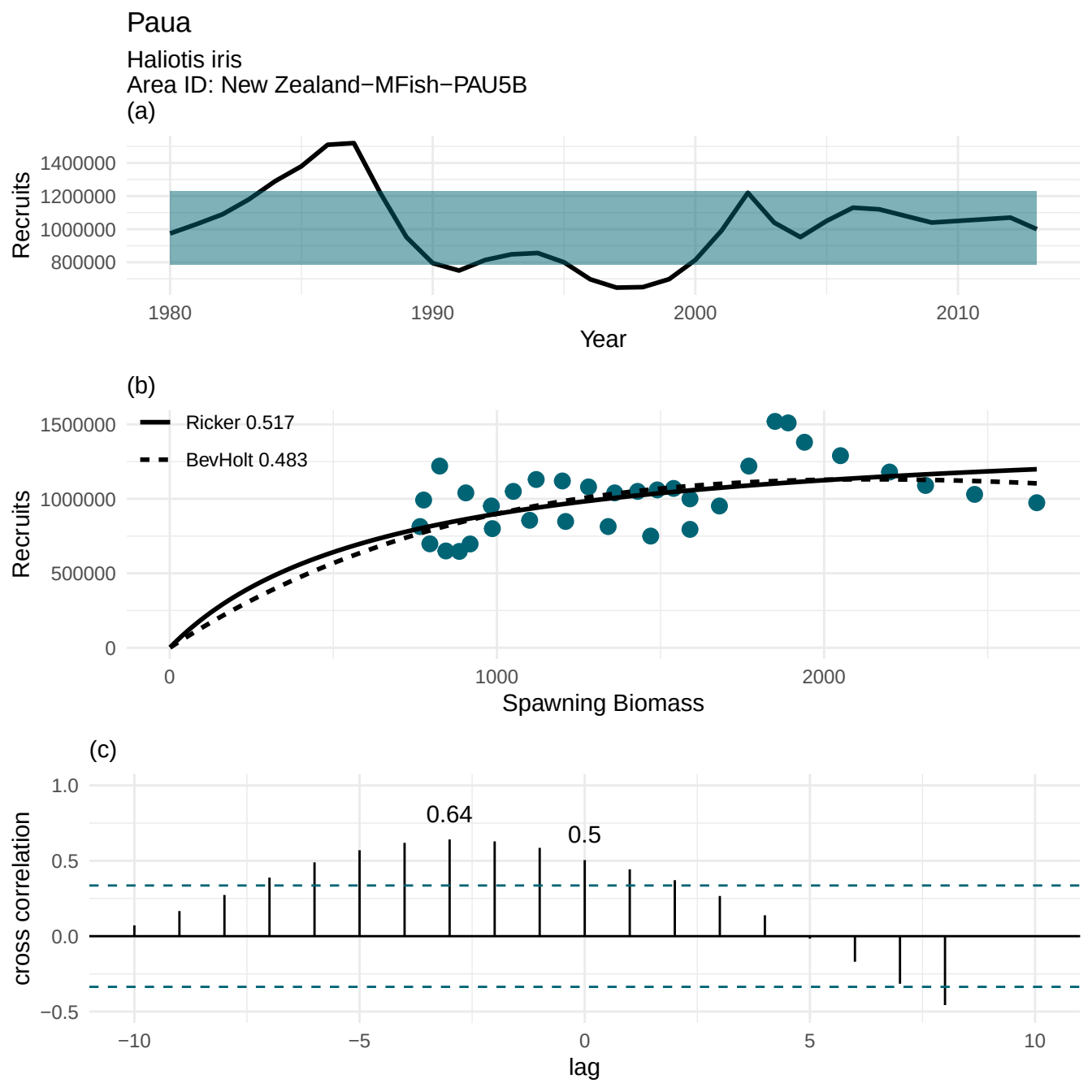

Peruvian anchoveta
Engraulis ringens
Area ID: Chile−SUBPESCA−NCH−SP
(a)
Recruits
750000
500000
250000
0
1990
2000
2010
2020
Year
(b)
Ricker 0.543
BevHolt 0.457
Recruits
750000
500000
250000
0
0
500000
1000000
1500000
2000000
2500000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.43
−10
−5
0
5
10
lag

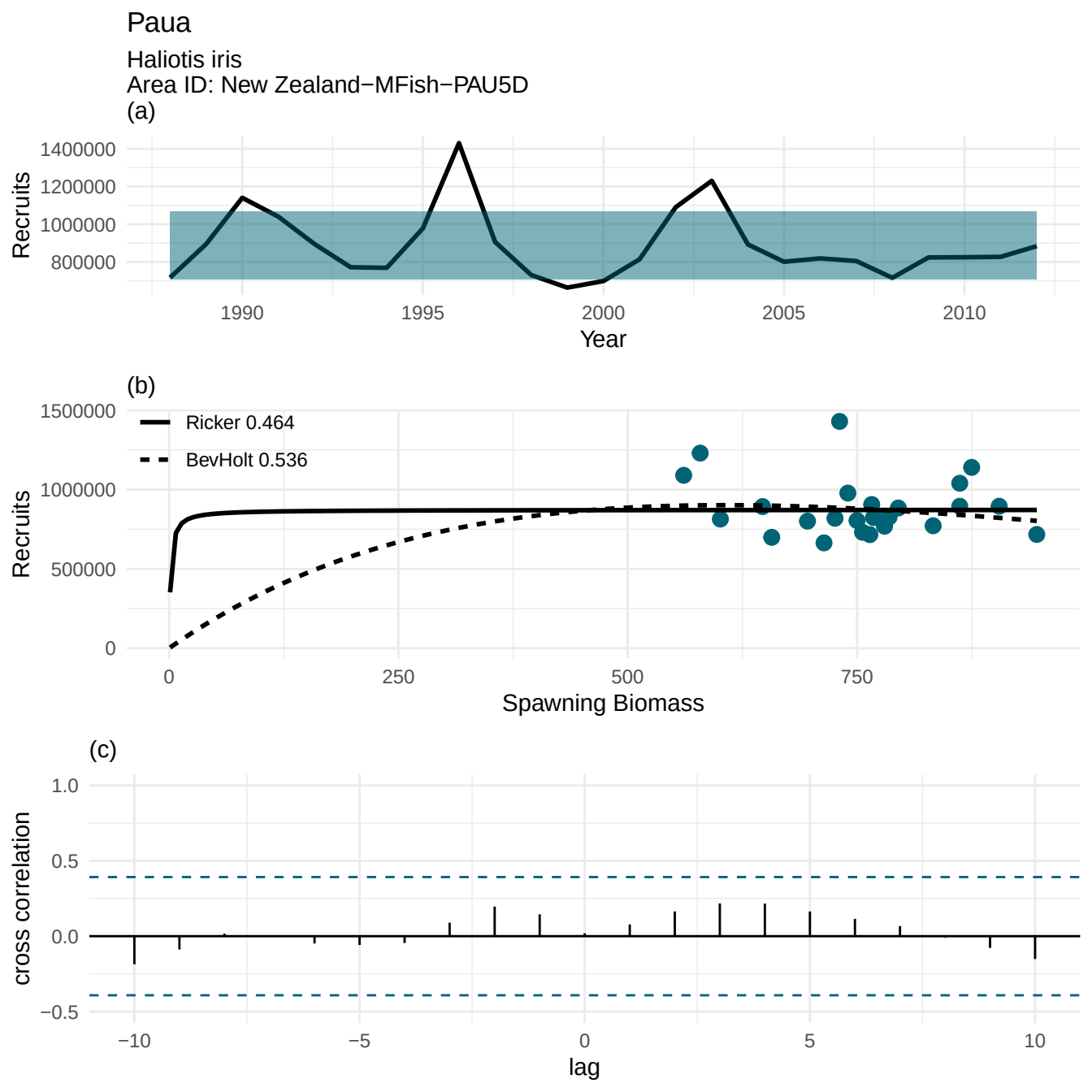

Peruvian anchoveta
Engraulis ringens
Area ID: Peru−IMARPE−NC
(a)
Recruits
1.5e+09
1.0e+09
5.0e+08
0.0e+00
1960
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.459
BevHolt 0.541
Recruits
1.5e+09
1.0e+09
5.0e+08
0.0e+00
0.0e+00
3.0e+06
6.0e+06
9.0e+06
1.2e+0
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.67
0.61
−10
−5
0
5
10
lag

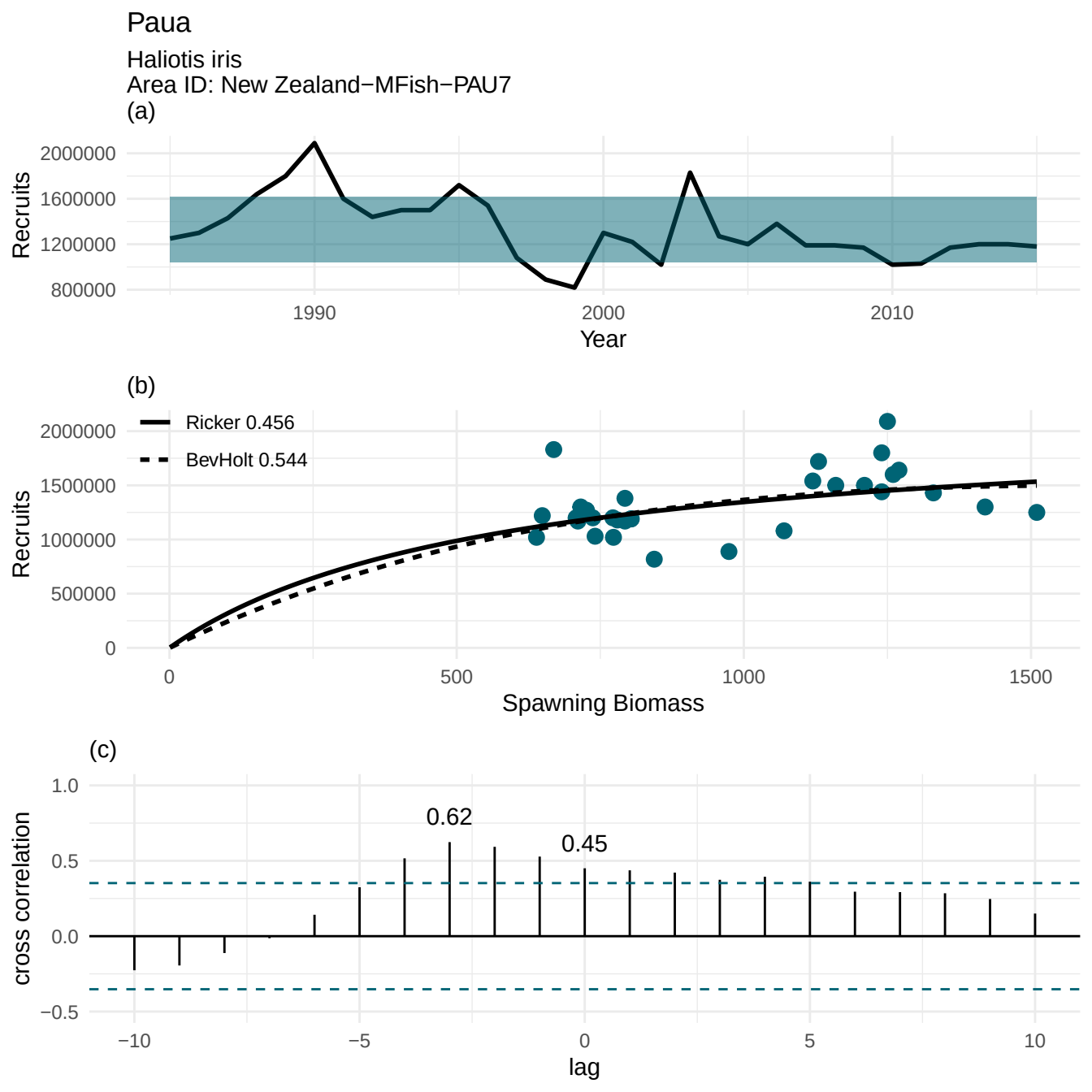

Northern shrimp
Pandalus borealis
Area ID: multinational−ICES−IIIaW−IVaE
(a)
Recruits
1.6e+10
1.2e+10
8.0e+09
4.0e+09
1990
2000
2010
2020
Year
(b)
Ricker 0.544
BevHolt 0.456
Recruits
1.5e+10
1.0e+10
5.0e+09
0.0e+00
0
5000
10000
15000
20000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.71
−10
−5
0
5
10
lag

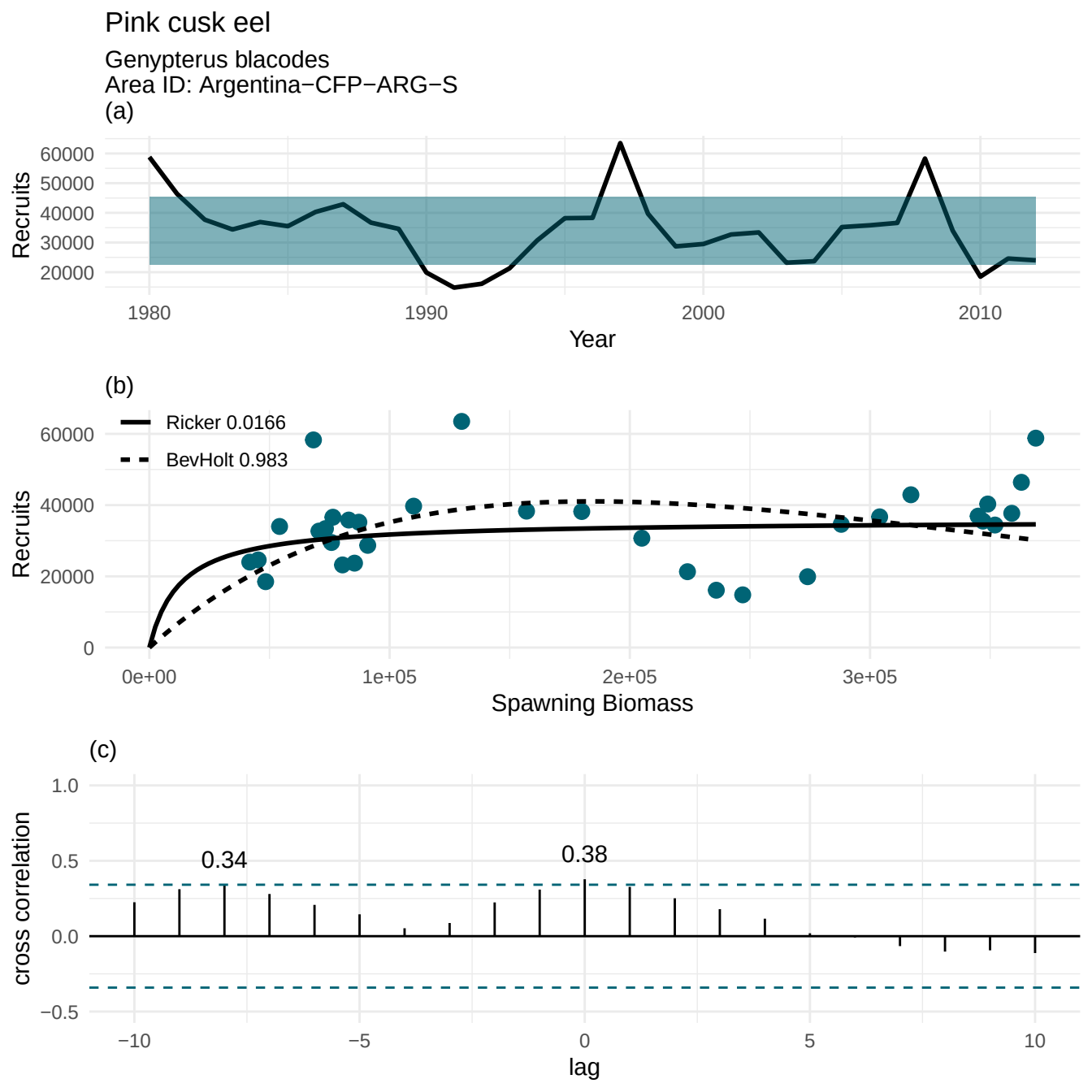

Patagonian grenadier
Macruronus magellanicus
Area ID: Chile−SUBPESCA−CH−CS
(a)
Recruits
5e+09
4e+09
3e+09
2e+09
1e+09
0e+00
1990
2000
2010
2020
Year
(b)
Ricker 0.501
BevHolt 0.499
Recruits
4e+09
2e+09
0e+00
0
200
400
600
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.81
0.78
−10
−5
0
5
10
lag

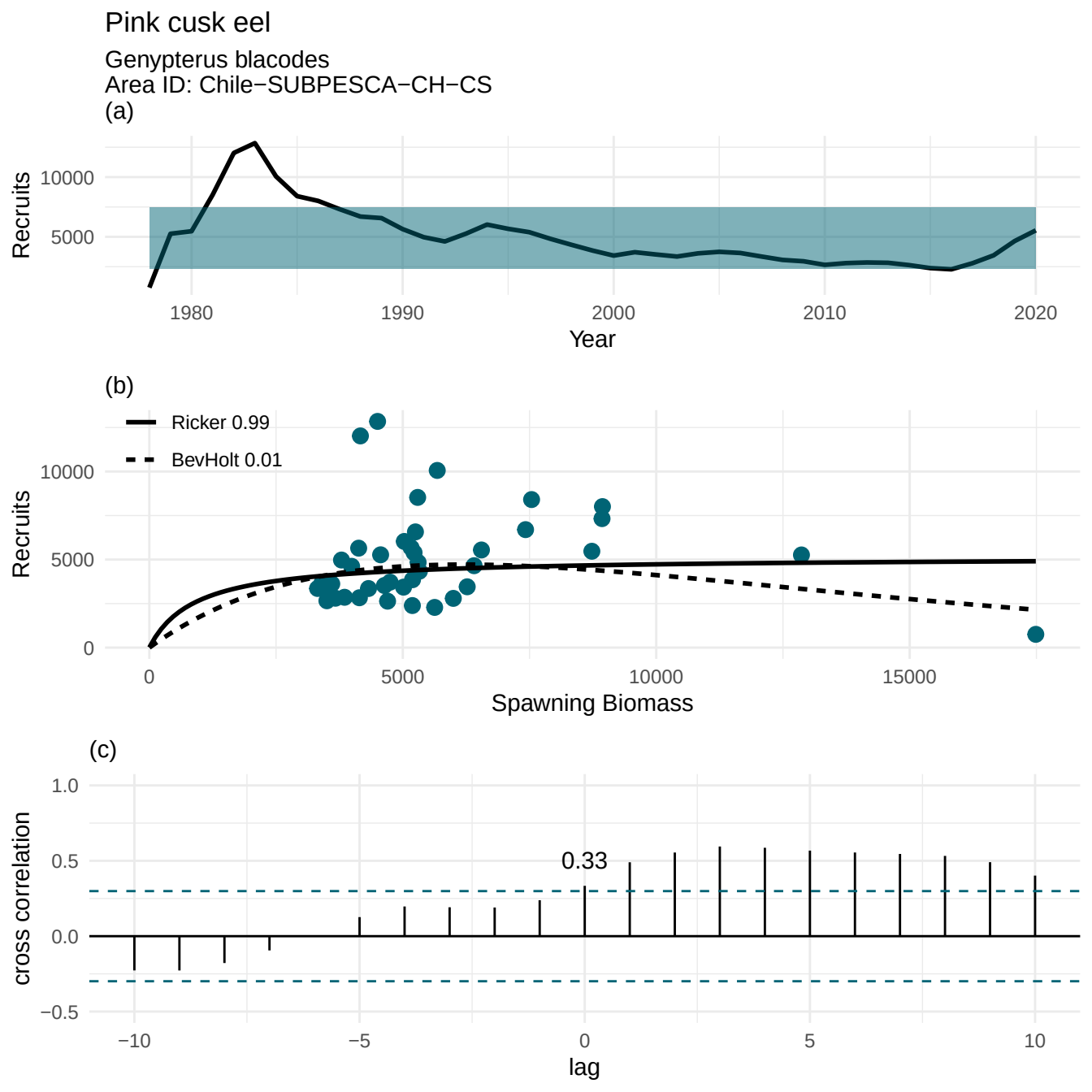

Patagonian grenadier
Macruronus magellanicus
Area ID: Argentina−CFP−ARG−S
(a)
Recruits
1.5e+09
1.0e+09
5.0e+08
1990
2000
2010
Year
(b)
Ricker 0.544
BevHolt 0.456
Recruits
1.5e+09
1.0e+09
5.0e+08
0.0e+00
0e+00
2e+05
4e+05
6e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.4
−10
−5
0
5
10
lag

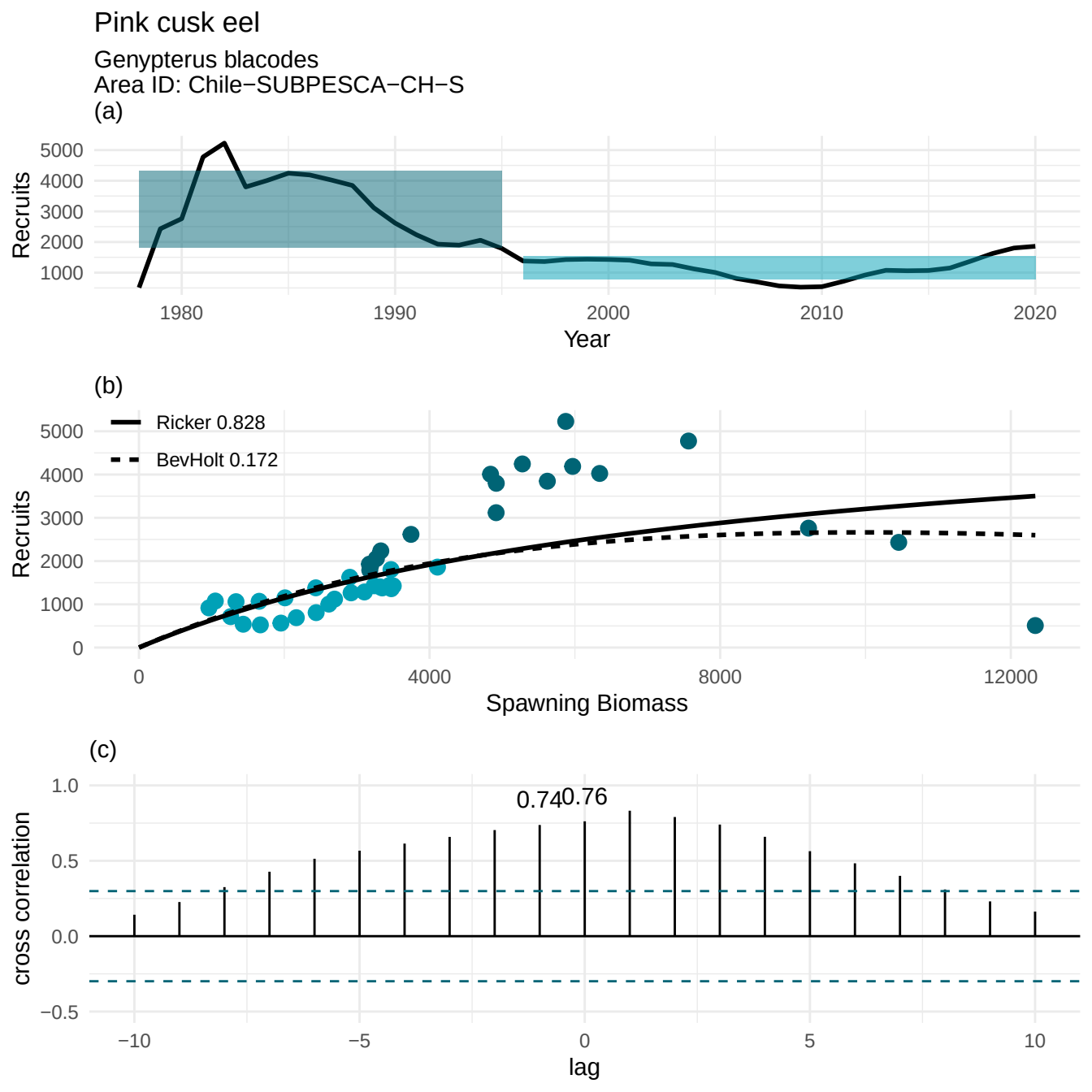

Paua
Haliotis iris
Area ID: New Zealand−MFish−PAU5B
(a)
Recruits
1400000
1200000
1000000
800000
1980
1990
2000
2010
Year
(b)
Ricker 0.517
BevHolt 0.483
Recruits
1500000
1000000
500000
0
0
1000
2000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.64
0.5
−10
−5
0
5
10
lag

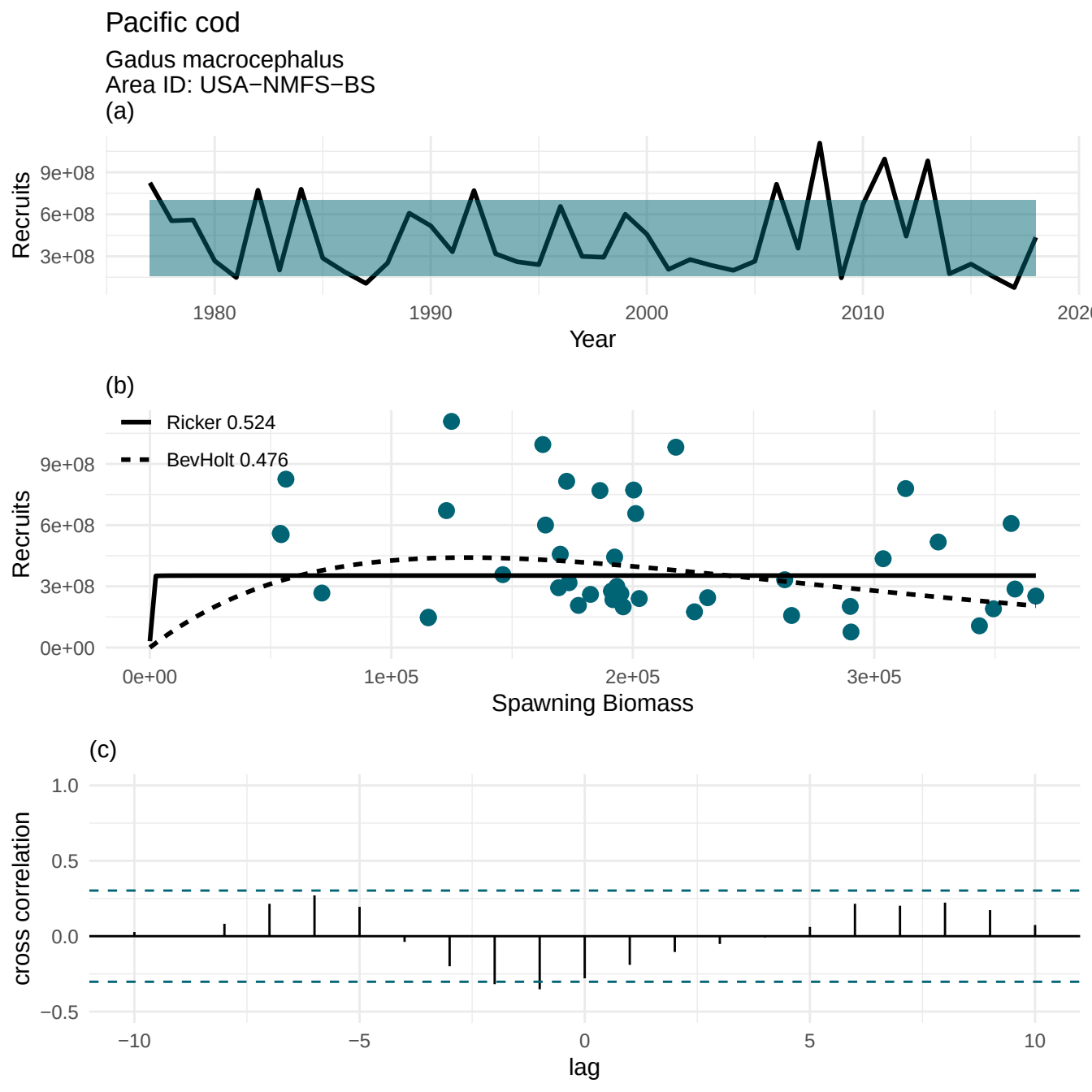

Paua
Haliotis iris
Area ID: New Zealand−MFish−PAU5D
(a)
Recruits
1400000
1200000
1000000
800000
1990
1995
2000
2005
2010
Year
(b)
Ricker 0.464
BevHolt 0.536
Recruits
1500000
1000000
500000
0
0
250
500
750
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

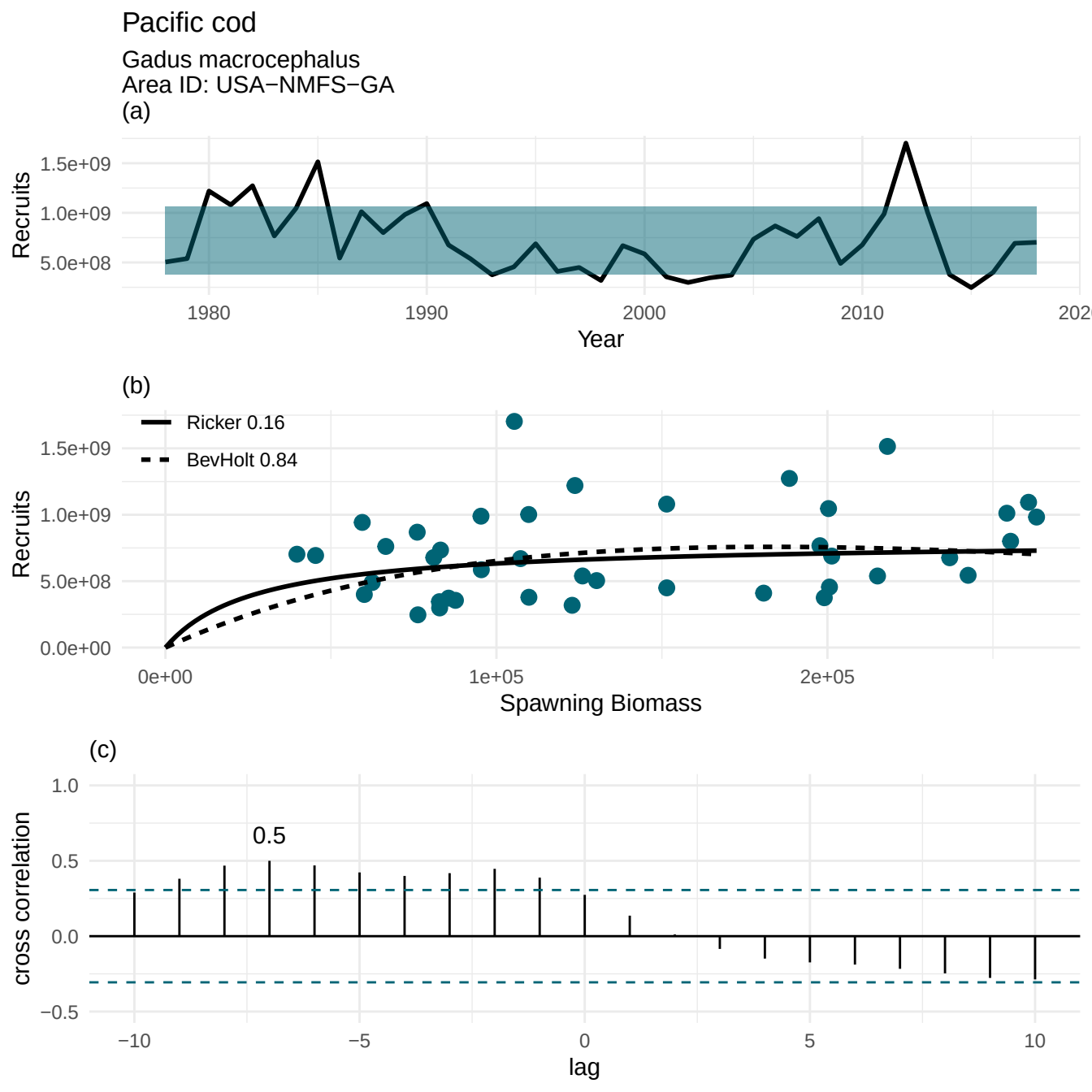

Paua
Haliotis iris
Area ID: New Zealand−MFish−PAU7
(a)
Recruits
2000000
1600000
1200000
800000
1990
2000
2010
Year
(b)
Ricker 0.456
BevHolt 0.544
Recruits
2000000
1500000
1000000
500000
0
0
500
1000
1500
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.62
0.45
−10
−5
0
5
10
lag

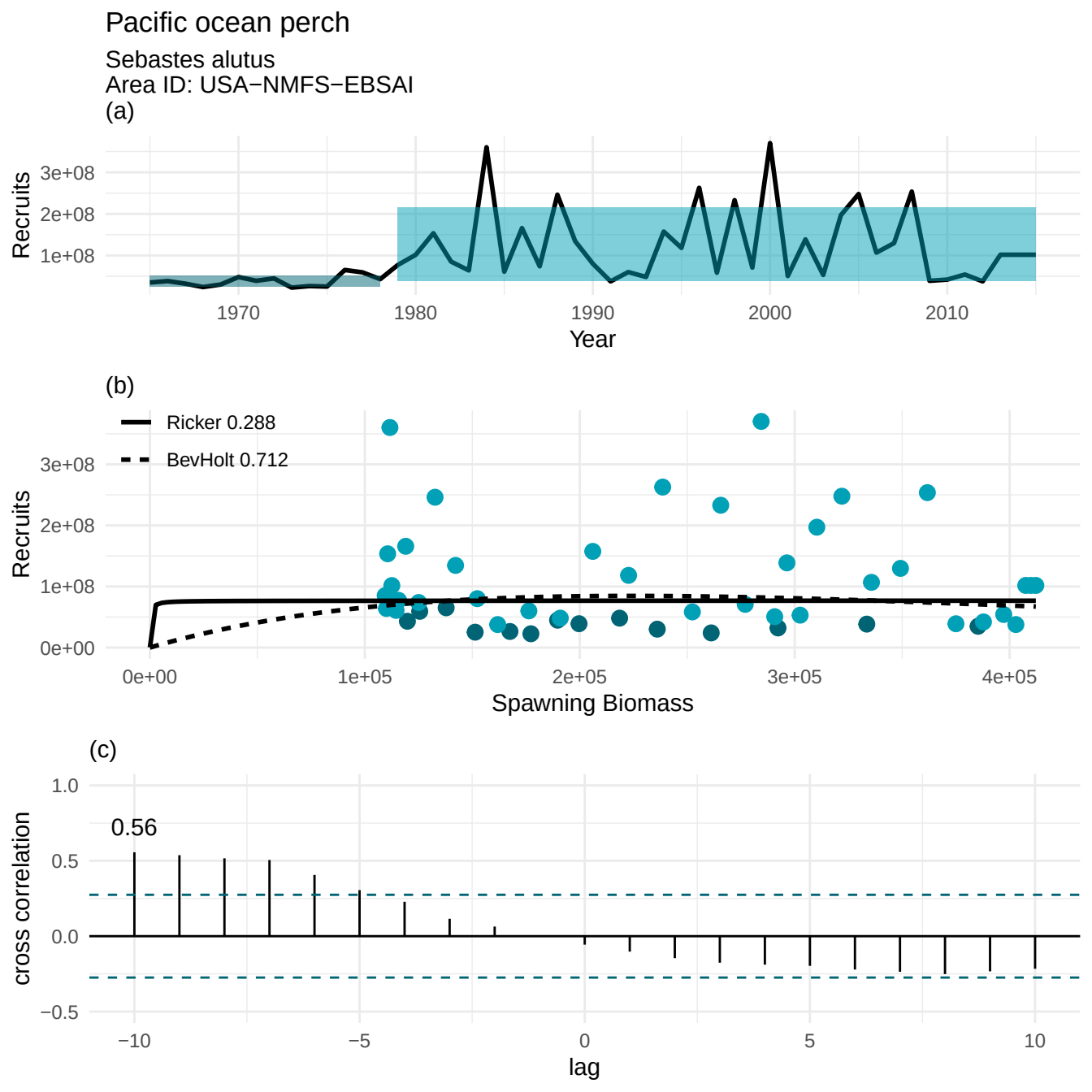

Pink cusk eel
Genypterus blacodes
Area ID: Argentina−CFP−ARG−S
(a)
Recruits
60000
50000
40000
30000
20000
1980
1990
2000
2010
Year
(b)
Ricker 0.0166
BevHolt 0.983
Recruits
60000
40000
20000
0
0e+00
1e+05
2e+05
3e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.34
0.38
−10
−5
0
5
10
lag

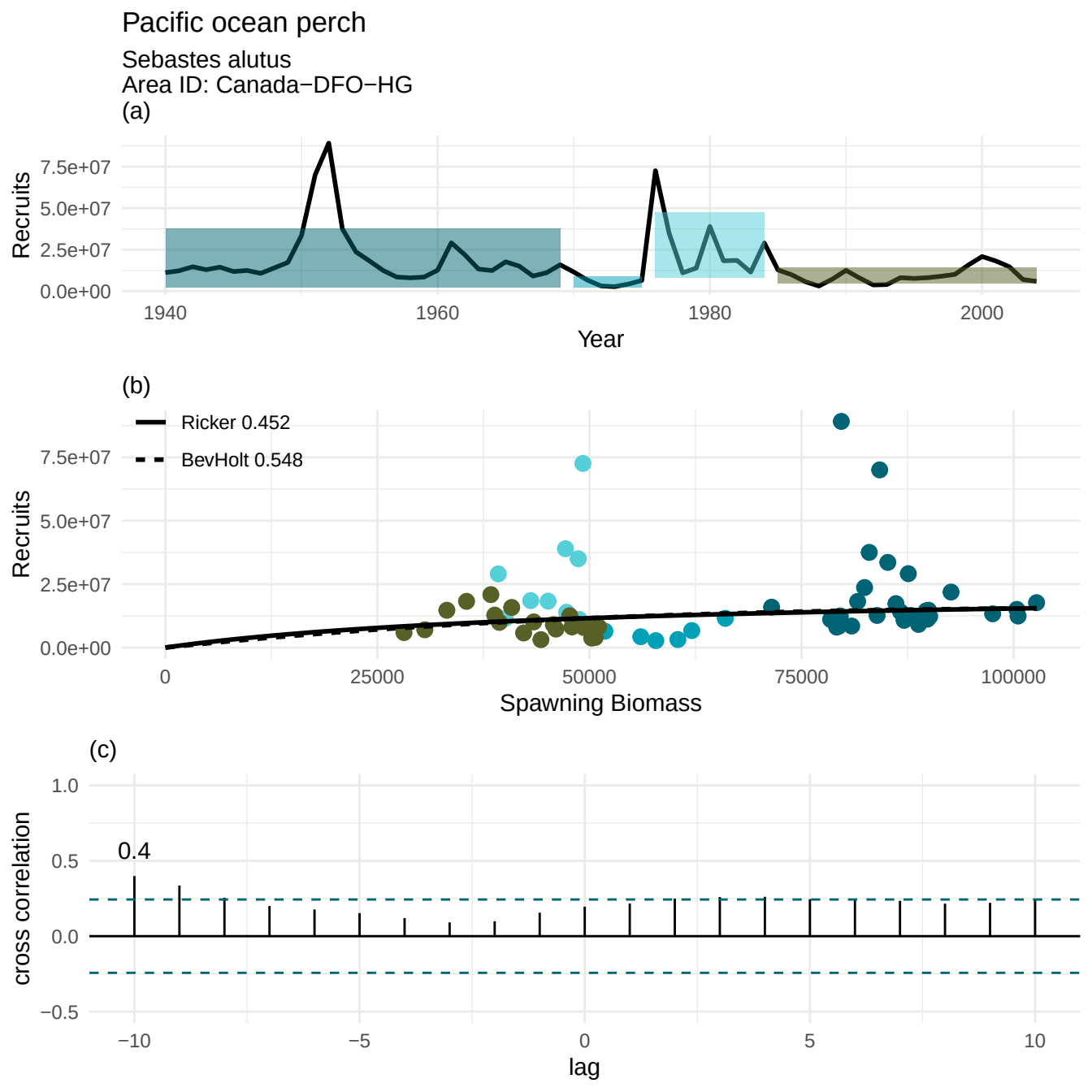

Pink cusk eel
Genypterus blacodes
Area ID: Chile−SUBPESCA−CH−CS
(a)
Recruits
10000
5000
1980
1990
2000
2010
2020
Year
(b)
Ricker 0.99
BevHolt 0.01
Recruits
10000
5000
0
0
5000
10000
15000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.33
−10
−5
0
5
10
lag

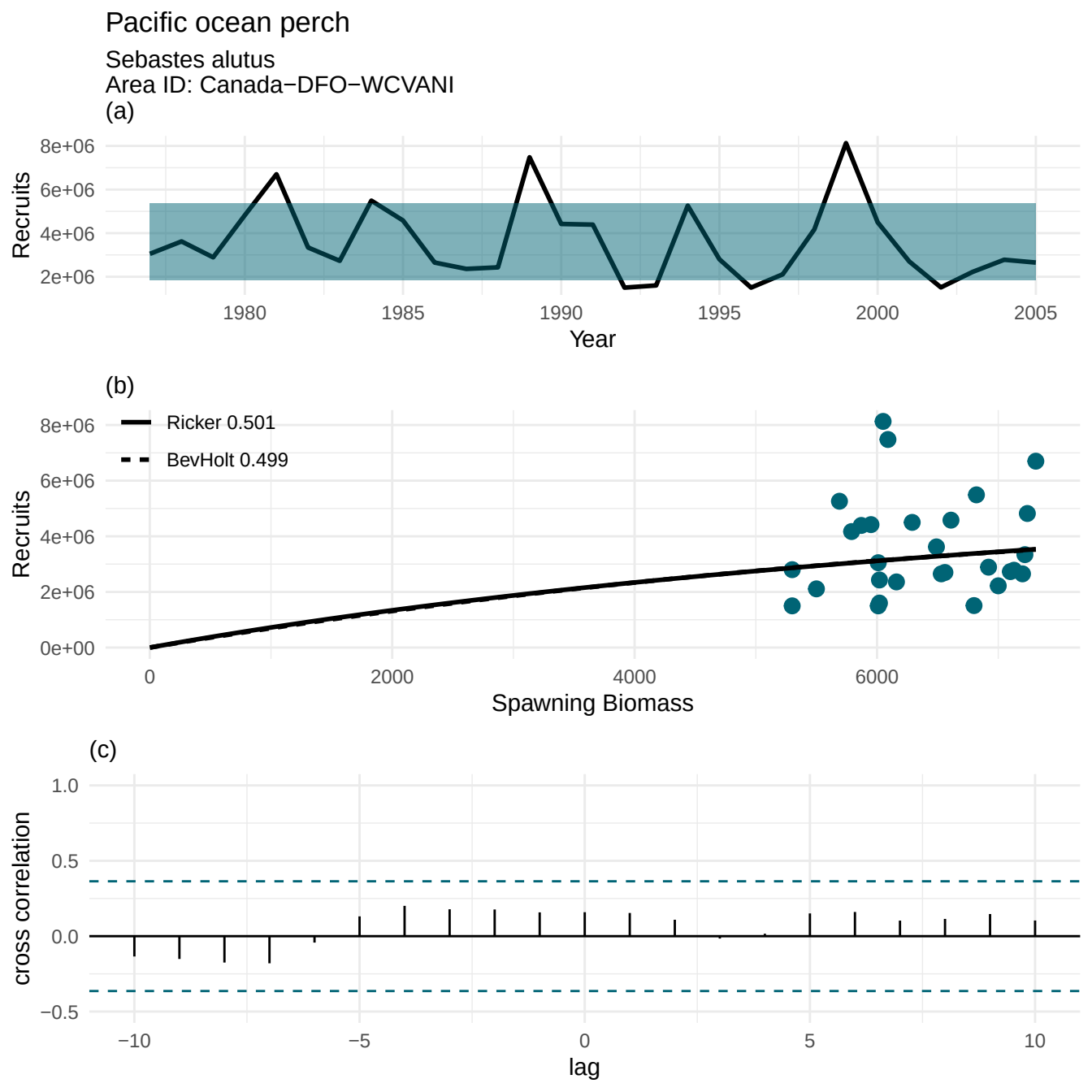

Pink cusk eel
Genypterus blacodes
Area ID: Chile−SUBPESCA−CH−S
(a)
Recruits
5000
4000
3000
2000
1000
1980
1990
2000
2010
2020
Year
(b)
Ricker 0.828
BevHolt 0.172
Recruits
5000
4000
3000
2000
1000
0
0
4000
8000
12000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.74
0.76
−10
−5
0
5
10
lag

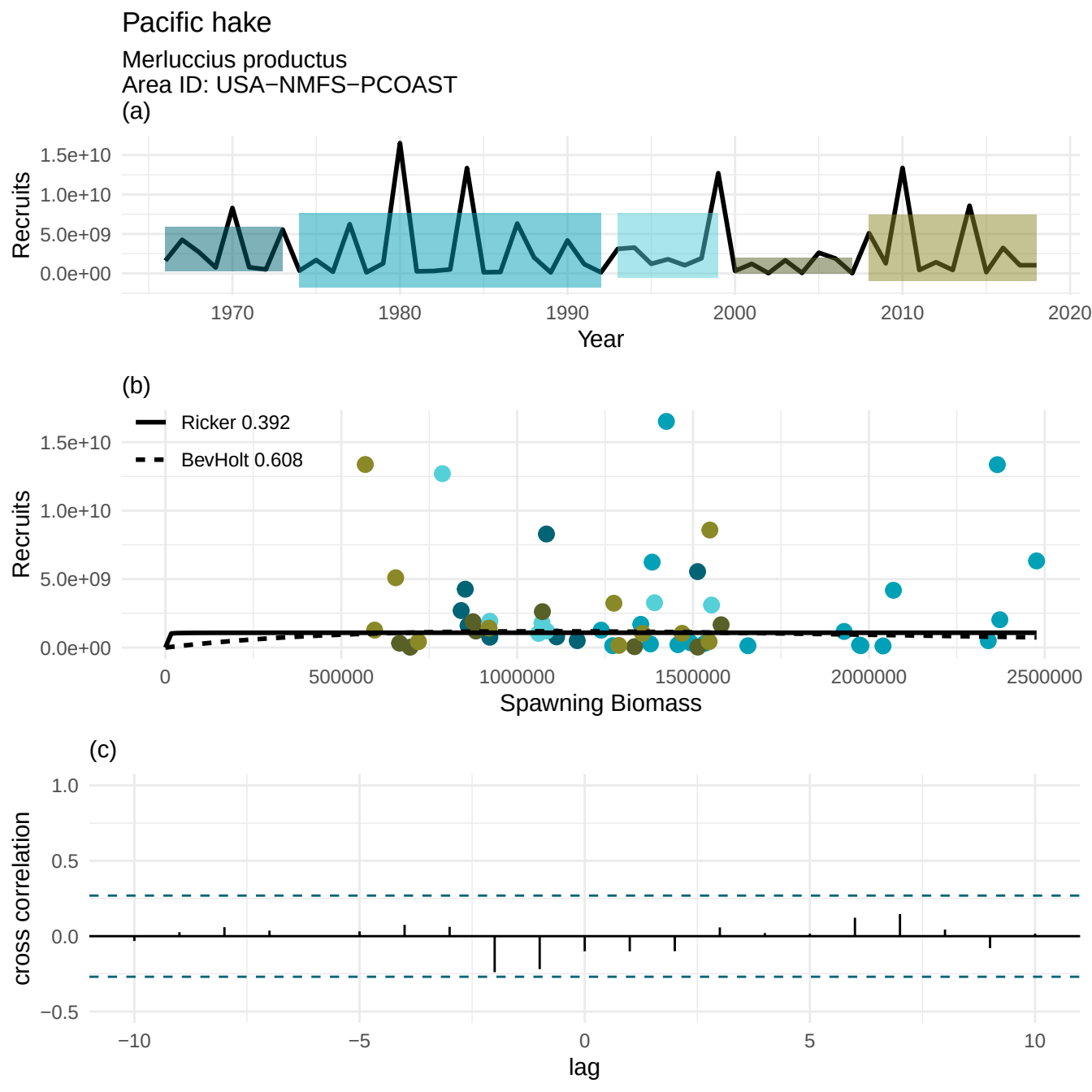

Pacific cod
Gadus macrocephalus
Area ID: USA−NMFS−BS
(a)
Recruits
9e+08
6e+08
3e+08
1980
1990
2000
2010
Year
(b)
Ricker 0.524
BevHolt 0.476
Recruits
9e+08
6e+08
3e+08
0e+00
0e+00
1e+05
2e+05
3e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

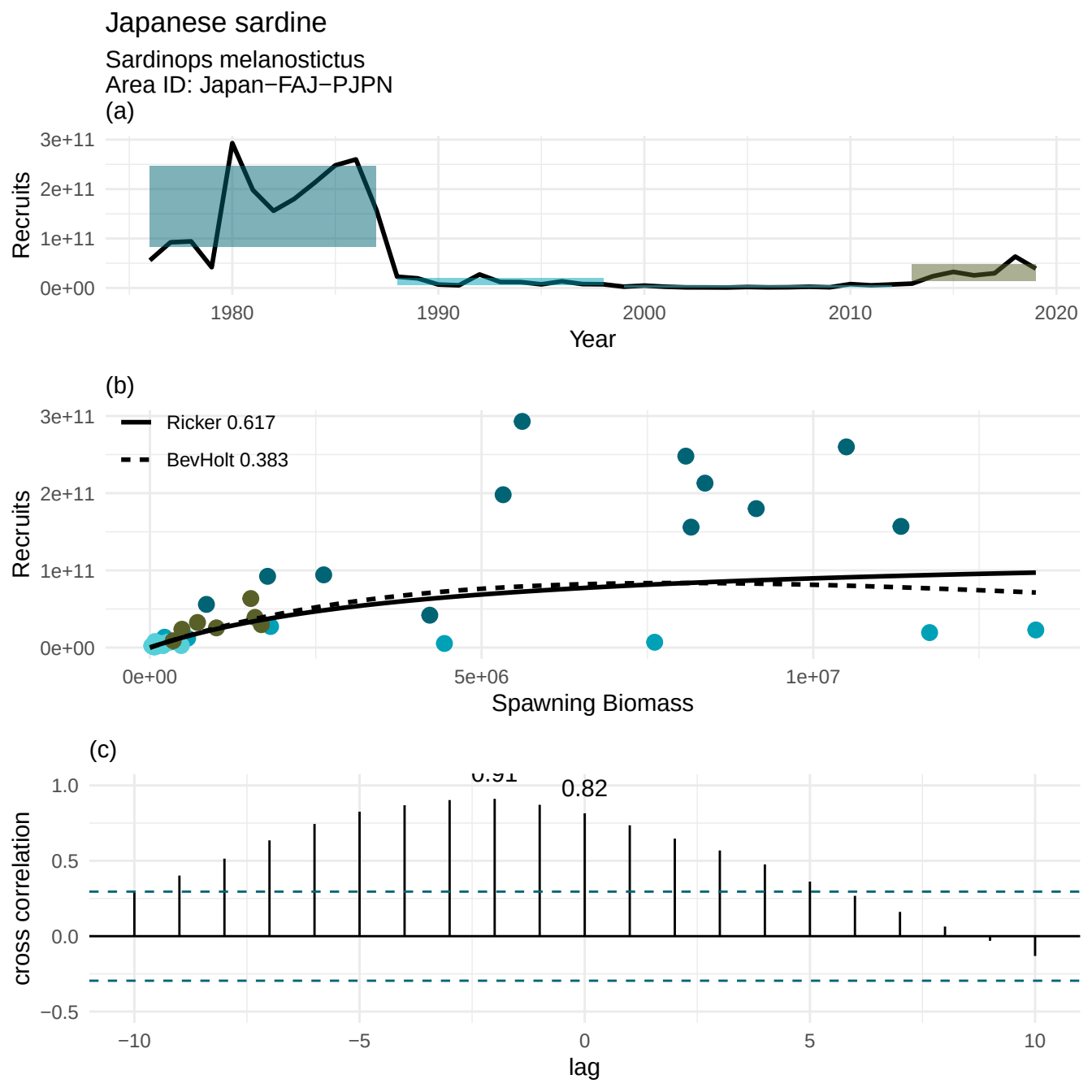

Pacific cod
Gadus macrocephalus
Area ID: USA−NMFS−GA
(a)
Recruits
1.5e+09
1.0e+09
5.0e+08
1980
1990
2000
2010
Year
(b)
Ricker 0.16
BevHolt 0.84
Recruits
1.5e+09
1.0e+09
5.0e+08
0.0e+00
0e+00
1e+05
2e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.5
−10
−5
0
5
10
lag

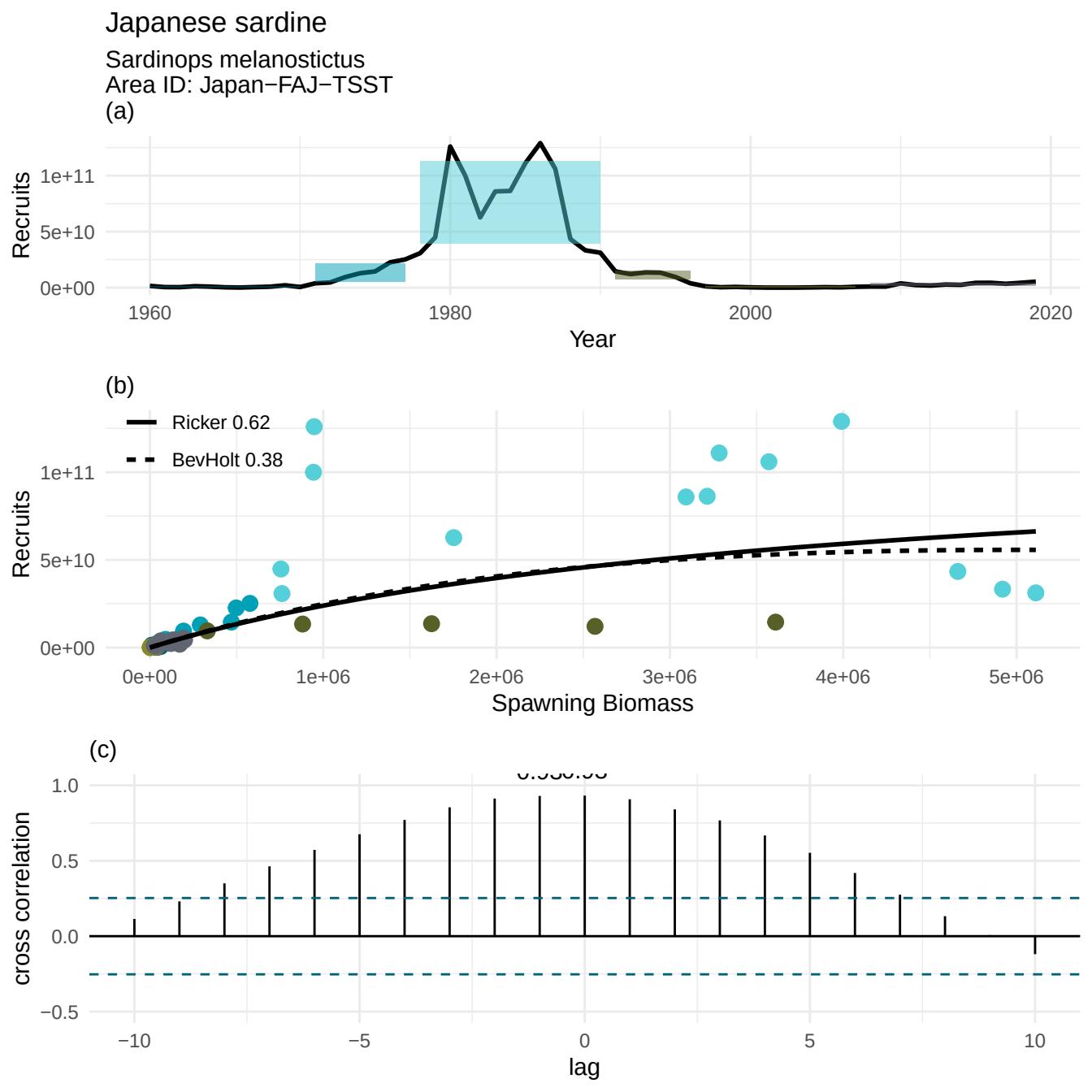

Pacific ocean perch
Sebastes alutus
Area ID: USA−NMFS−EBSAI
(a)
Recruits
3e+08
2e+08
1e+08
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.288
BevHolt 0.712
Recruits
3e+08
2e+08
1e+08
0e+00
0e+00
1e+05
2e+05
3e+05
4e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.56
−10
−5
0
5
10
lag

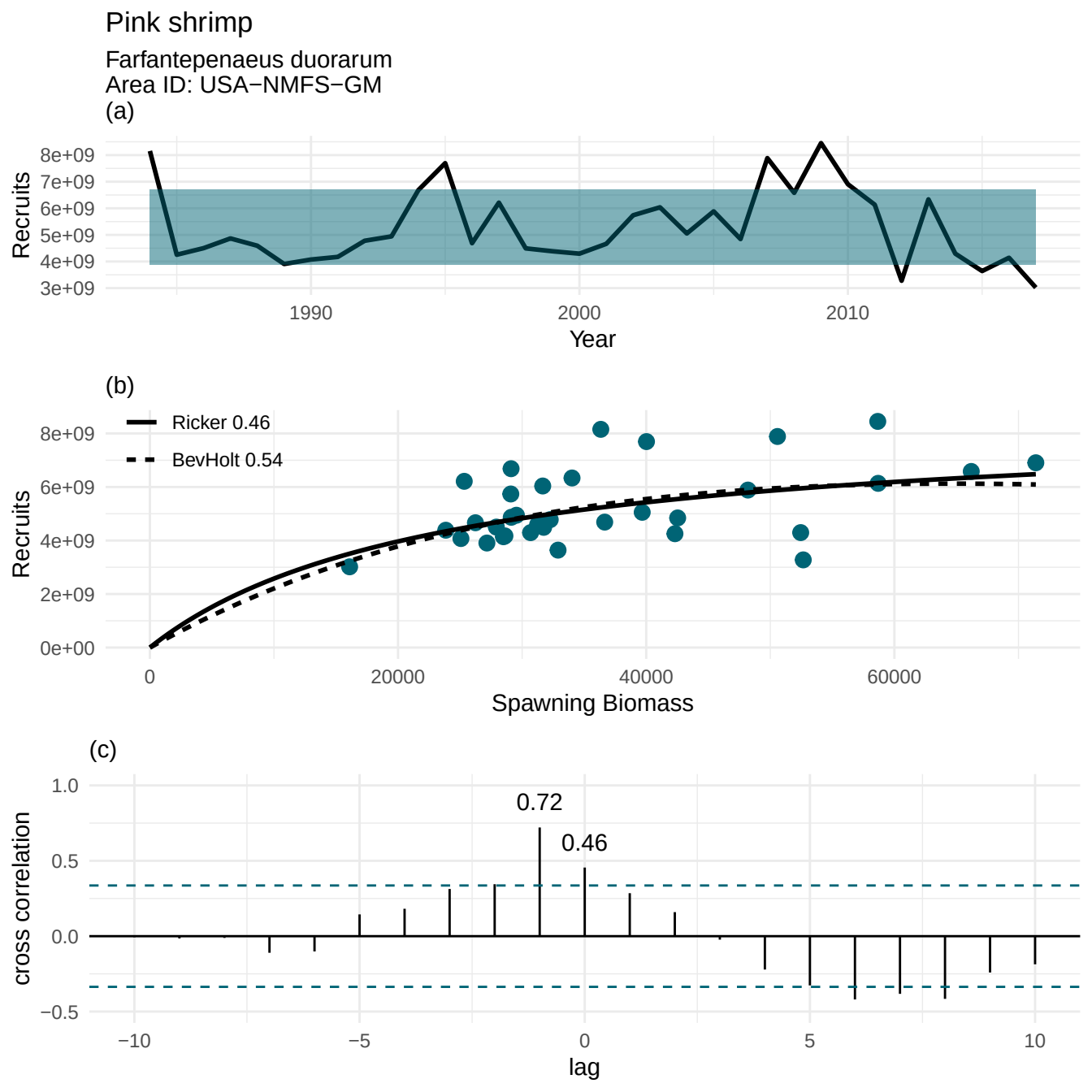

Pacific ocean perch
Sebastes alutus
Area ID: Canada−DFO−HG
(a)
Recruits
7.5e+07
5.0e+07
2.5e+07
0.0e+00
1940
1960
1980
2000
Year
(b)
Ricker 0.452
BevHolt 0.548
Recruits
7.5e+07
5.0e+07
2.5e+07
0.0e+00
0
25000
50000
75000
100000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.4
−10
−5
0
5
10
lag


Pacific ocean perch
Sebastes alutus
Area ID: Canada−DFO−WCVANI
(a)
Recruits
8e+06
6e+06
4e+06
2e+06
1980
1985
1990
1995
2000
2005
Year
(b)
Ricker 0.501
BevHolt 0.499
Recruits
8e+06
6e+06
4e+06
2e+06
0e+00
0
2000
4000
6000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

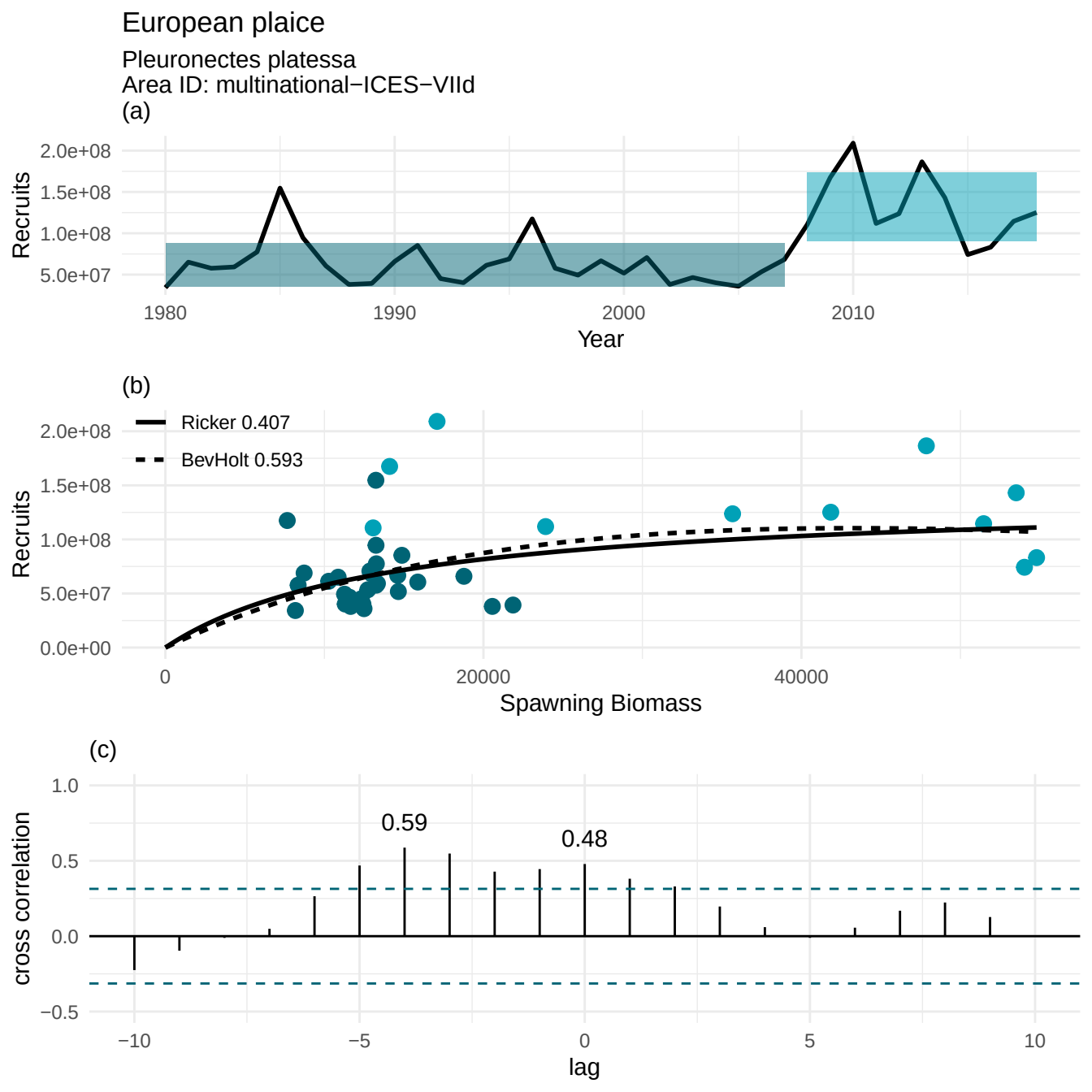

Pacific hake
Merluccius productus
Area ID: USA−NMFS−PCOAST
(a)
Recruits
1.5e+10
1.0e+10
5.0e+09
0.0e+00
1970
1980
1990
2000
2010
2020
Year
(b)
Ricker 0.392
BevHolt 0.608
Recruits
1.5e+10
1.0e+10
5.0e+09
0.0e+00
0
500000
1000000
1500000
2000000
2500000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

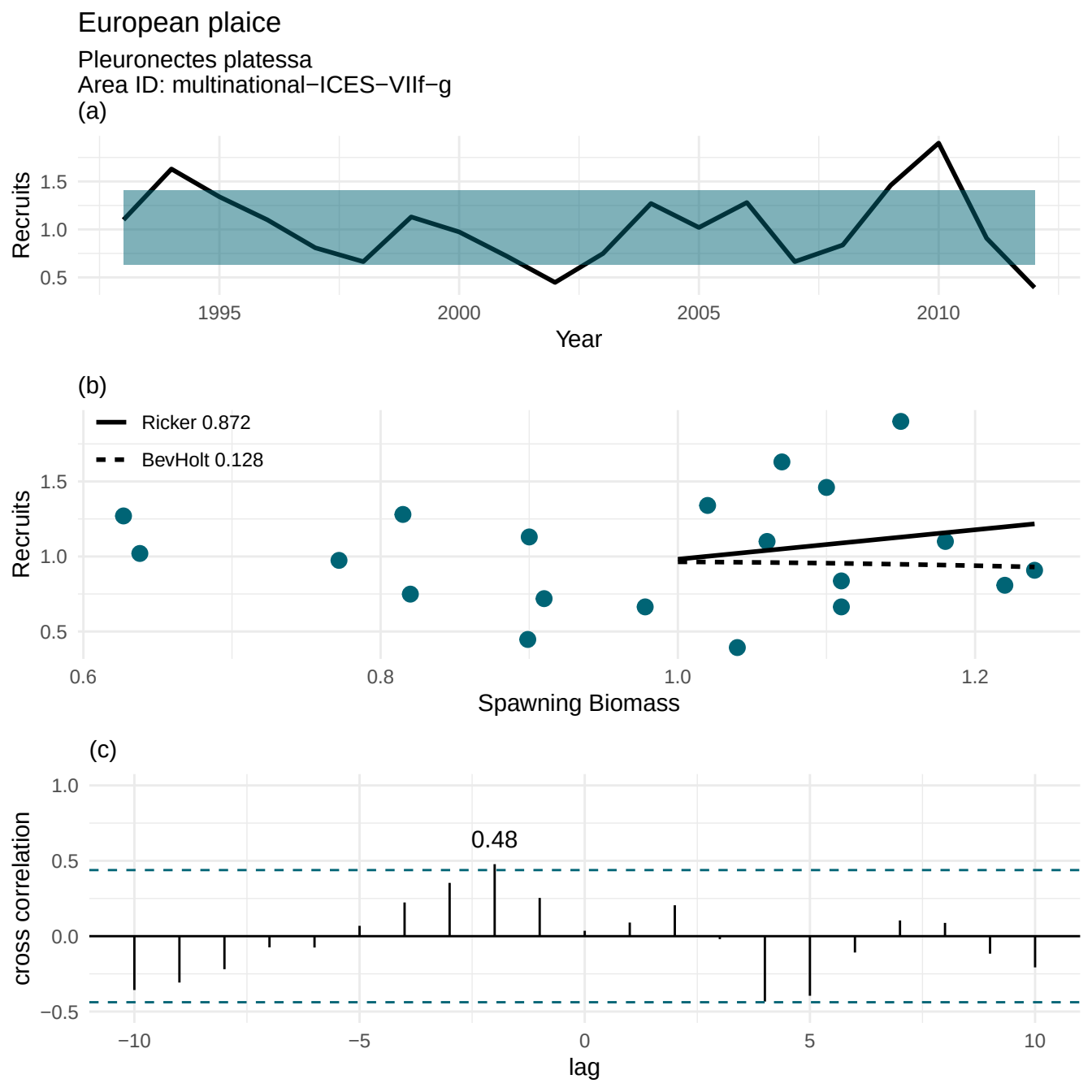

Japanese sardine
Sardinops melanostictus
Area ID: Japan−FAJ−PJPN
(a)
Recruits
3e+11
2e+11
1e+11
0e+00
1980
1990
2000
2010
2020
Year
(b)
Ricker 0.617
BevHolt 0.383
Recruits
3e+11
2e+11
1e+11
0e+00
0e+00
5e+06
1e+07
Spawning Biomass
(c)
0.91
0.82
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

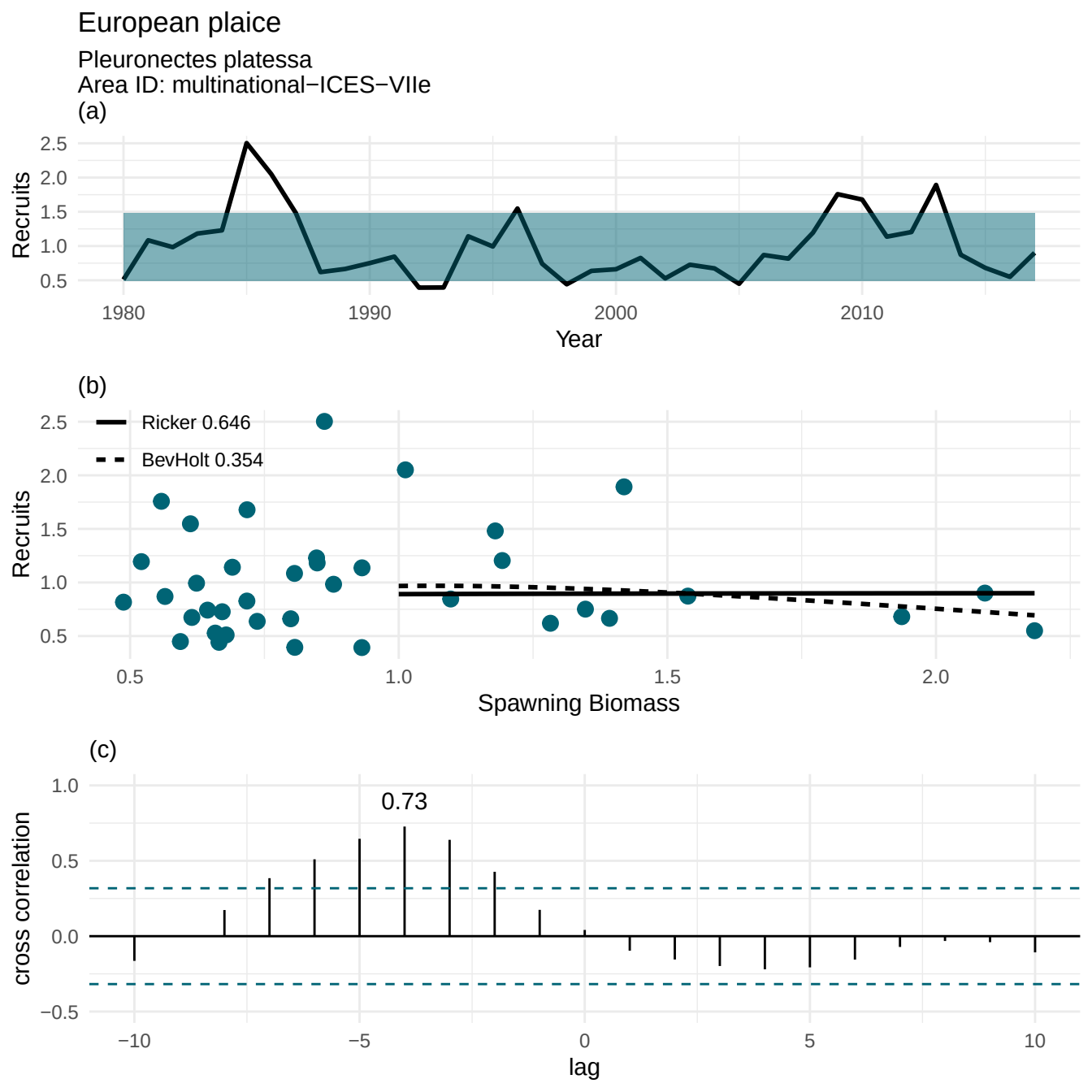

Japanese sardine
Sardinops melanostictus
Area ID: Japan−FAJ−TSST
(a)
Recruits
1e+11
5e+10
0e+00
1960
1980
2000
2020
Year
(b)
Ricker 0.62
BevHolt 0.38
Recruits
1e+11
5e+10
0e+00
0e+00
1e+06
2e+06
3e+06
4e+06
5e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

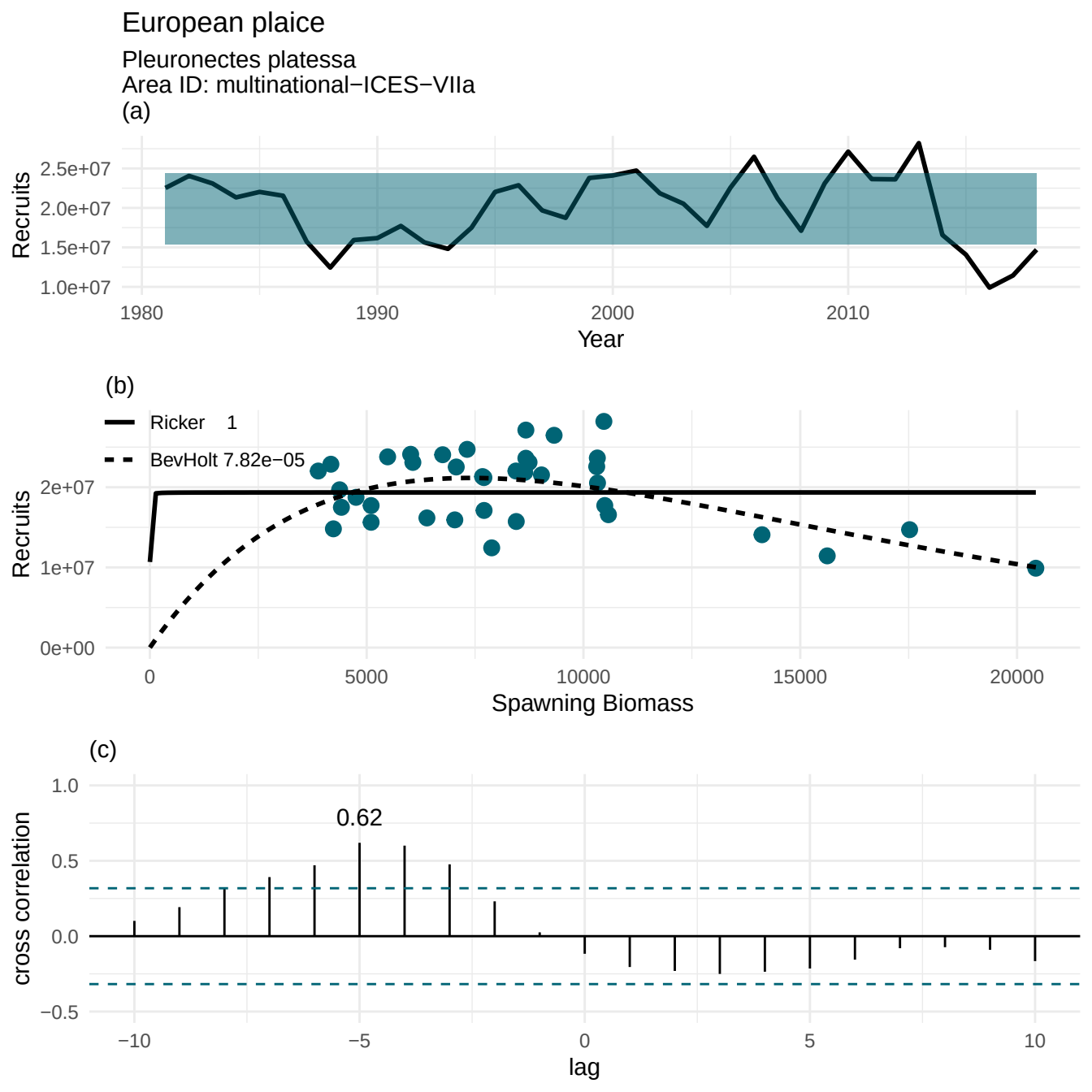

Pink shrimp
Farfantepenaeus duorarum
Area ID: USA−NMFS−GM
(a)
Recruits
8e+09
7e+09
6e+09
5e+09
4e+09
3e+09
1990
2000
2010
Year
(b)
Ricker 0.46
BevHolt 0.54
Recruits
8e+09
6e+09
4e+09
2e+09
0e+00
0
20000
40000
60000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.72
0.46
−10
−5
0
5
10
lag

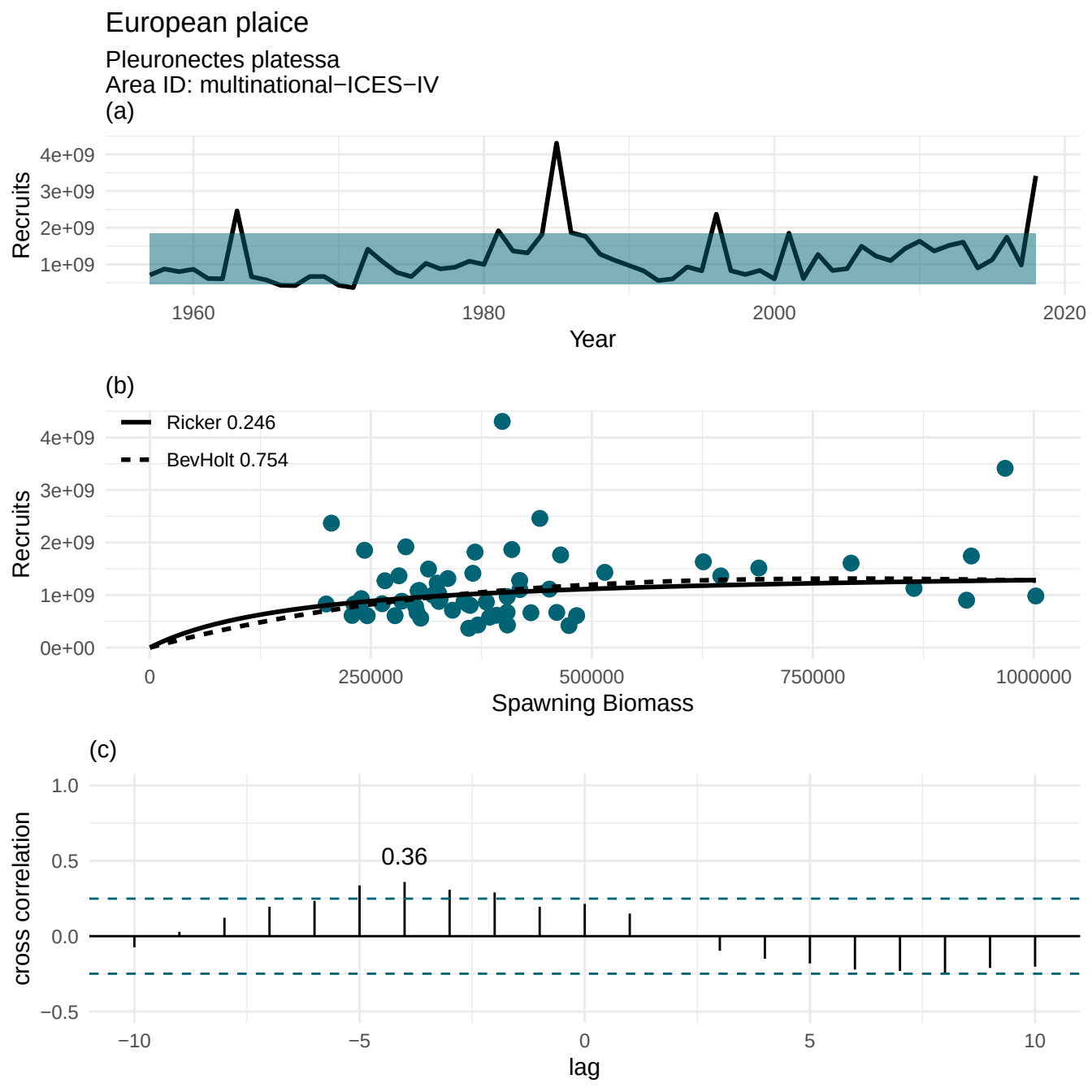
European plaice
Pleuronectes platessa
Area ID: multinational−ICES−2123
(a)
Recruits
60000
50000
40000
30000
20000
2000
2005
2010
2015
Year
(b)
Ricker 0.427
BevHolt 0.573
Recruits
60000
40000
20000
0
0
2500
5000
7500
10000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.55
−10
−5
0
5
10
lag

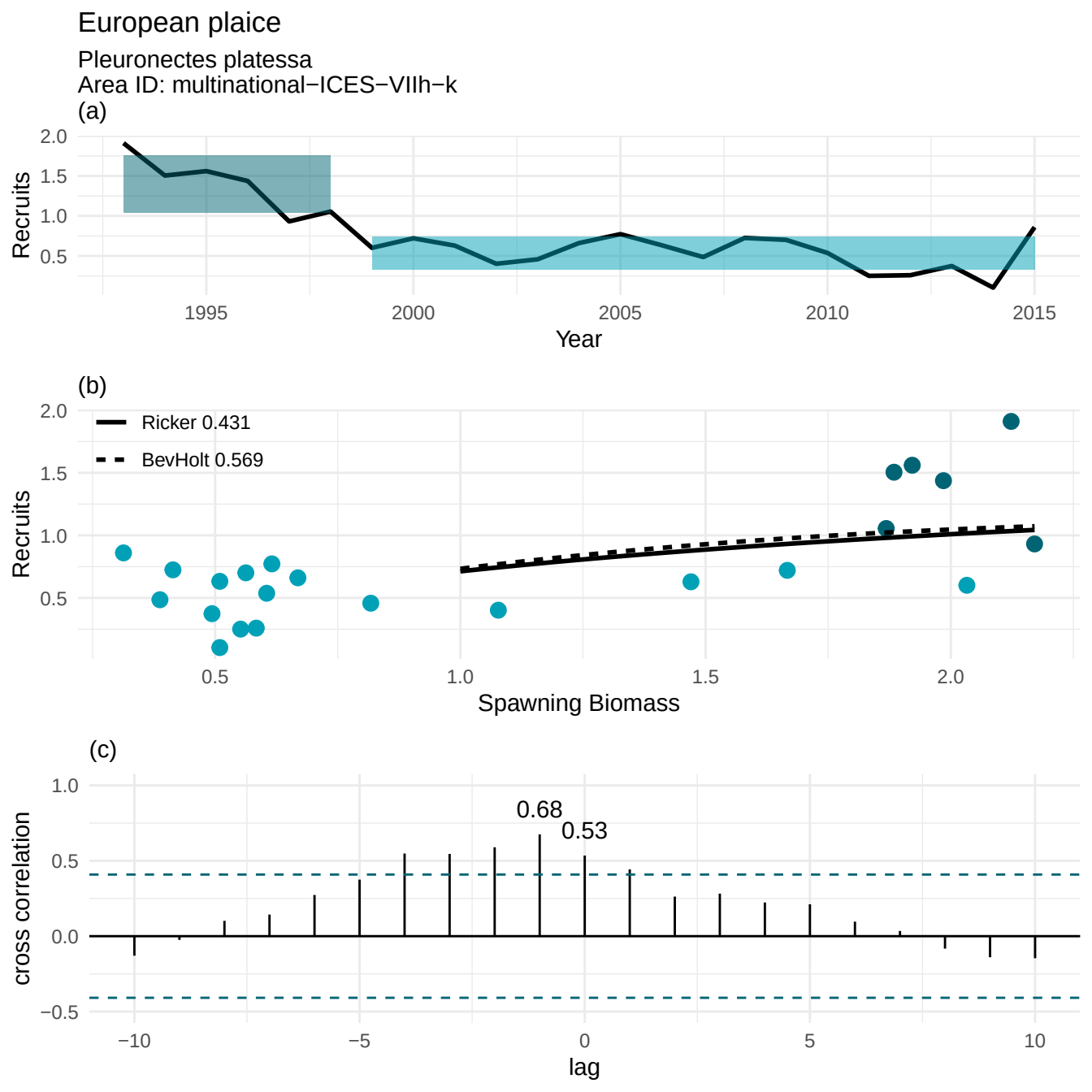

European plaice
Pleuronectes platessa
Area ID: multinational−ICES−VIId
(a)
Recruits
2.0e+08
1.5e+08
1.0e+08
5.0e+07
1980
1990
2000
2010
Year
(b)
Ricker 0.407
BevHolt 0.593
Recruits
2.0e+08
1.5e+08
1.0e+08
5.0e+07
0.0e+00
0
20000
40000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.59
0.48
−10
−5
0
5
10
lag

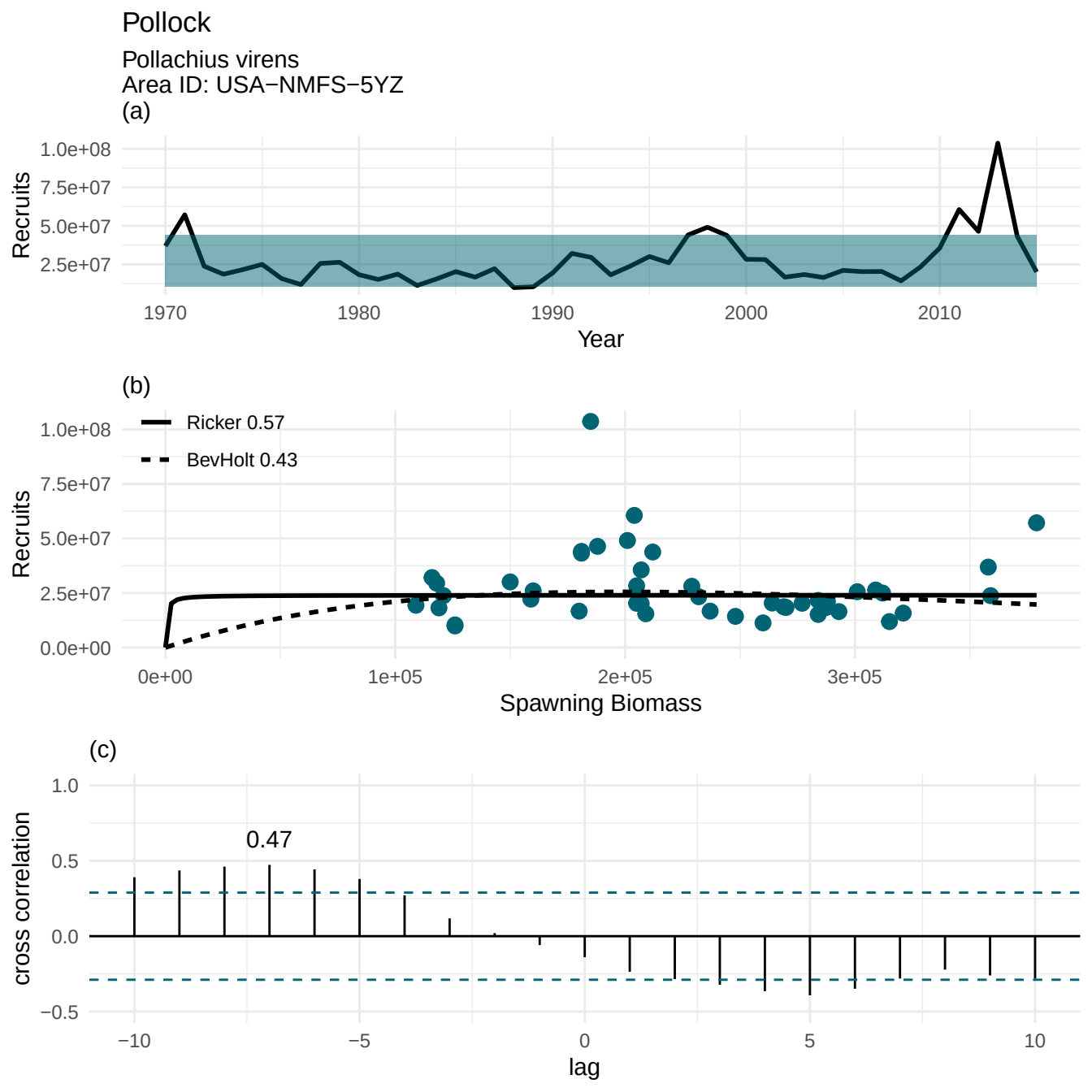

European plaice
Pleuronectes platessa
Area ID: multinational−ICES−VIIf−g
(a)
Recruits
1.5
1.0
0.5
1995
2000
2005
2010
Year
(b)
Ricker 0.872
BevHolt 0.128
Recruits
1.5
1.0
0.5
0.6
0.8
1.0
1.2
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.48
−10
−5
0
5
10
lag

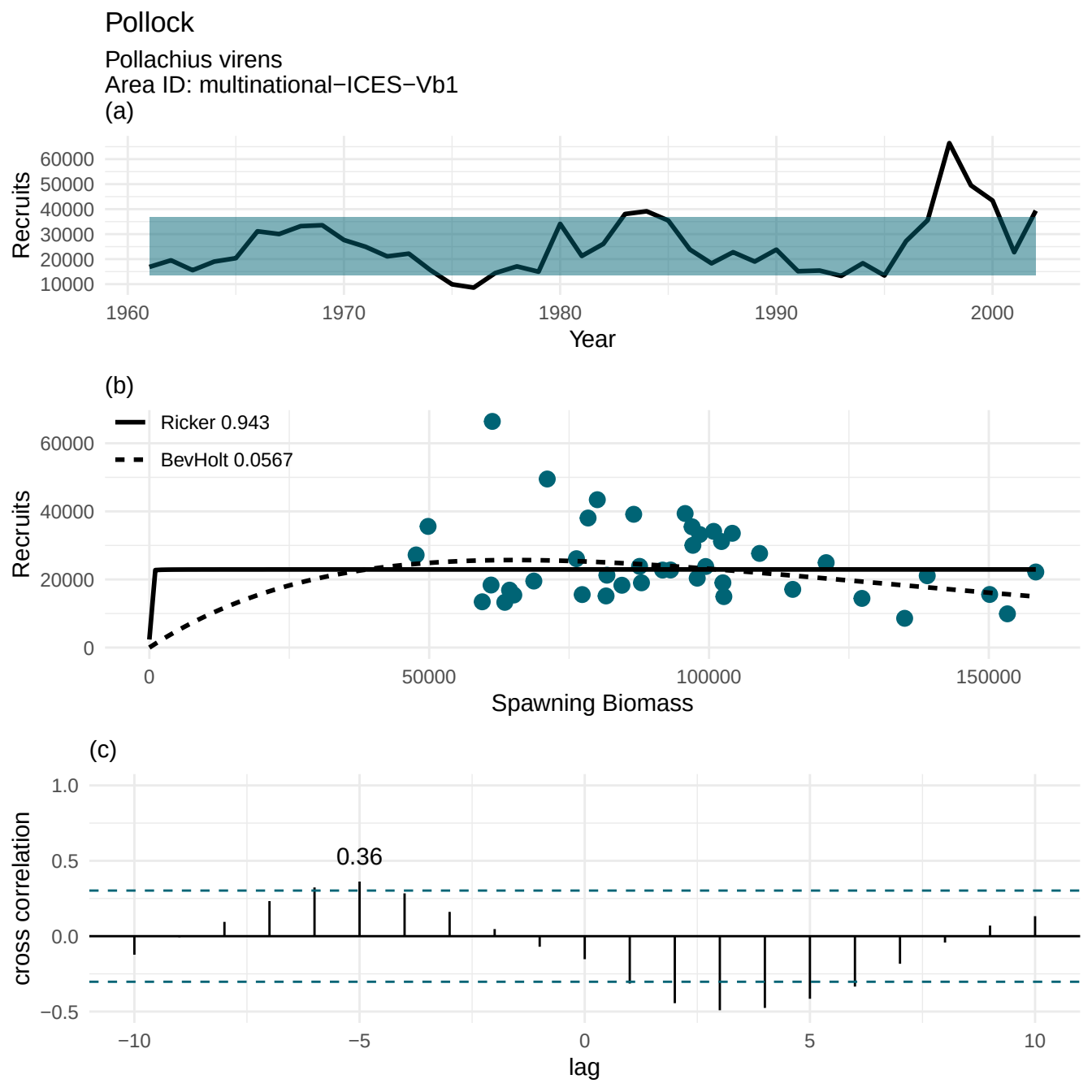

European plaice
Pleuronectes platessa
Area ID: multinational−ICES−VIIe
(a)
Recruits
2.5
2.0
1.5
1.0
0.5
1980
1990
2000
2010
Year
(b)
Ricker 0.646
BevHolt 0.354
Recruits
2.5
2.0
1.5
1.0
0.5
0.5
1.0
1.5
2.0
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.73
−10
−5
0
5
10
lag

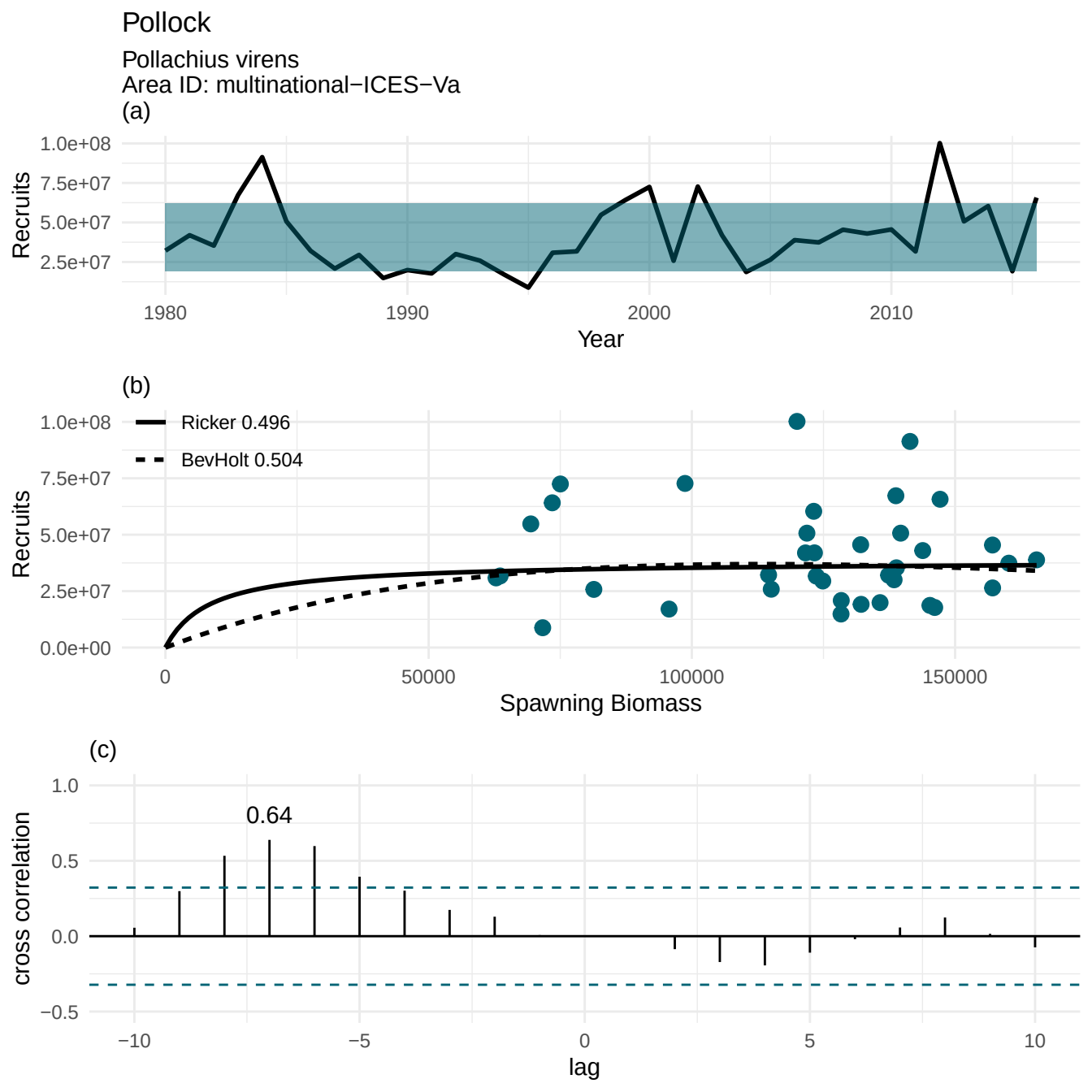

European plaice
Pleuronectes platessa
Area ID: multinational−ICES−VIIa
(a)
Recruits
2.5e+07
2.0e+07
1.5e+07
1.0e+07
1980
1990
2000
2010
Year
(b)
Ricker 1
BevHolt 7.82e−05
Recruits
2e+07
1e+07
0e+00
0
5000
10000
15000
20000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.62
−10
−5
0
5
10
lag

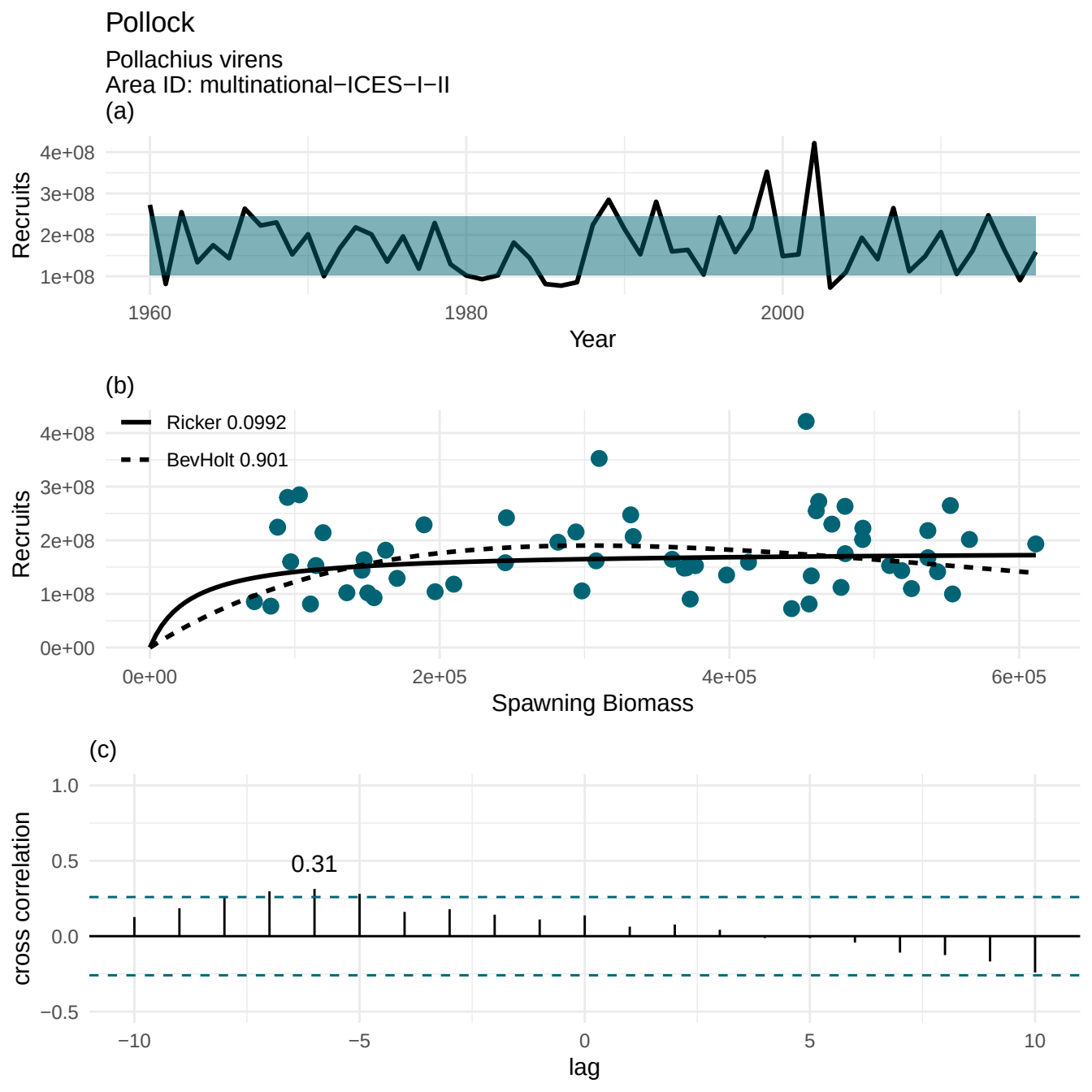

European plaice
Pleuronectes platessa
Area ID: multinational−ICES−IV
(a)
Recruits
4e+09
3e+09
2e+09
1e+09
1960
1980
2000
2020
Year
(b)
Ricker 0.246
BevHolt 0.754
Recruits
4e+09
3e+09
2e+09
1e+09
0e+00
0
250000
500000
750000
1000000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.36
−10
−5
0
5
10
lag

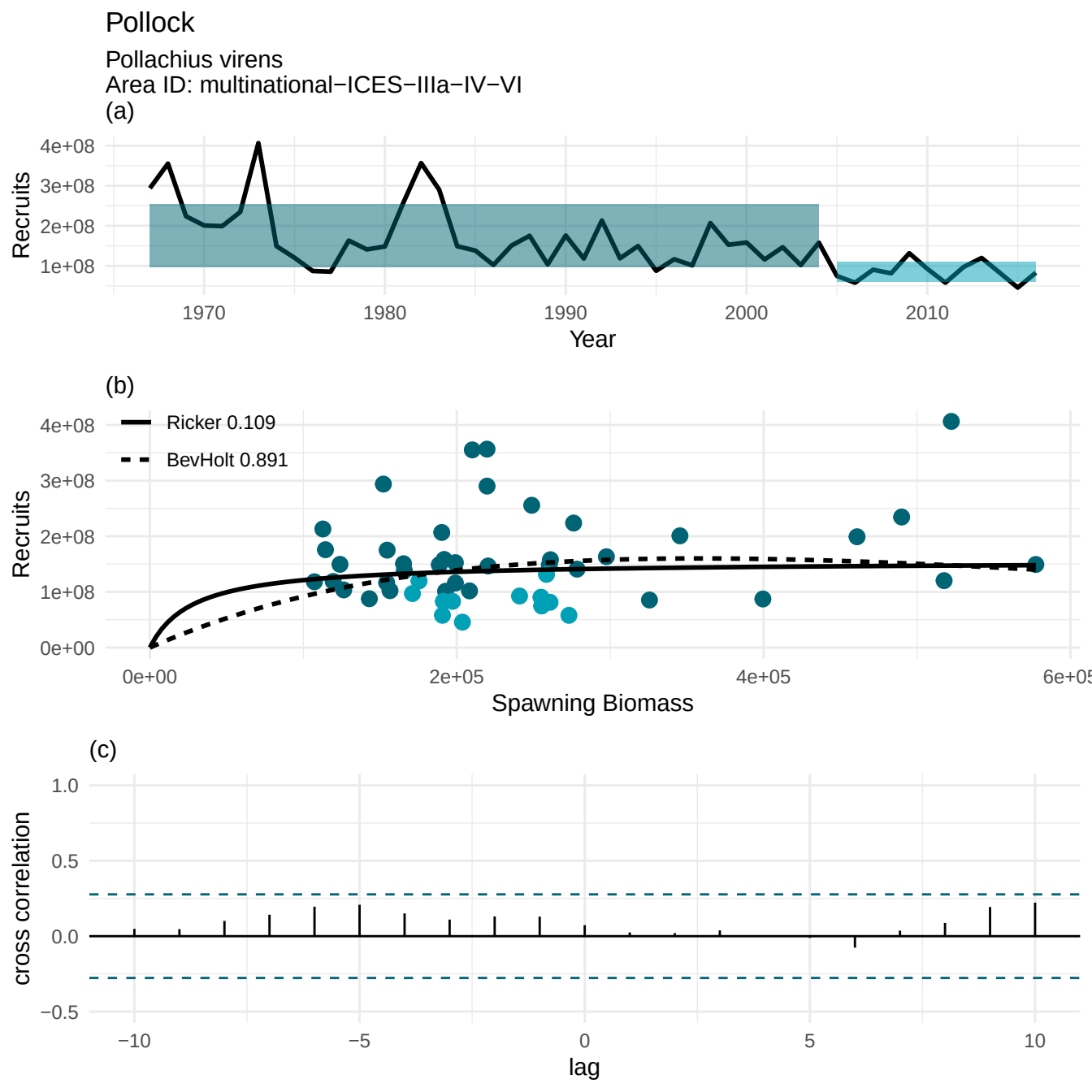

European plaice
Pleuronectes platessa
Area ID: multinational−ICES−VIIh−k
(a)
Recruits
2.0
1.5
1.0
0.5
1995
2000
2005
2010
2015
Year
(b)
Ricker 0.431
BevHolt 0.569
Recruits
2.0
1.5
1.0
0.5
0.5
1.0
1.5
2.0
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.68
0.53
−10
−5
0
5
10
lag

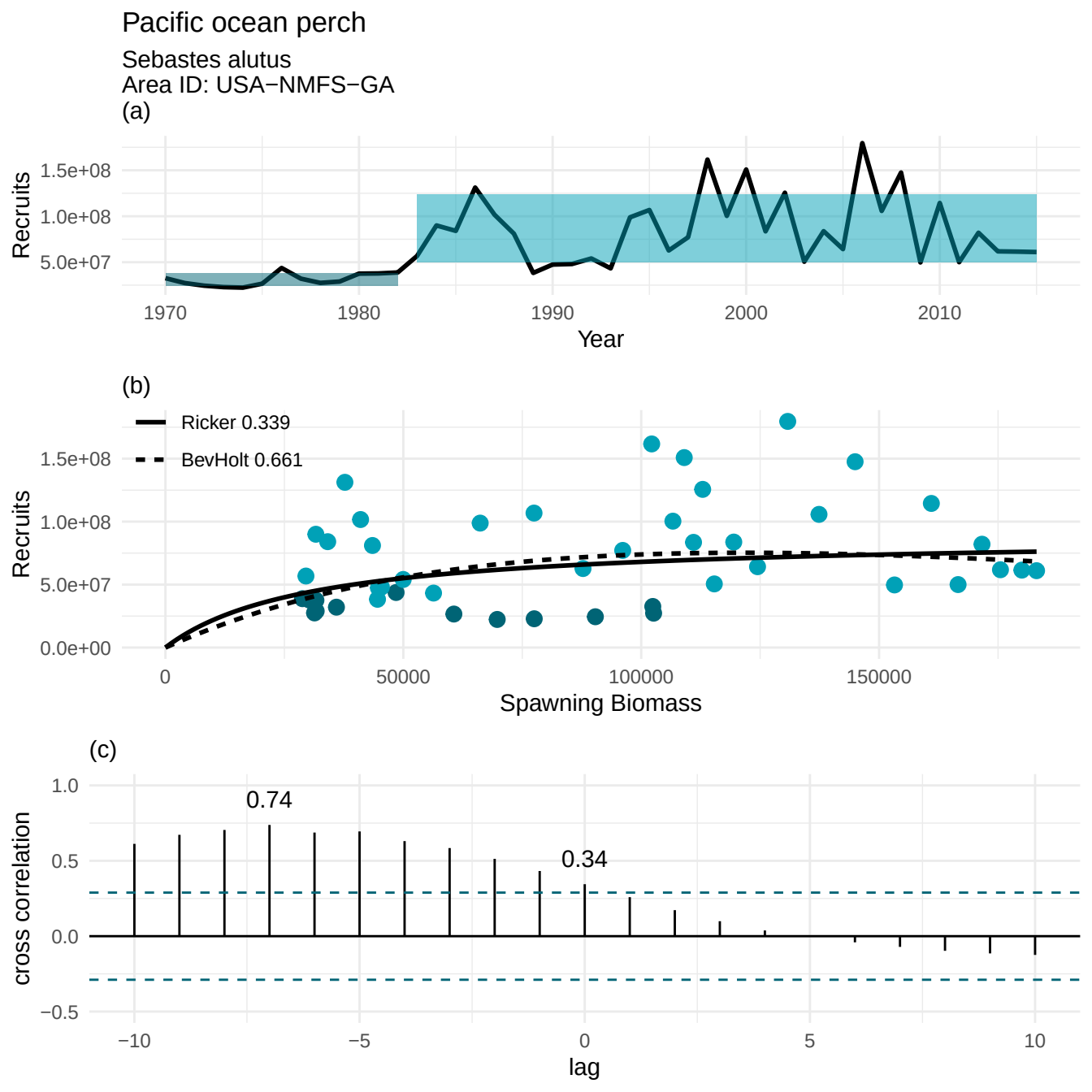

Pollock
Pollachius virens
Area ID: USA−NMFS−5YZ
(a)
Recruits
1.0e+08
7.5e+07
5.0e+07
2.5e+07
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.57
BevHolt 0.43
Recruits
1.0e+08
7.5e+07
5.0e+07
2.5e+07
0.0e+00
0e+00
1e+05
2e+05
3e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.47
−10
−5
0
5
10
lag

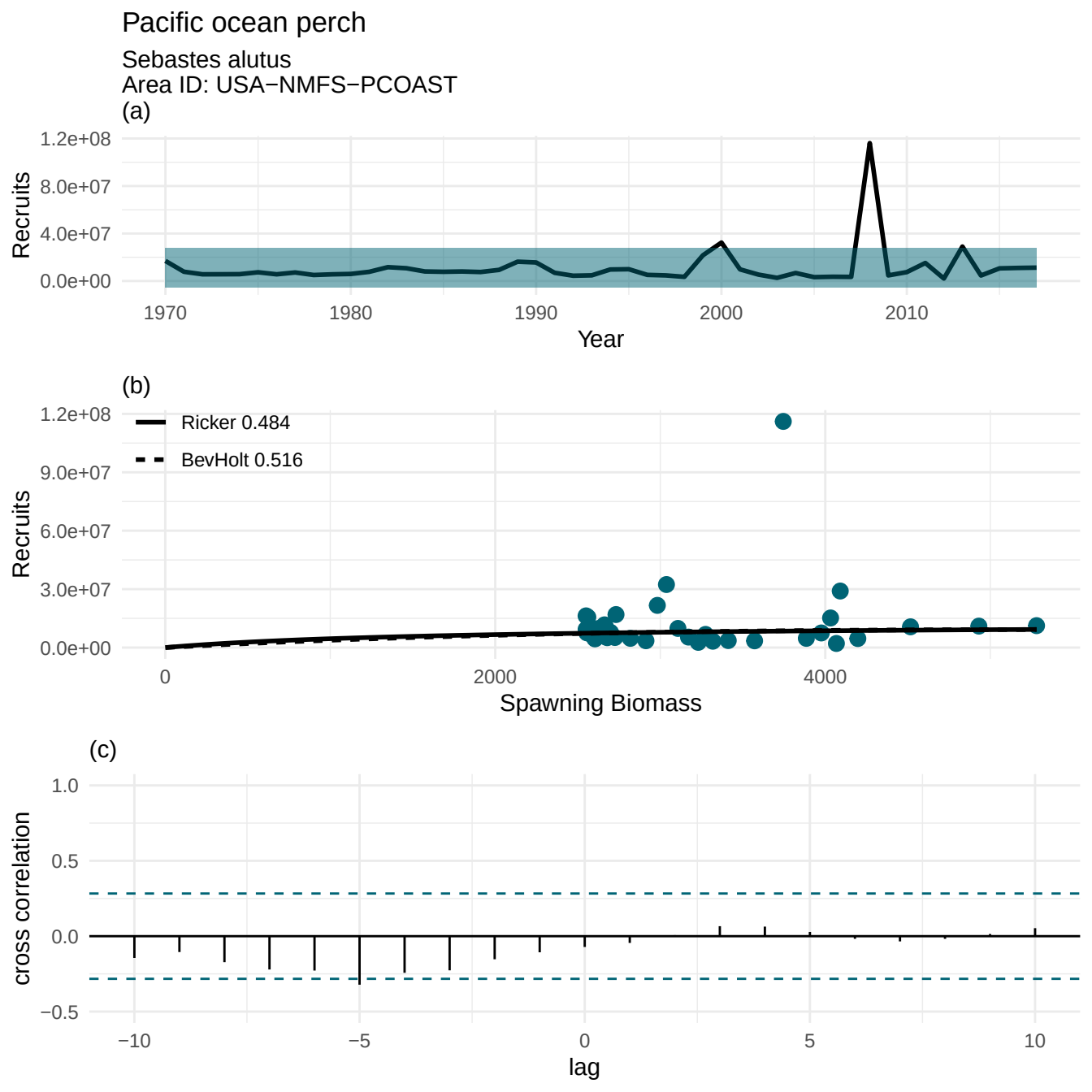

Pollock
Pollachius virens
Area ID: multinational−ICES−Vb1
(a)
Recruits
60000
50000
40000
30000
20000
10000
1960
1970
1980
1990
2000
Year
(b)
Ricker 0.943
BevHolt 0.0567
Recruits
60000
40000
20000
0
0
50000
100000
150000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.36
−10
−5
0
5
10
lag

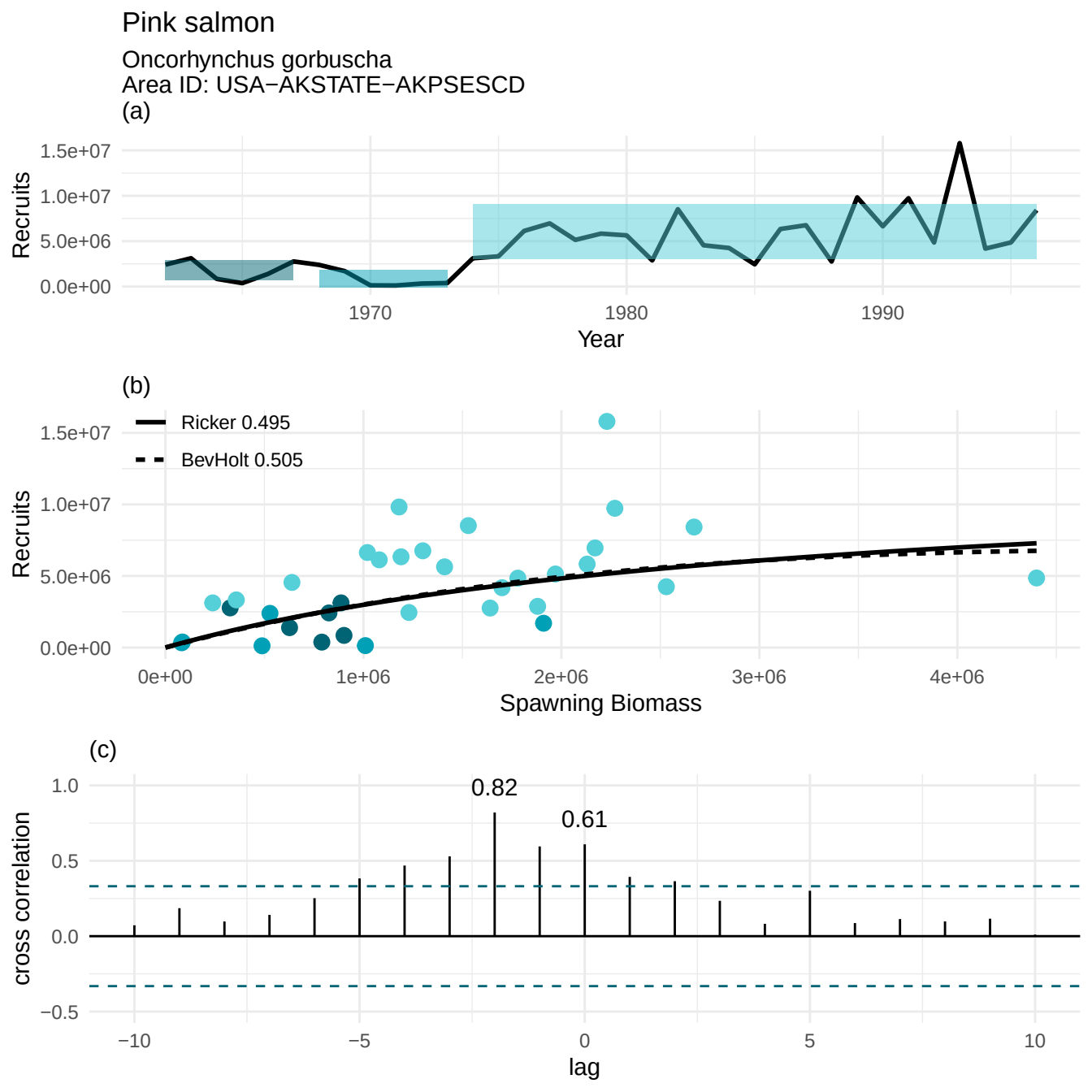

Pollock
Pollachius virens
Area ID: multinational−ICES−Va
(a)
Recruits
1.0e+08
7.5e+07
5.0e+07
2.5e+07
1980
1990
2000
2010
Year
(b)
Ricker 0.496
BevHolt 0.504
Recruits
1.0e+08
7.5e+07
5.0e+07
2.5e+07
0.0e+00
0
50000
100000
150000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.64
−10
−5
0
5
10
lag

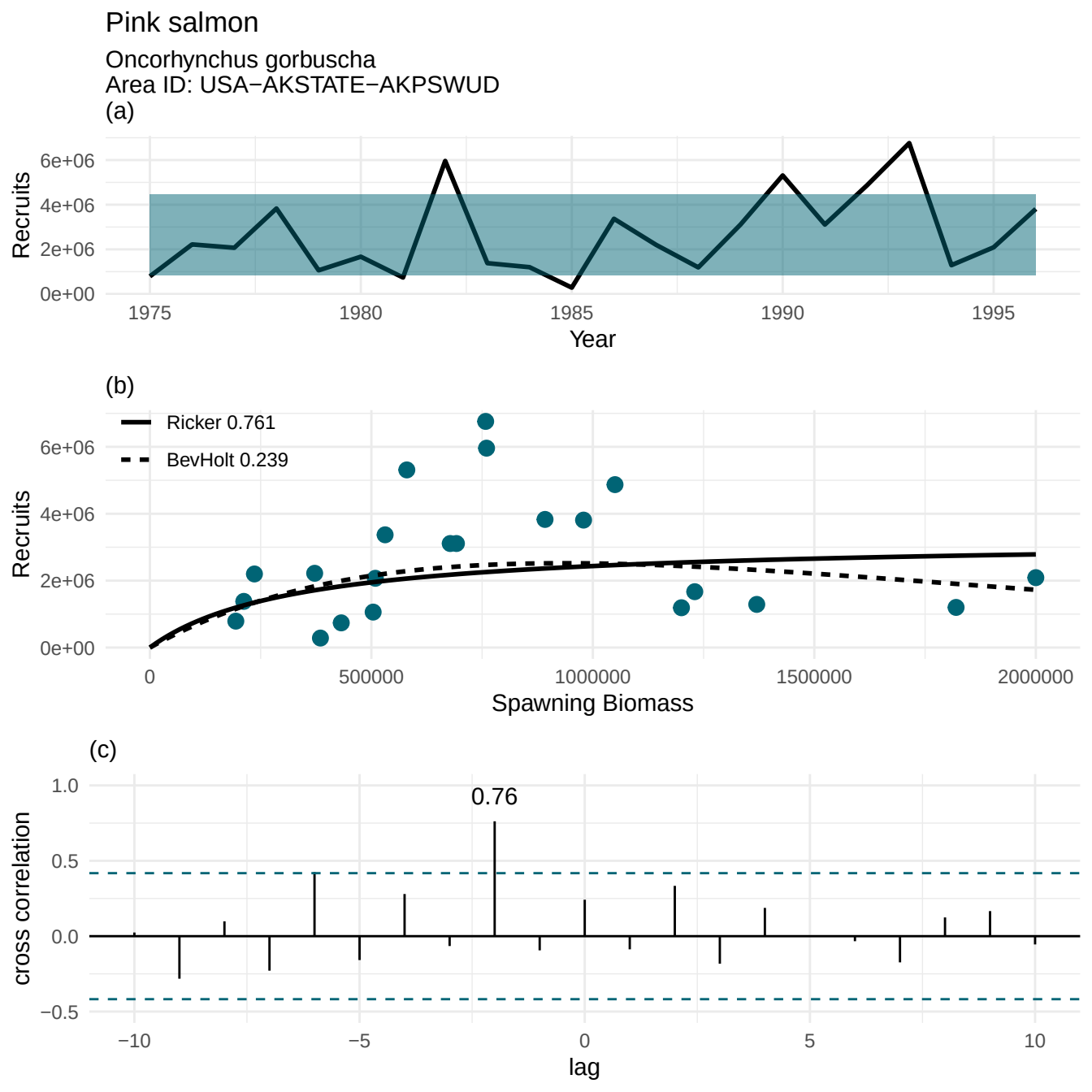

Pollock
Pollachius virens
Area ID: multinational−ICES−I−II
(a)
Recruits
4e+08
3e+08
2e+08
1e+08
1960
1980
2000
Year
(b)
Ricker 0.0992
BevHolt 0.901
Recruits
4e+08
3e+08
2e+08
1e+08
0e+00
0e+00
2e+05
4e+05
6e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.31
−10
−5
0
5
10
lag

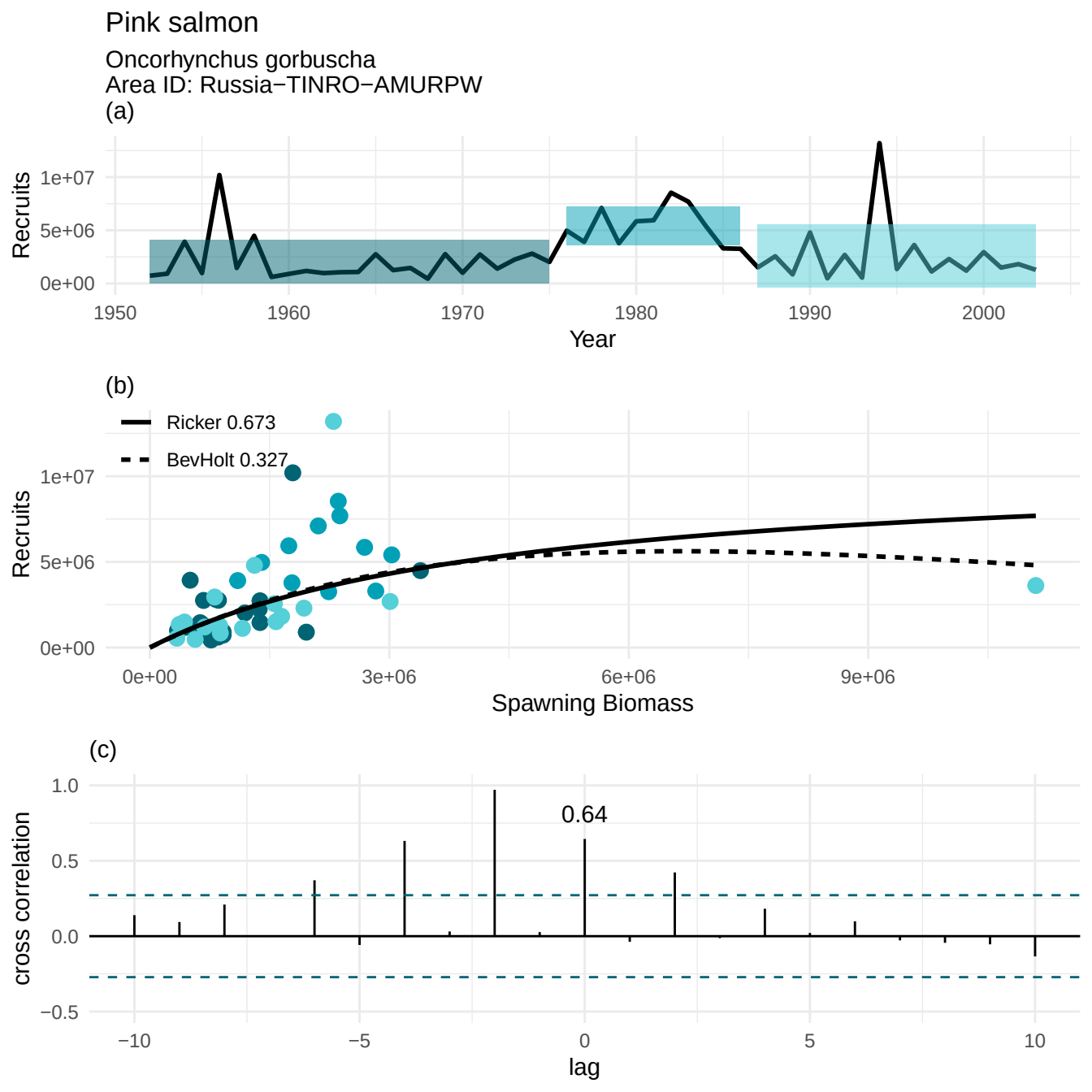

Pollock
Pollachius virens
Area ID: multinational−ICES−IIIa−IV−VI
(a)
Recruits
4e+08
3e+08
2e+08
1e+08
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.109
BevHolt 0.891
Recruits
4e+08
3e+08
2e+08
1e+08
0e+00
0e+00
2e+05
4e+05
6e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

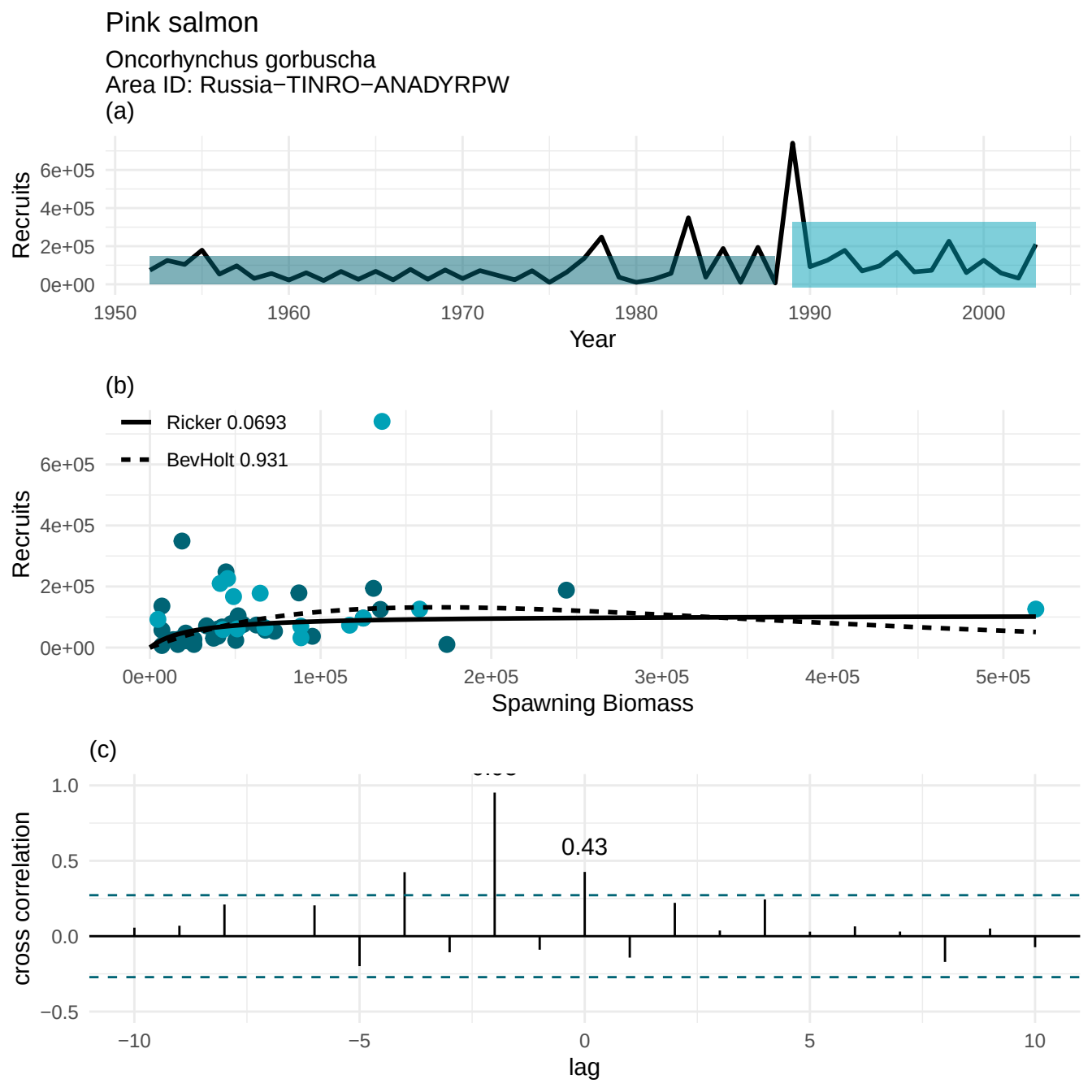

Pacific ocean perch
Sebastes alutus
Area ID: USA−NMFS−GA
(a)
Recruits
1.5e+08
1.0e+08
5.0e+07
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.339
BevHolt 0.661
Recruits
1.5e+08
1.0e+08
5.0e+07
0.0e+00
0
50000
100000
150000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.74
0.34
−10
−5
0
5
10
lag

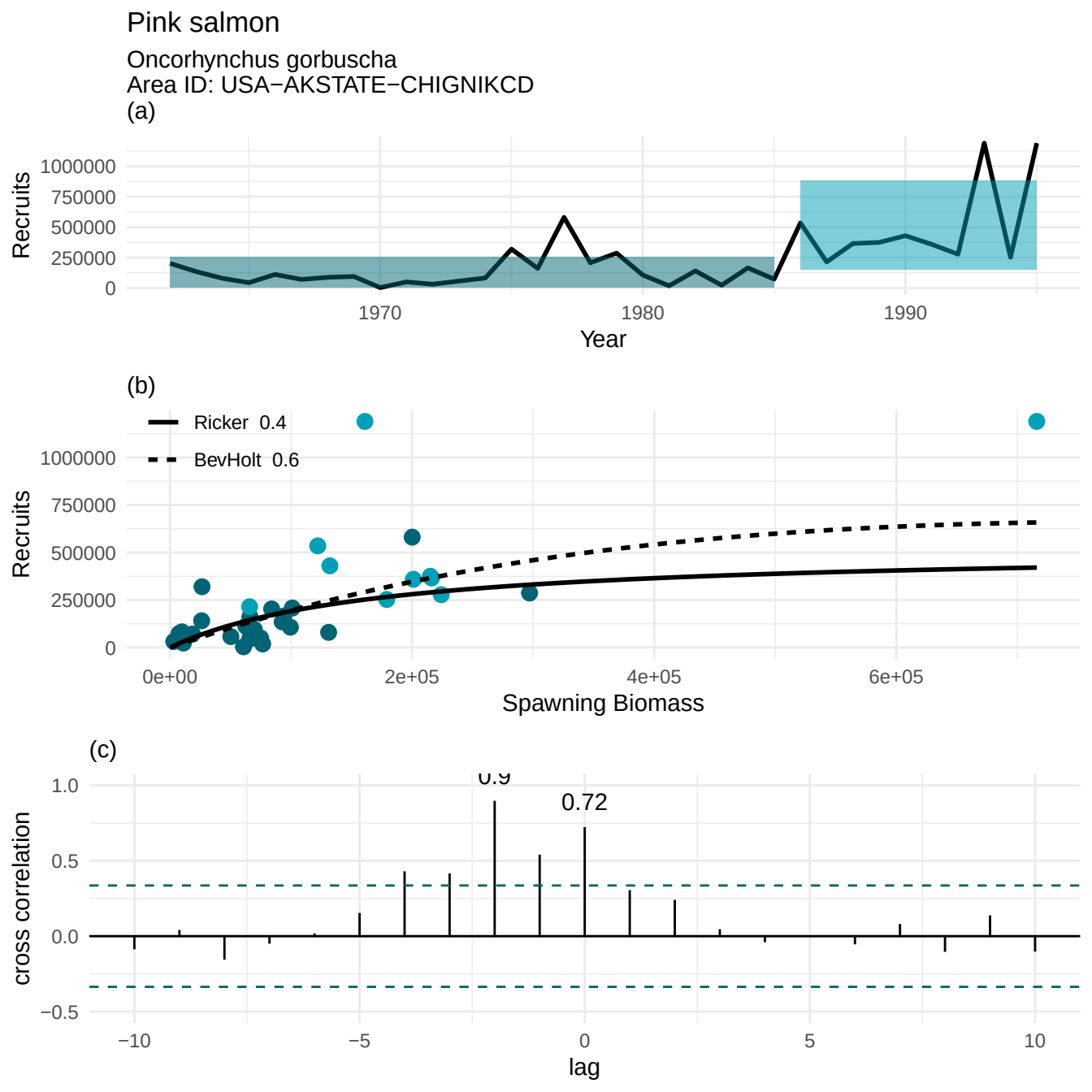

Pacific ocean perch
Sebastes alutus
Area ID: USA−NMFS−PCOAST
(a)
Recruits
1.2e+08
8.0e+07
4.0e+07
0.0e+00
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.484
BevHolt 0.516
Recruits
1.2e+08
9.0e+07
6.0e+07
3.0e+07
0.0e+00
0
2000
4000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

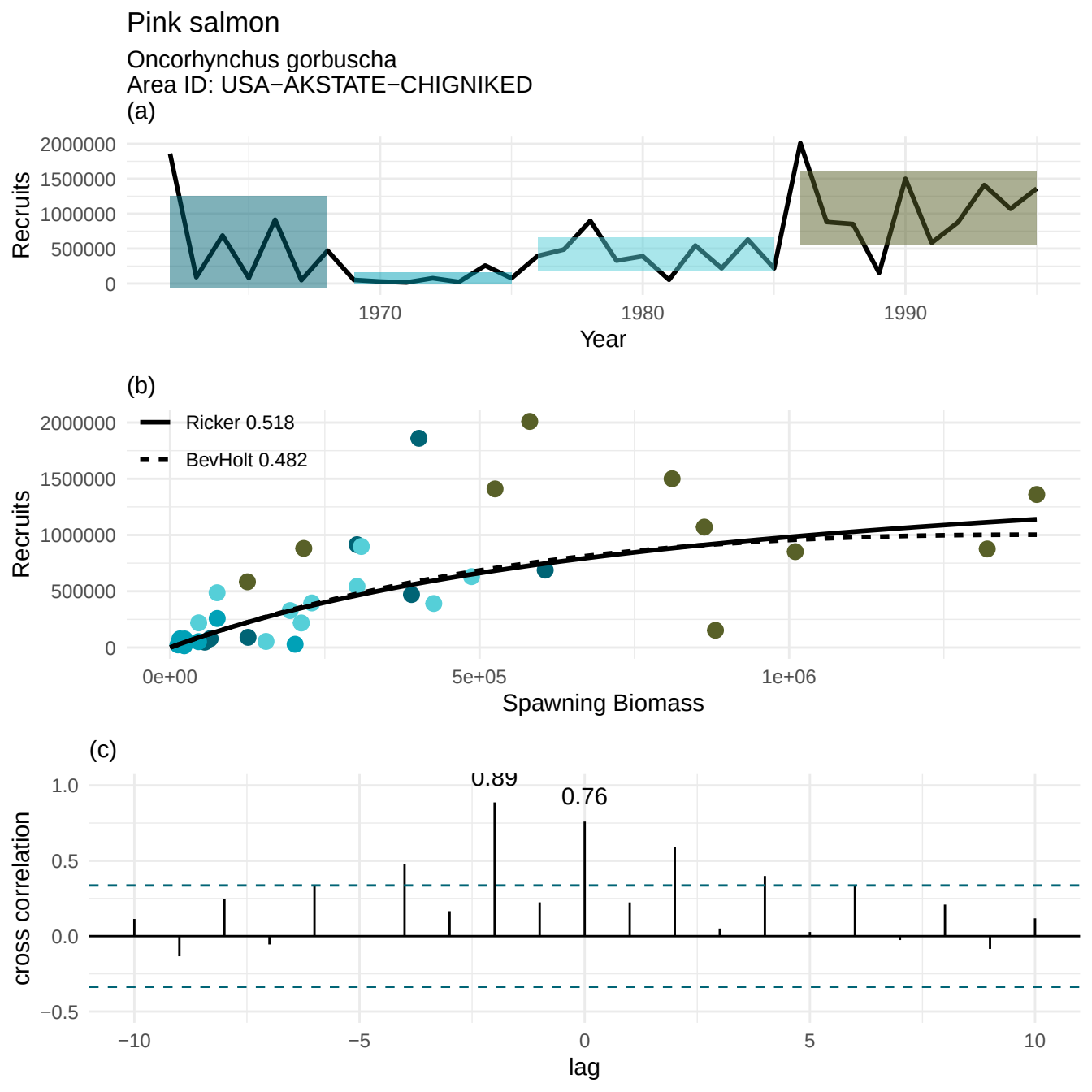

Pink salmon
Oncorhynchus gorbuscha
Area ID: USA−AKSTATE−AKPSESCD
(a)
Recruits
1.5e+07
1.0e+07
5.0e+06
0.0e+00
1970
1980
1990
Year
(b)
Ricker 0.495
BevHolt 0.505
Recruits
1.5e+07
1.0e+07
5.0e+06
0.0e+00
0e+00
1e+06
2e+06
3e+06
4e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.82
0.61
−10
−5
0
5
10
lag

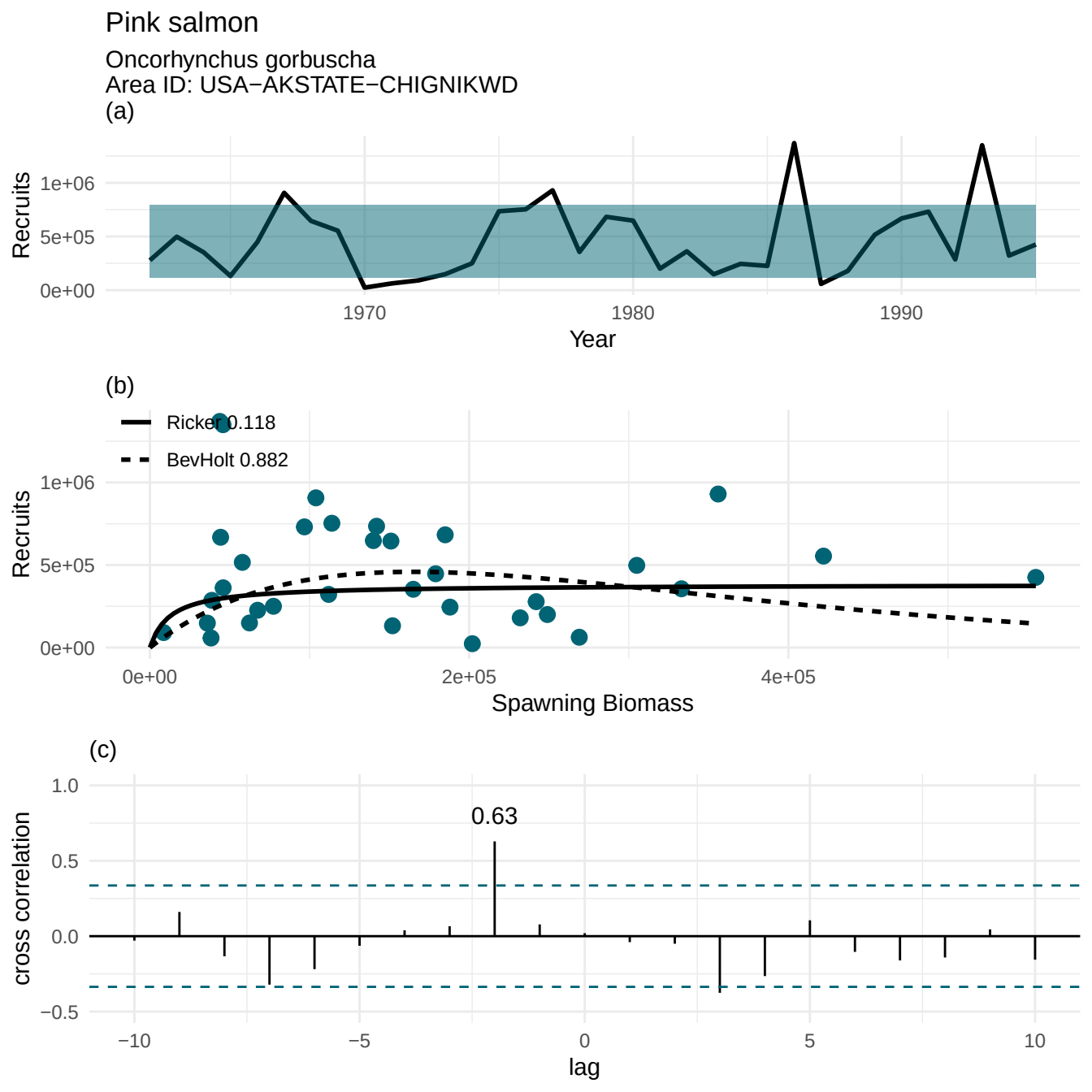

Pink salmon
Oncorhynchus gorbuscha
Area ID: USA−AKSTATE−AKPSWUD
(a)
Recruits
6e+06
4e+06
2e+06
0e+00
1975
1980
1985
1990
1995
Year
(b)
Ricker 0.761
BevHolt 0.239
Recruits
6e+06
4e+06
2e+06
0e+00
0
500000
1000000
1500000
2000000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.76
−10
−5
0
5
10
lag

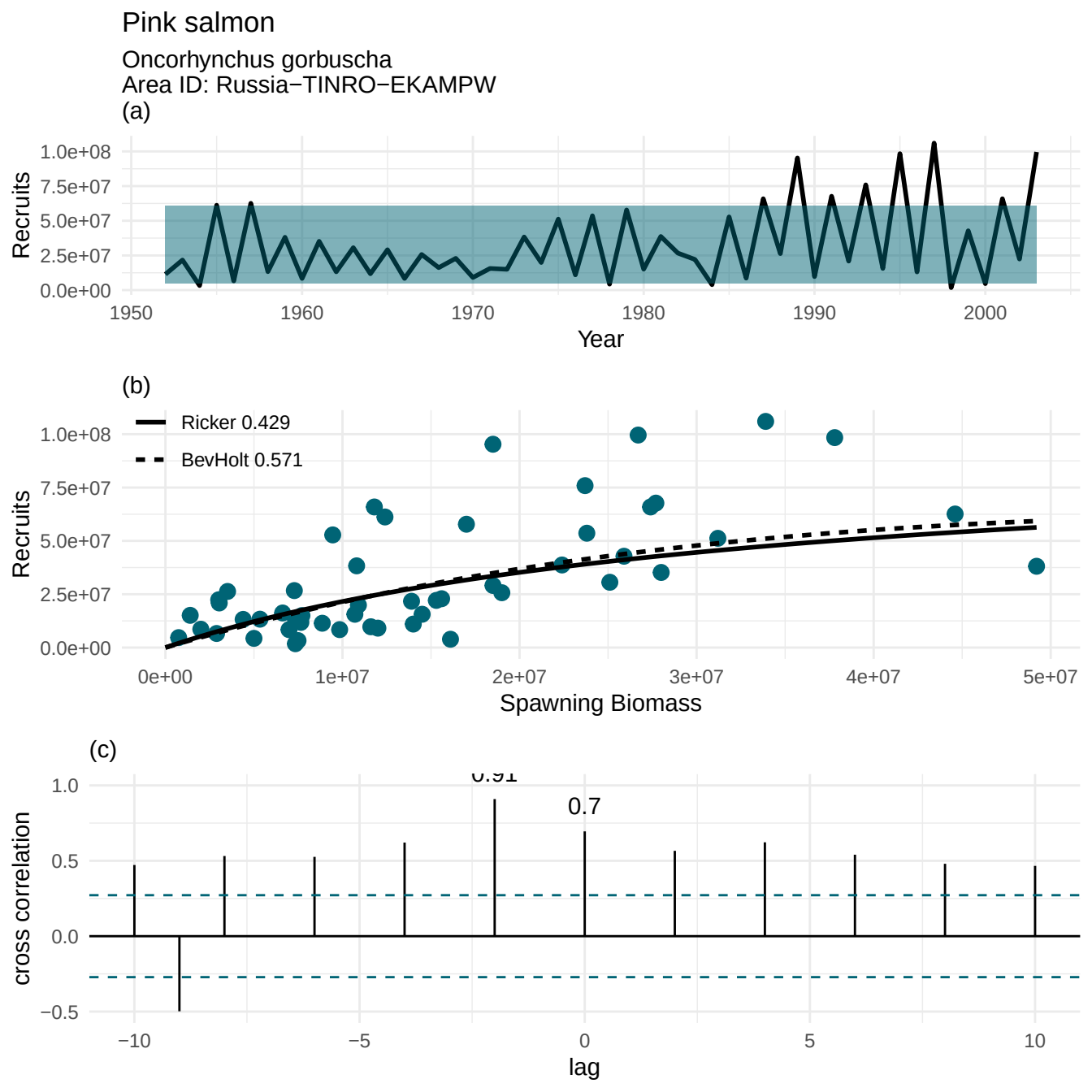

Pink salmon
Oncorhynchus gorbuscha
Area ID: Russia−TINRO−AMURPW
(a)
Recruits
1e+07
5e+06
0e+00
1950
1960
1970
1980
1990
2000
Year
(b)
Ricker 0.673
BevHolt 0.327
Recruits
1e+07
5e+06
0e+00
0e+00
3e+06
6e+06
9e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.64
−10
−5
0
5
10
lag

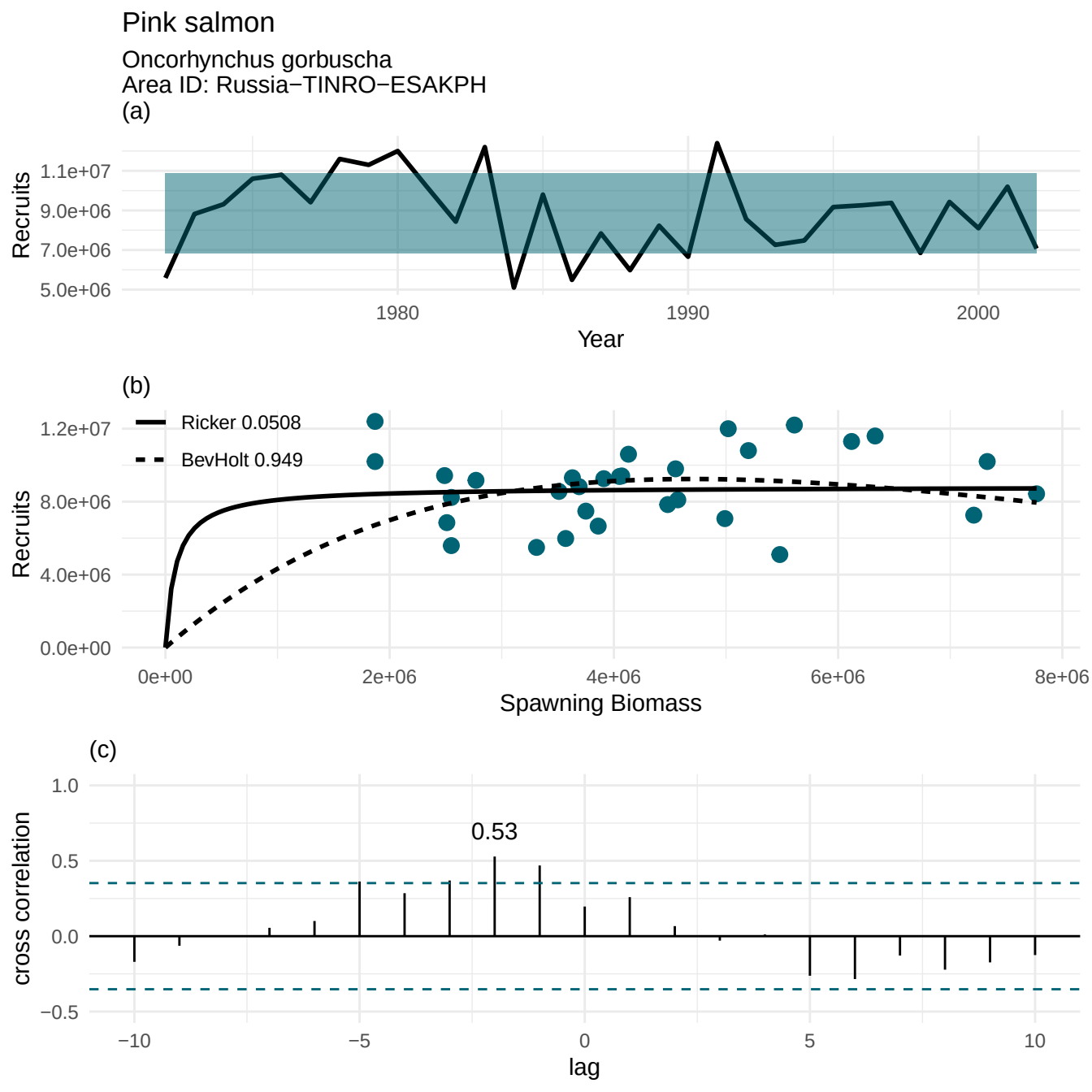

Pink salmon
Oncorhynchus gorbuscha
Area ID: Russia−TINRO−ANADYRPW
(a)
Recruits
6e+05
4e+05
2e+05
0e+00
1950
1960
1970
1980
1990
2000
Year
(b)
Ricker 0.0693
BevHolt 0.931
Recruits
6e+05
4e+05
2e+05
0e+00
0e+00
1e+05
2e+05
3e+05
4e+05
5e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.43
−10
−5
0
5
10
lag

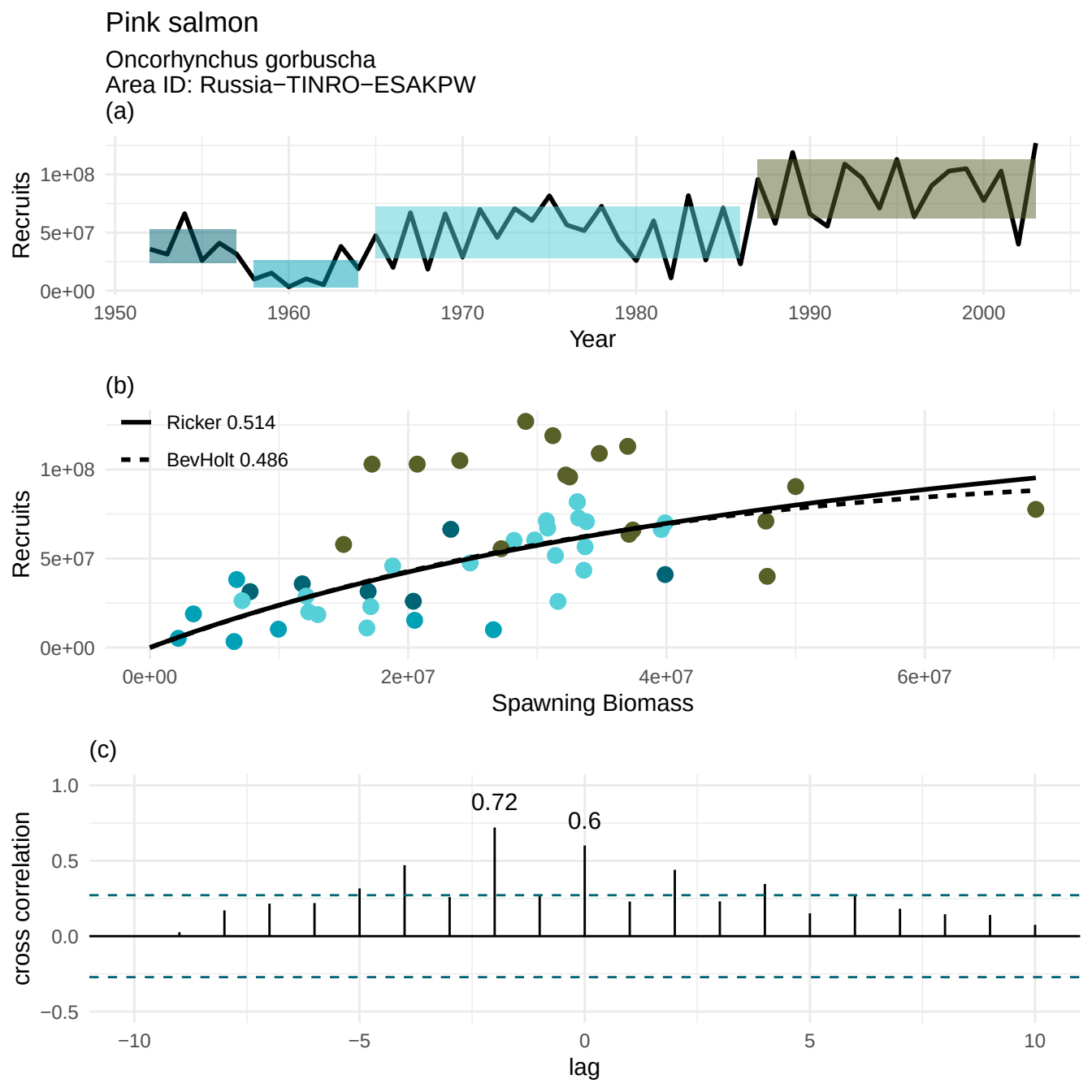

Pink salmon
Oncorhynchus gorbuscha
Area ID: USA−AKSTATE−CHIGNIKCD
(a)
Recruits
1000000
750000
500000
250000
0
1970
1980
1990
Year
(b)
Ricker 0.4
BevHolt 0.6
Recruits
1000000
750000
500000
250000
0
0e+00
2e+05
4e+05
6e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.9
0.72
−10
−5
0
5
10
lag

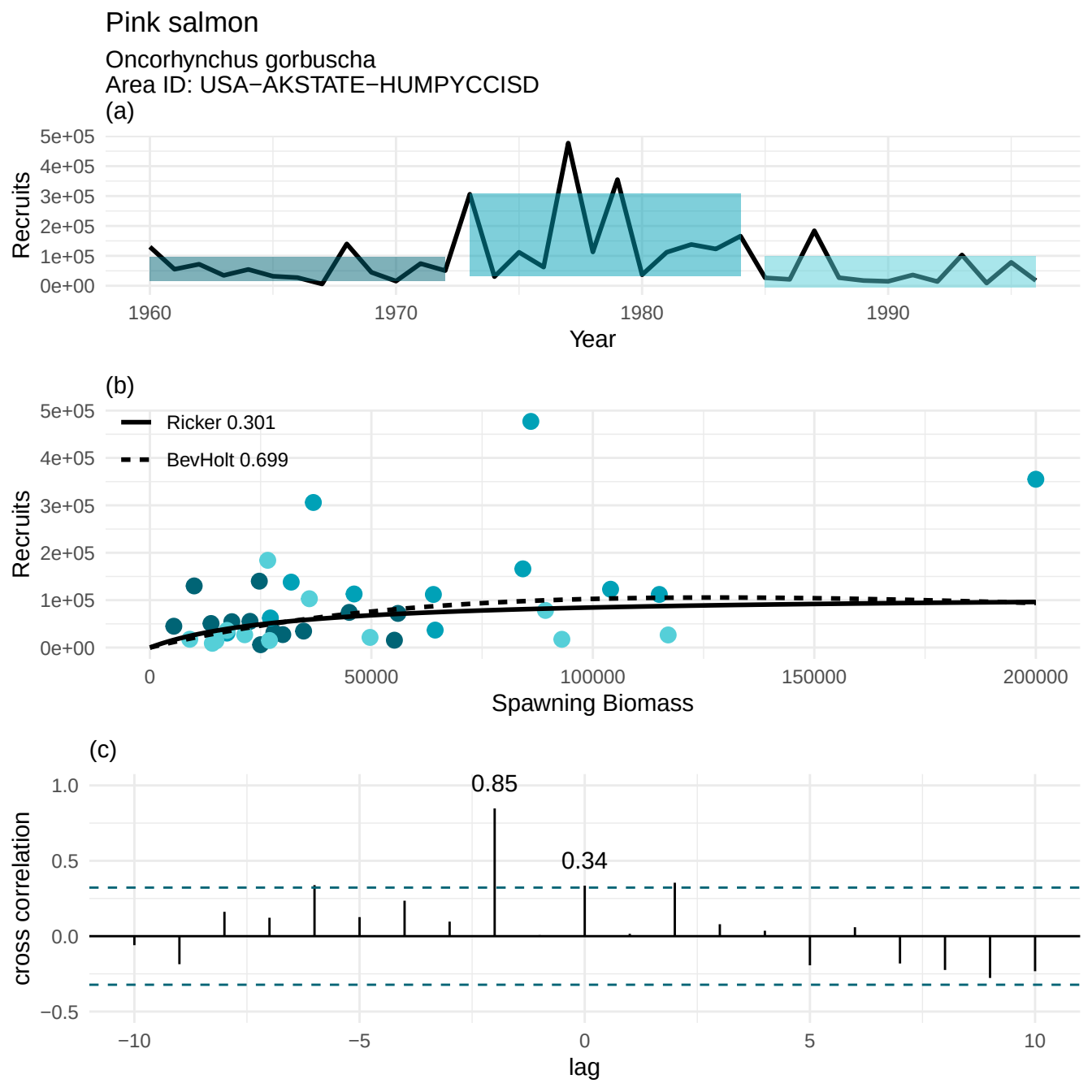

Pink salmon
Oncorhynchus gorbuscha
Area ID: USA−AKSTATE−CHIGNIKED
(a)
Recruits
2000000
1500000
1000000
500000
0
1970
1980
1990
Year
(b)
Ricker 0.518
BevHolt 0.482
Recruits
2000000
1500000
1000000
500000
0
0e+00
5e+05
1e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.89
0.76
−10
−5
0
5
10
lag

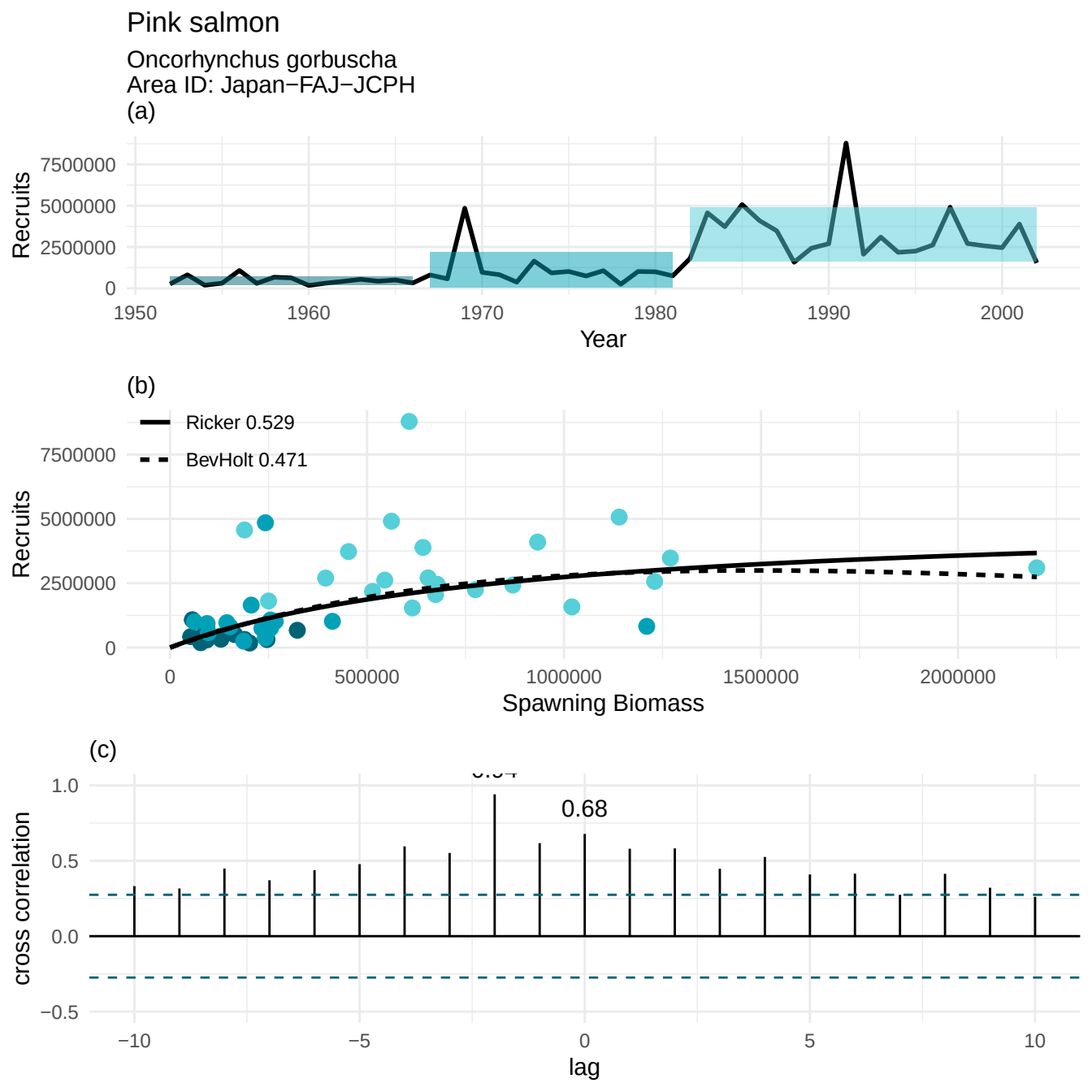

Pink salmon
Oncorhynchus gorbuscha
Area ID: USA−AKSTATE−CHIGNIKWD
(a)
Recruits
1e+06
5e+05
0e+00
1970
1980
1990
Year
(b)
Ricker 0.118
BevHolt 0.882
Recruits
1e+06
5e+05
0e+00
0e+00
2e+05
4e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.63
−10
−5
0
5
10
lag

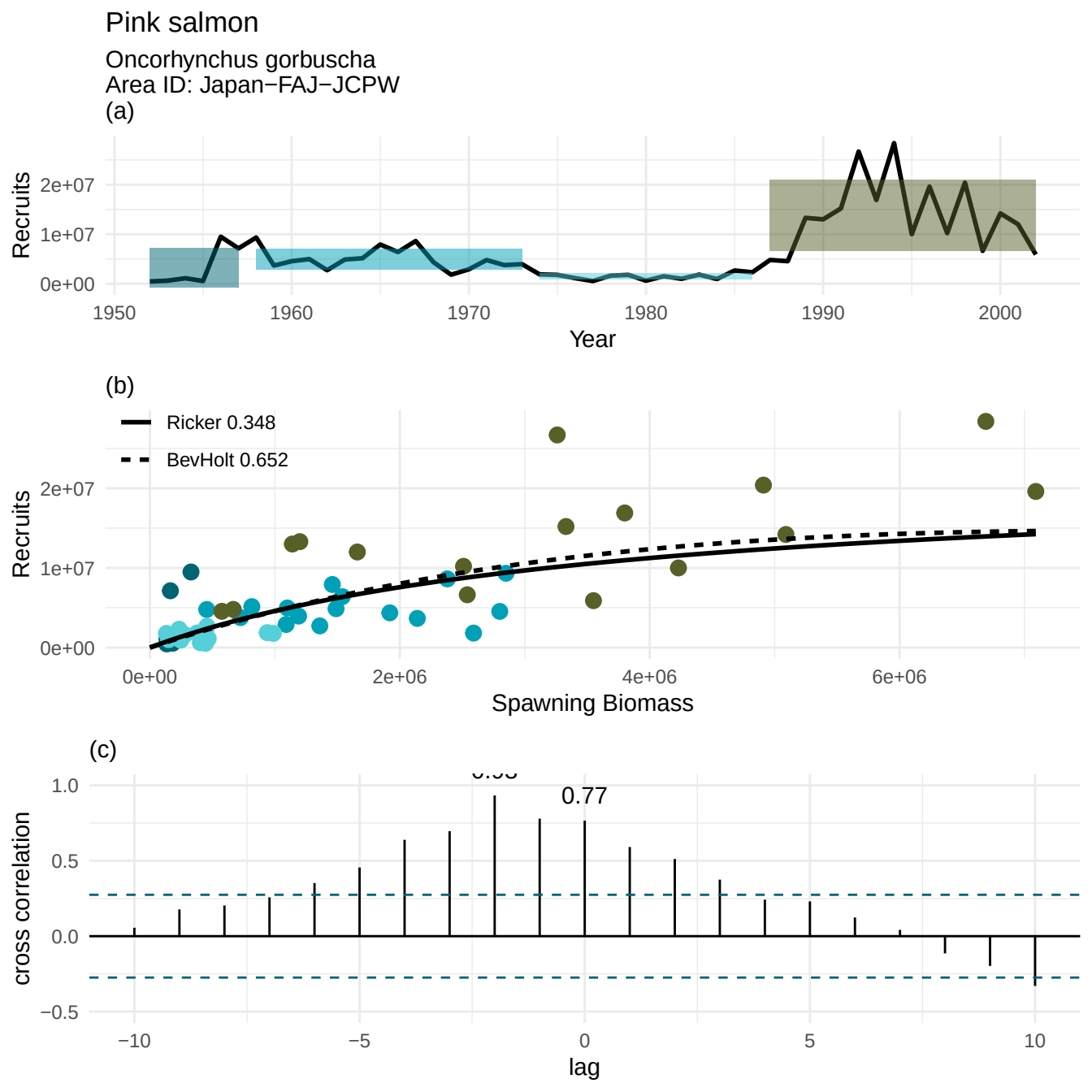

Pink salmon
Oncorhynchus gorbuscha
Area ID: Russia−TINRO−EKAMPW
(a)
Recruits
1.0e+08
7.5e+07
5.0e+07
2.5e+07
0.0e+00
1950
1960
1970
1980
1990
2000
Year
(b)
Ricker 0.429
BevHolt 0.571
Recruits
1.0e+08
7.5e+07
5.0e+07
2.5e+07
0.0e+00
0e+00
1e+07
2e+07
3e+07
4e+07
5e+07
Spawning Biomass
(c)
0.91
0.7
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

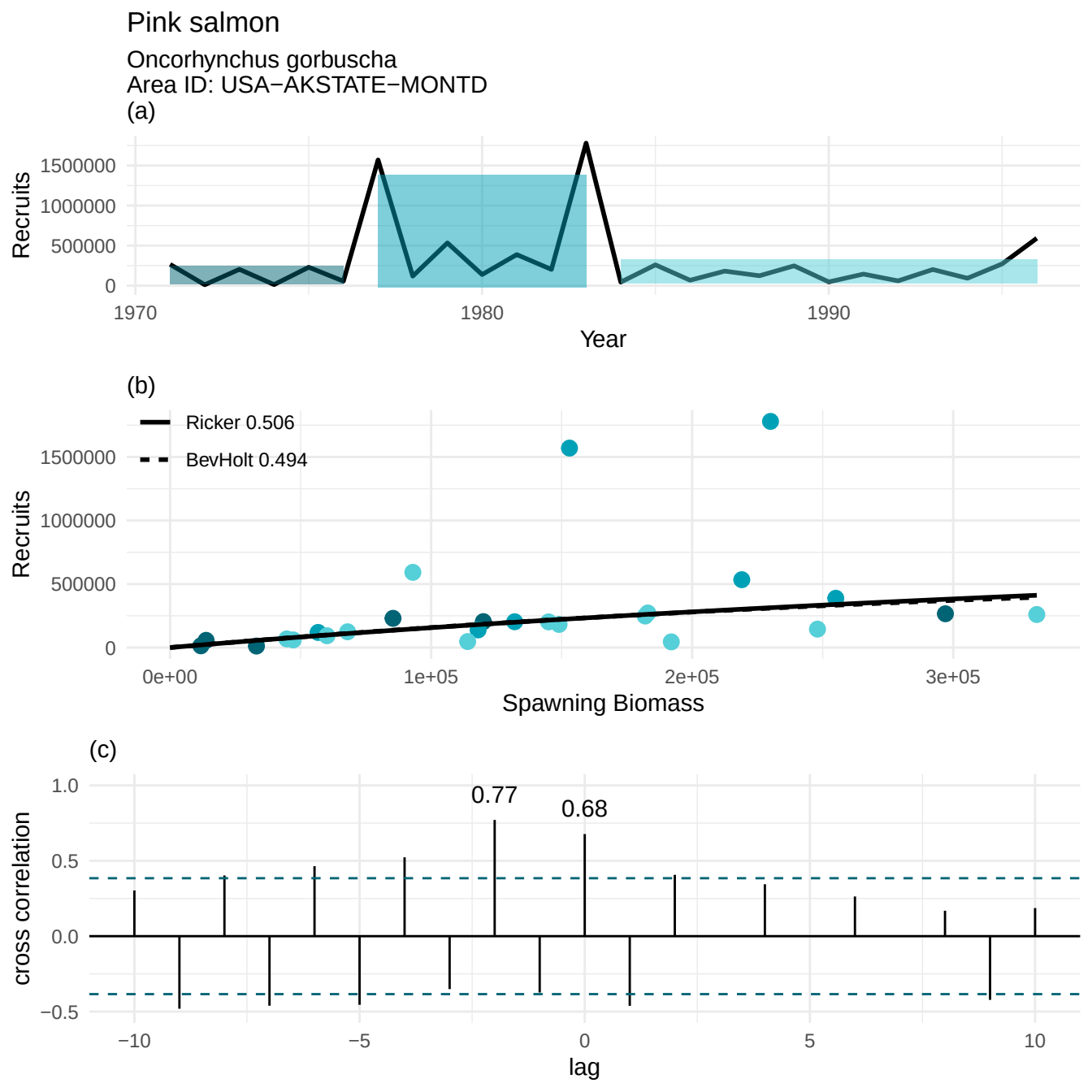

Pink salmon
Oncorhynchus gorbuscha
Area ID: Russia−TINRO−ESAKPH
(a)
Recruits
1.1e+07
9.0e+06
7.0e+06
5.0e+06
1980
1990
2000
Year
(b)
Ricker 0.0508
BevHolt 0.949
Recruits
1.2e+07
8.0e+06
4.0e+06
0.0e+00
0e+00
2e+06
4e+06
6e+06
8e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.53
−10
−5
0
5
10
lag

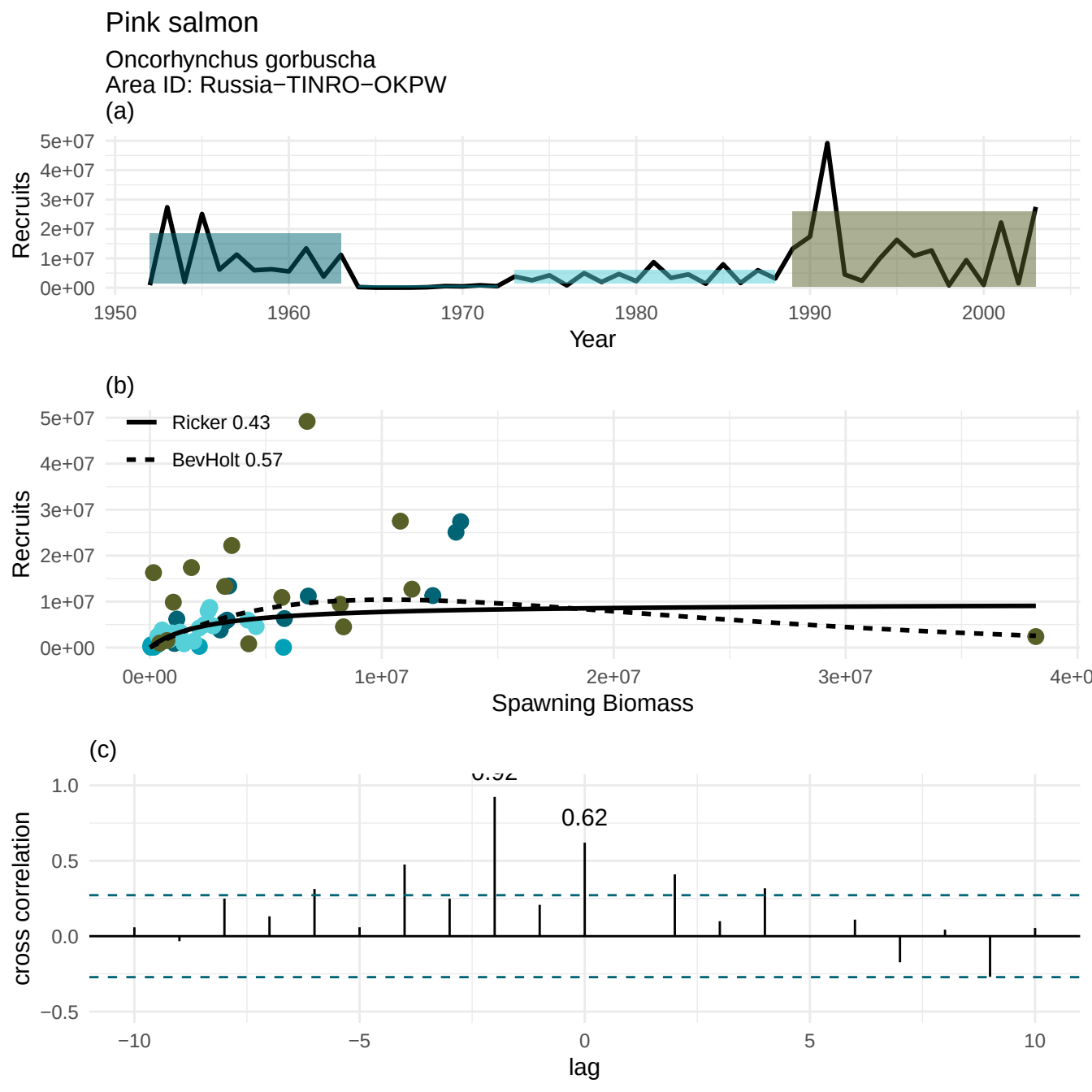

Pink salmon
Oncorhynchus gorbuscha
Area ID: Russia−TINRO−ESAKPW
(a)
Recruits
1e+08
5e+07
0e+00
1950
1960
1970
1980
1990
2000
Year
(b)
Ricker 0.514
BevHolt 0.486
Recruits
1e+08
5e+07
0e+00
0e+00
2e+07
4e+07
6e+07
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.72
0.6
−10
−5
0
5
10
lag

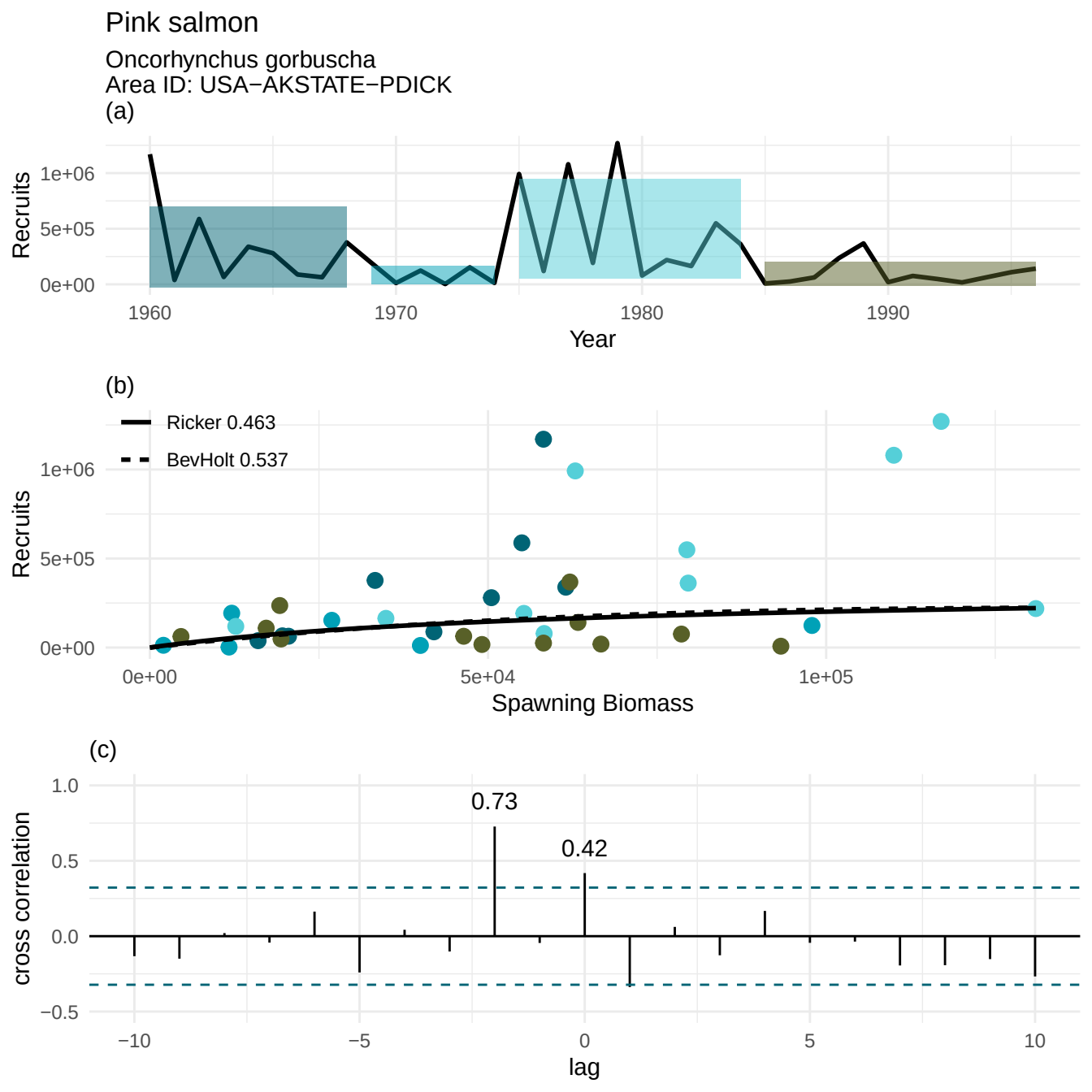

Pink salmon
Oncorhynchus gorbuscha
Area ID: USA−AKSTATE−HUMPYCCISD
(a)
Recruits
5e+05
4e+05
3e+05
2e+05
1e+05
0e+00
1960
1970
1980
1990
Year
(b)
Ricker 0.301
BevHolt 0.699
Recruits
0
50000
100000
150000
200000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.85
0.34
−10
−5
0
5
10
lag

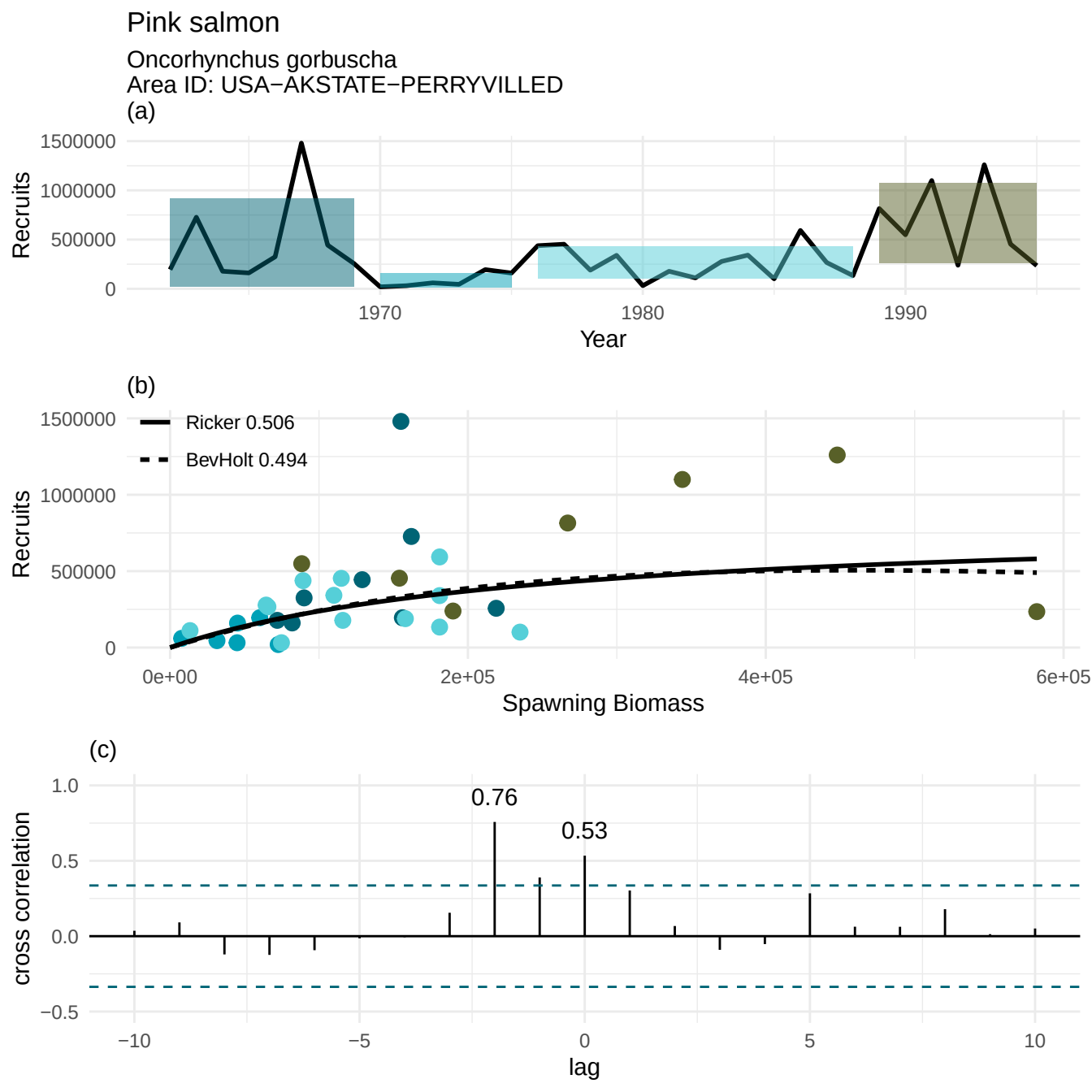

Pink salmon
Oncorhynchus gorbuscha
Area ID: Japan−FAJ−JCPH
(a)
Recruits
7500000
5000000
2500000
0
1950
1960
1970
1980
1990
2000
Year
(b)
Ricker 0.529
BevHolt 0.471
Recruits
7500000
5000000
2500000
0
0
500000
1000000
1500000
2000000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.68
−10
−5
0
5
10
lag

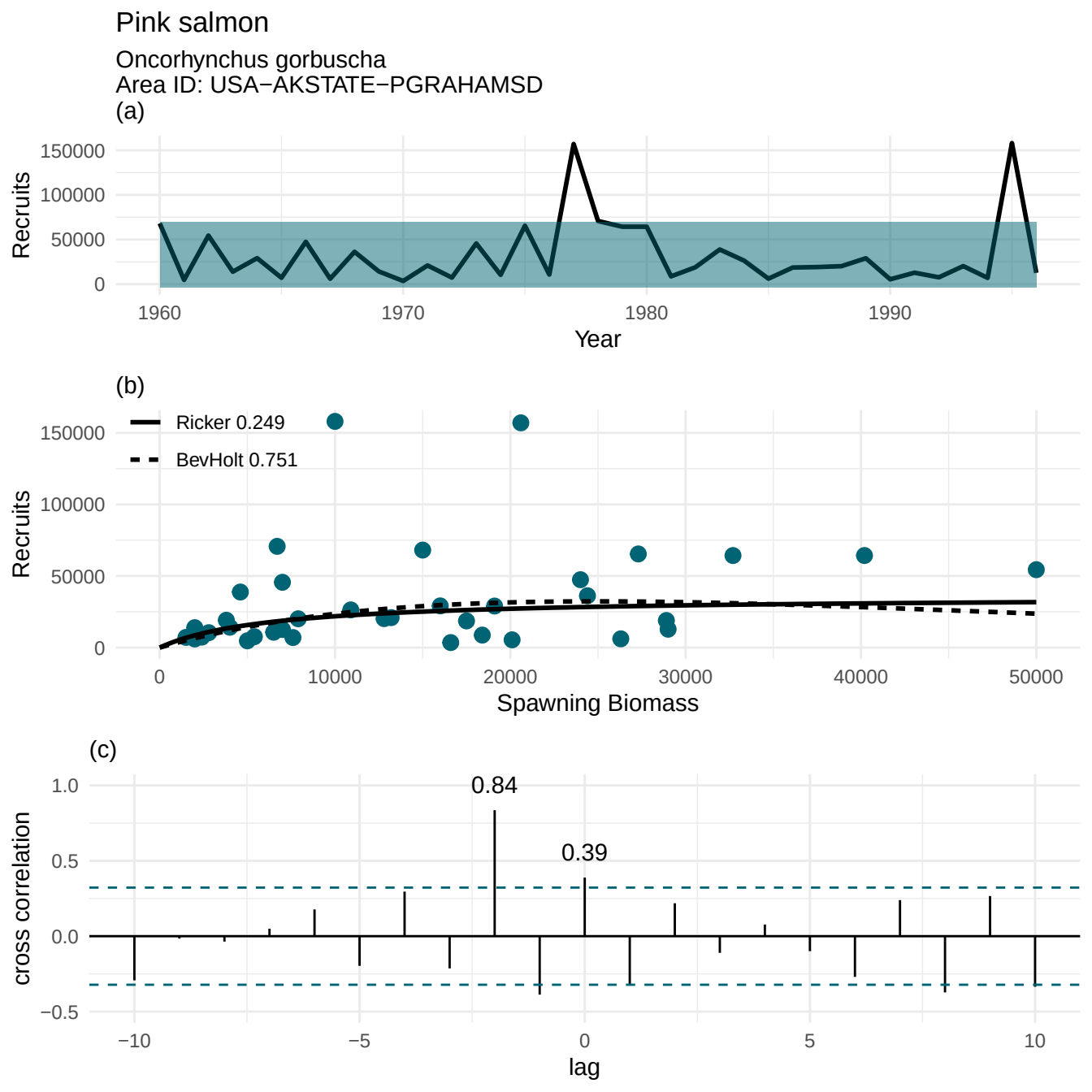

Pink salmon
Oncorhynchus gorbuscha
Area ID: Japan−FAJ−JCPW
(a)
Recruits
2e+07
1e+07
0e+00
1950
1960
1970
1980
1990
2000
Year
(b)
Ricker 0.348
BevHolt 0.652
Recruits
2e+07
1e+07
0e+00
0e+00
2e+06
4e+06
6e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.77
−10
−5
0
5
10
lag

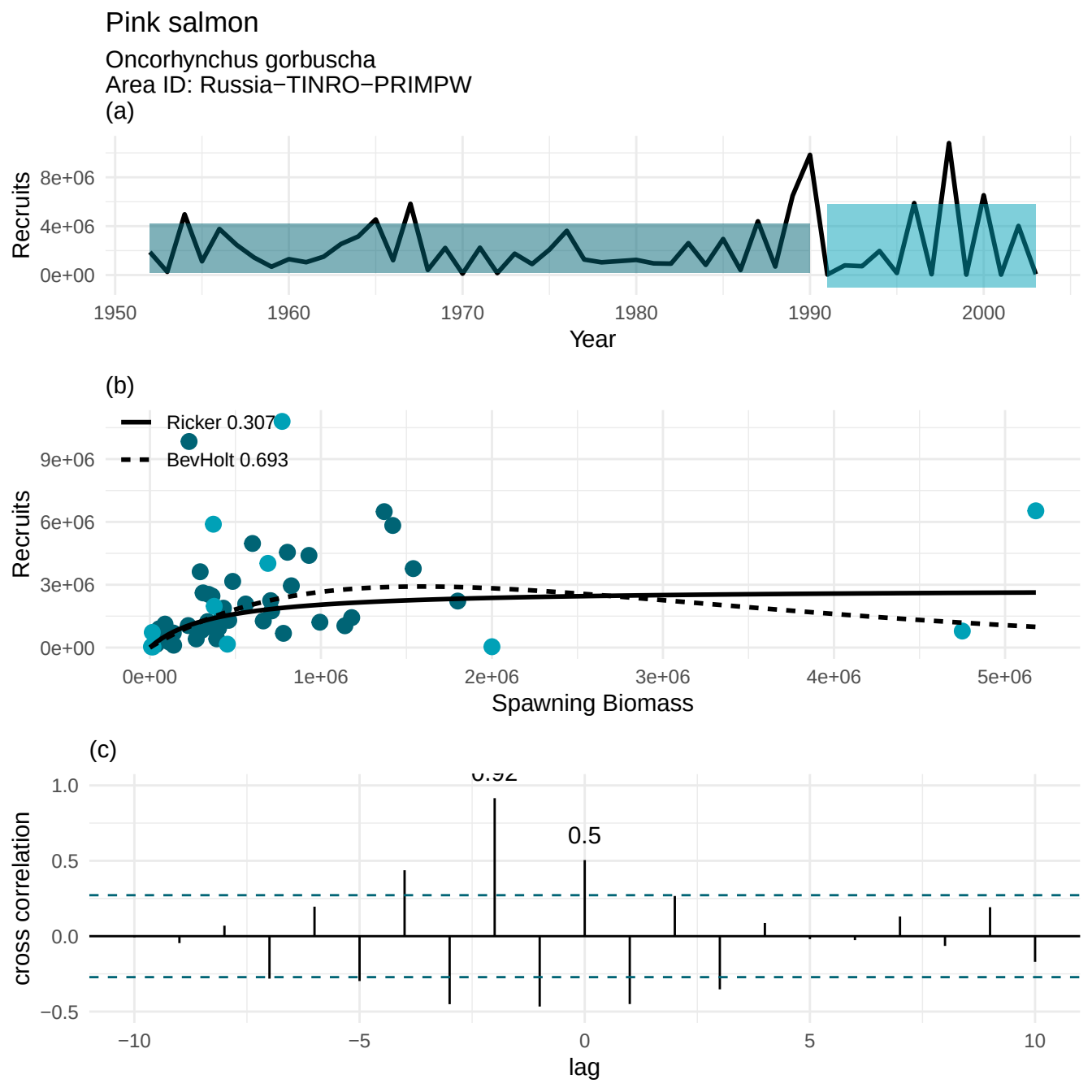

Pink salmon
Oncorhynchus gorbuscha
Area ID: USA−AKSTATE−MONTD
(a)
Recruits
1500000
1000000
500000
0
1970
1980
1990
Year
(b)
Ricker 0.506
BevHolt 0.494
Recruits
1500000
1000000
500000
0
0e+00
1e+05
2e+05
3e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.77
0.68
−10
−5
0
5
10
lag

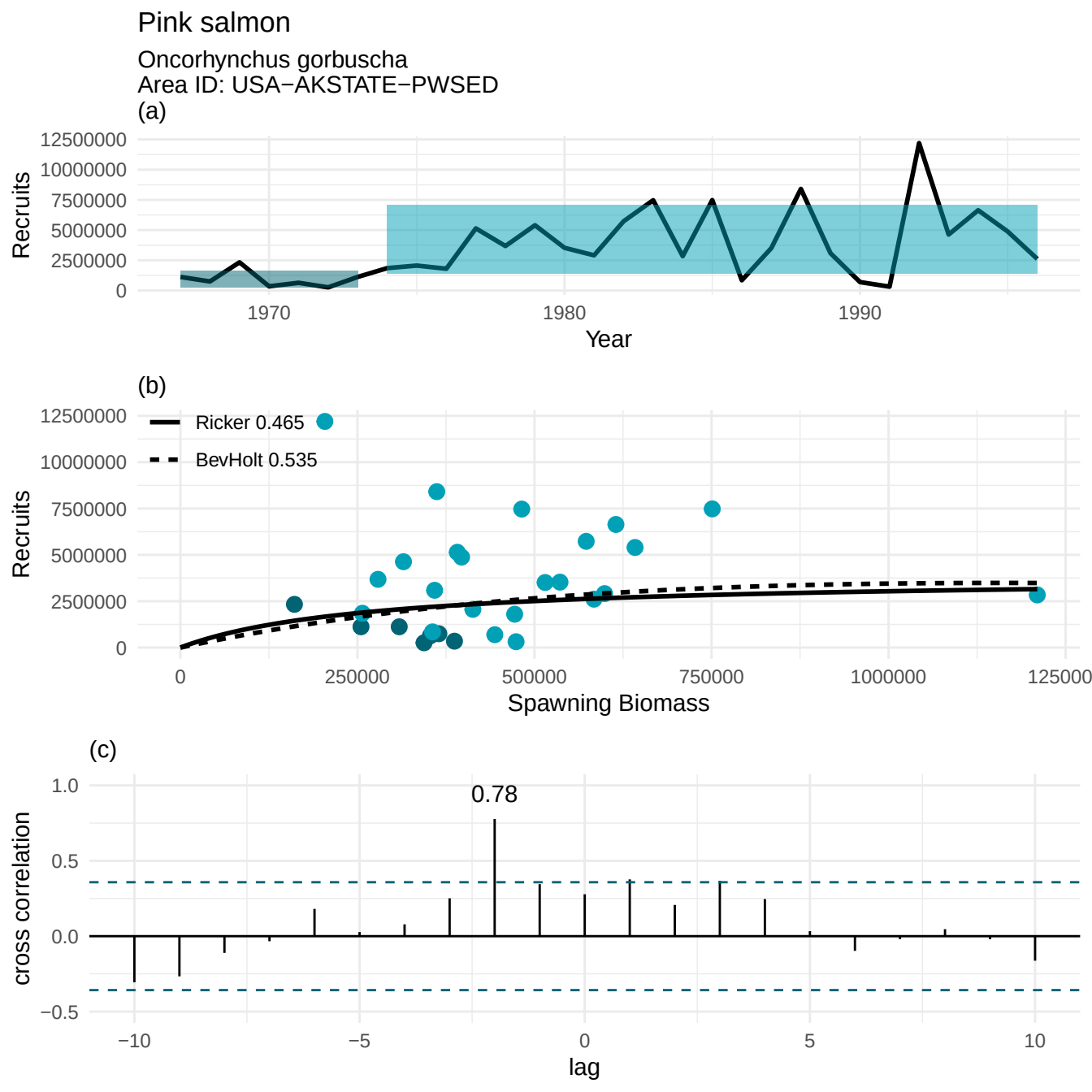

Pink salmon
Oncorhynchus gorbuscha
Area ID: Russia−TINRO−OKPW
(a)
Recruits
5e+07
4e+07
3e+07
2e+07
1e+07
0e+00
1950
1960
1970
1980
1990
2000
Year
(b)
Ricker 0.43
BevHolt 0.57
Recruits
Spawning Biomass
(c)
cross correlation
0.92
0.62
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

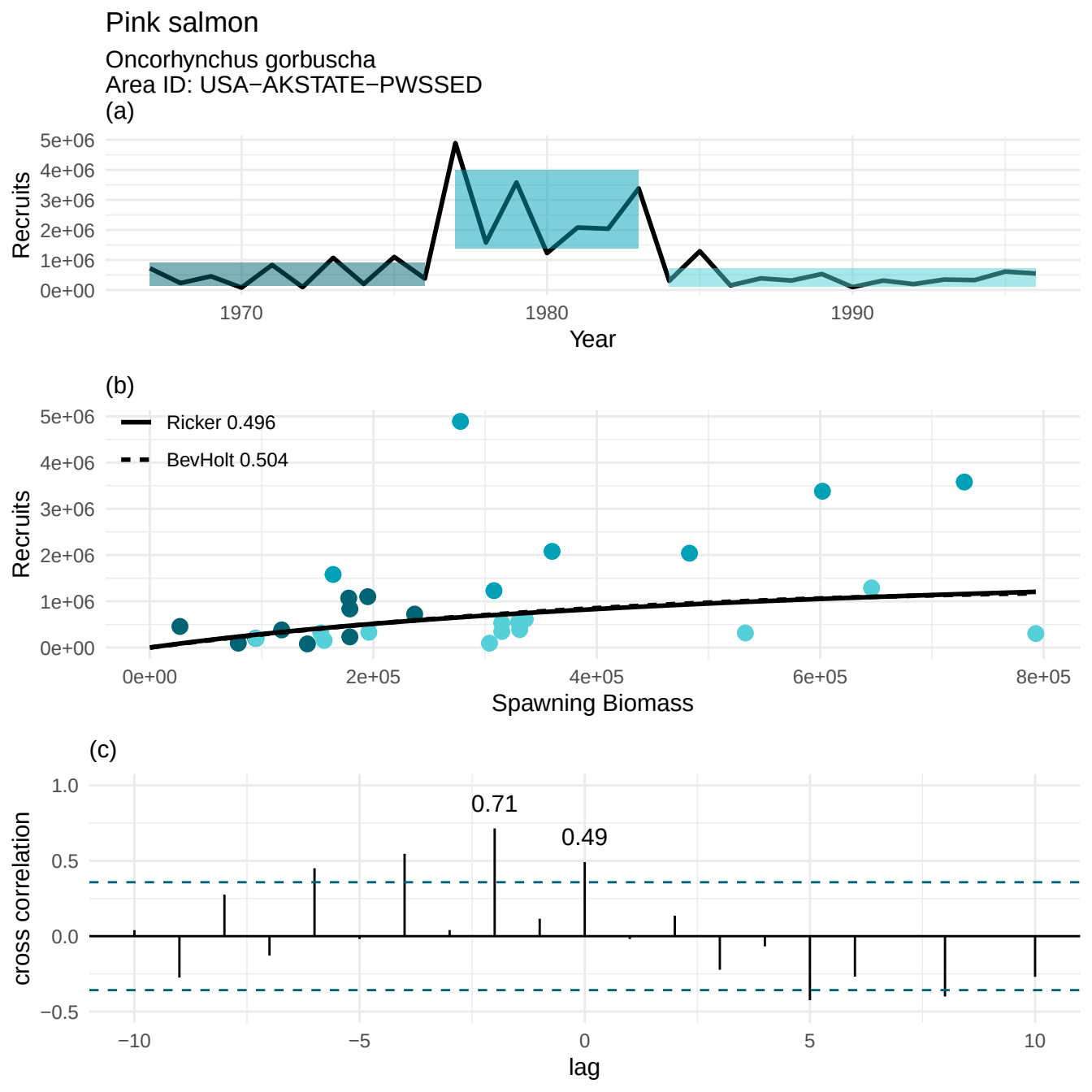

Pink salmon
Oncorhynchus gorbuscha
Area ID: USA−AKSTATE−PDICK
(a)
Recruits
1e+06
5e+05
0e+00
1960
1970
1980
1990
Year
(b)
Ricker 0.463
BevHolt 0.537
Recruits
1e+06
5e+05
0e+00
0e+00
5e+04
1e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.73
0.42
−10
−5
0
5
10
lag

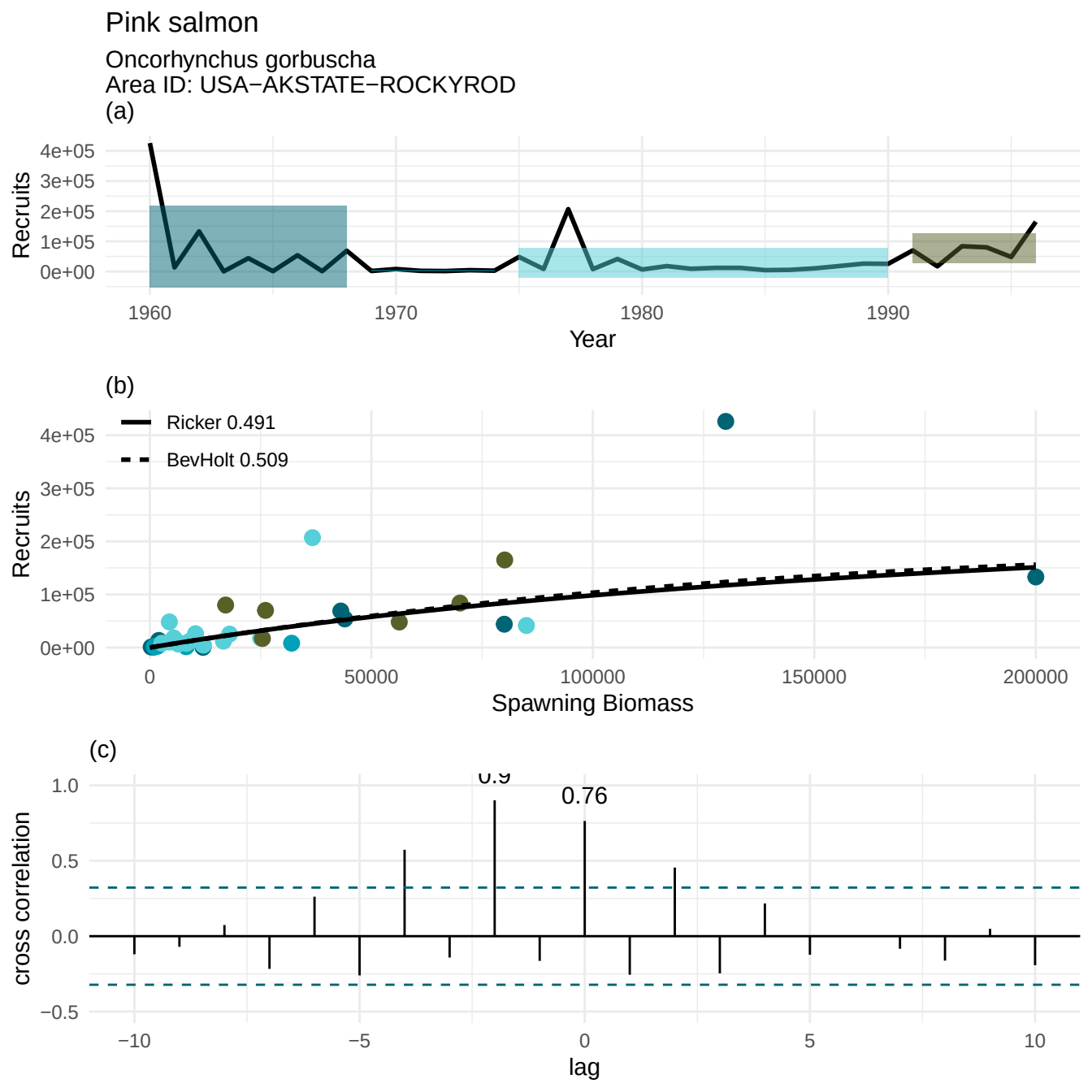

Pink salmon
Oncorhynchus gorbuscha
Area ID: USA−AKSTATE−PERRYVILLED
(a)
Recruits
1500000
1000000
500000
0
1970
1980
1990
Year
(b)
Ricker 0.506
BevHolt 0.494
Recruits
1500000
1000000
500000
0
0e+00
2e+05
4e+05
6e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.76
0.53
−10
−5
0
5
10
lag

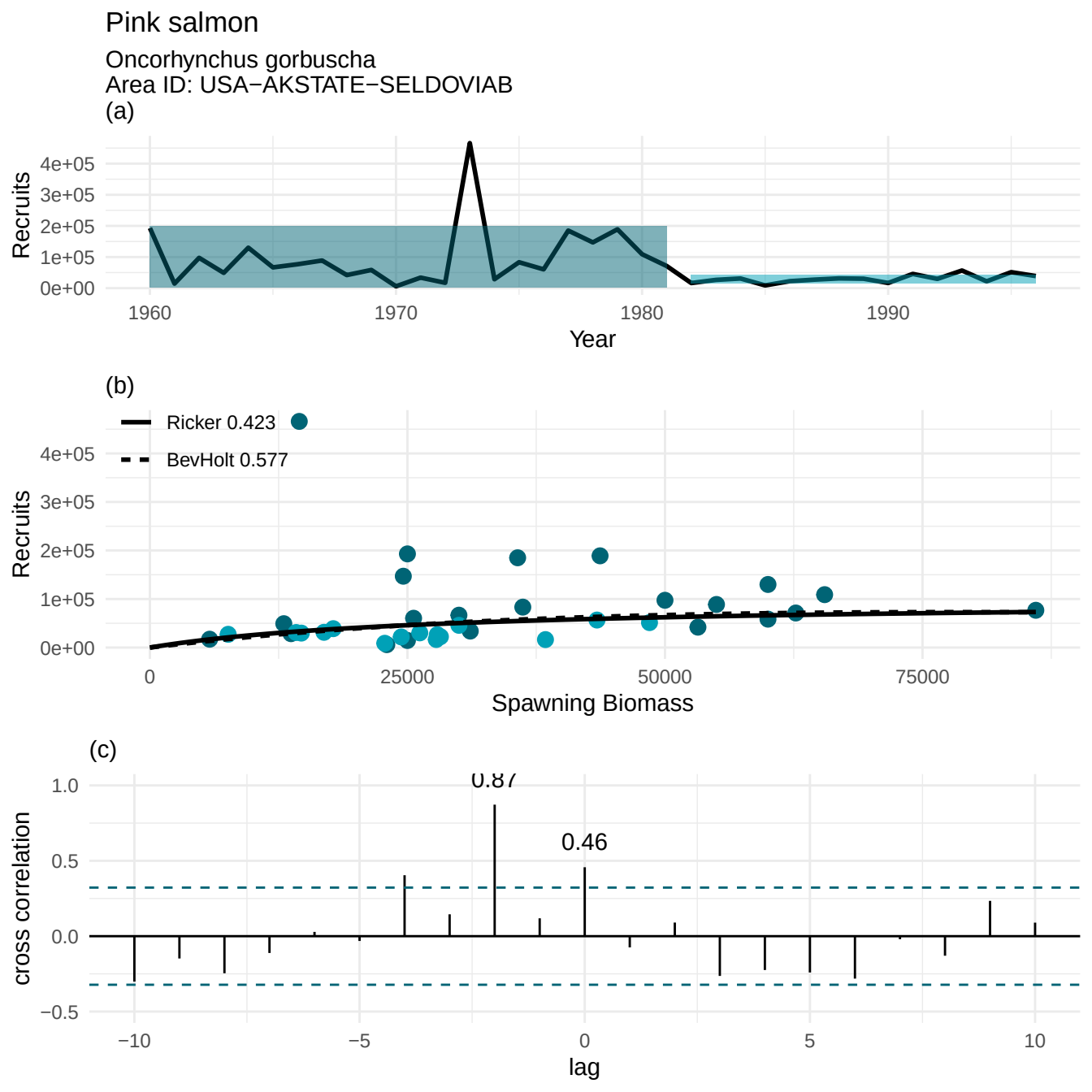

Pink salmon
Oncorhynchus gorbuscha
Area ID: USA−AKSTATE−PGRAHAMSD
(a)
Recruits
150000
100000
50000
0
1960
1970
1980
1990
Year
(b)
Ricker 0.249
BevHolt 0.751
Recruits
150000
100000
50000
0
0
10000
20000
30000
40000
50000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.84
0.39
−10
−5
0
5
10
lag

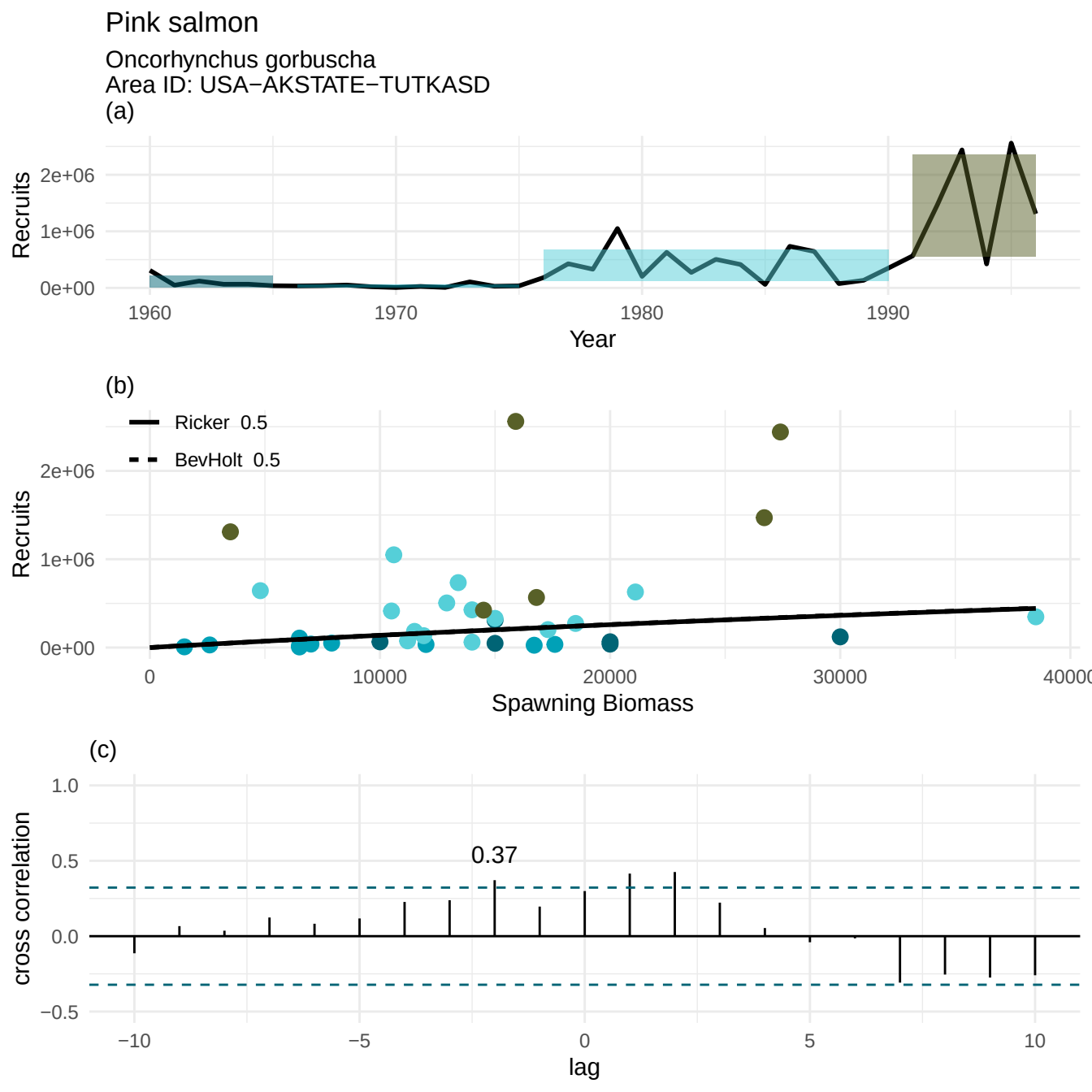

Pink salmon
Oncorhynchus gorbuscha
Area ID: Russia−TINRO−PRIMPW
(a)
Recruits
8e+06
4e+06
0e+00
1950
1960
1970
1980
1990
2000
Year
(b)
Ricker 0.307
BevHolt 0.693
Recruits
9e+06
6e+06
3e+06
0e+00
0e+00
1e+06
2e+06
3e+06
4e+06
5e+06
Spawning Biomass
(c)
0.92
0.5
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

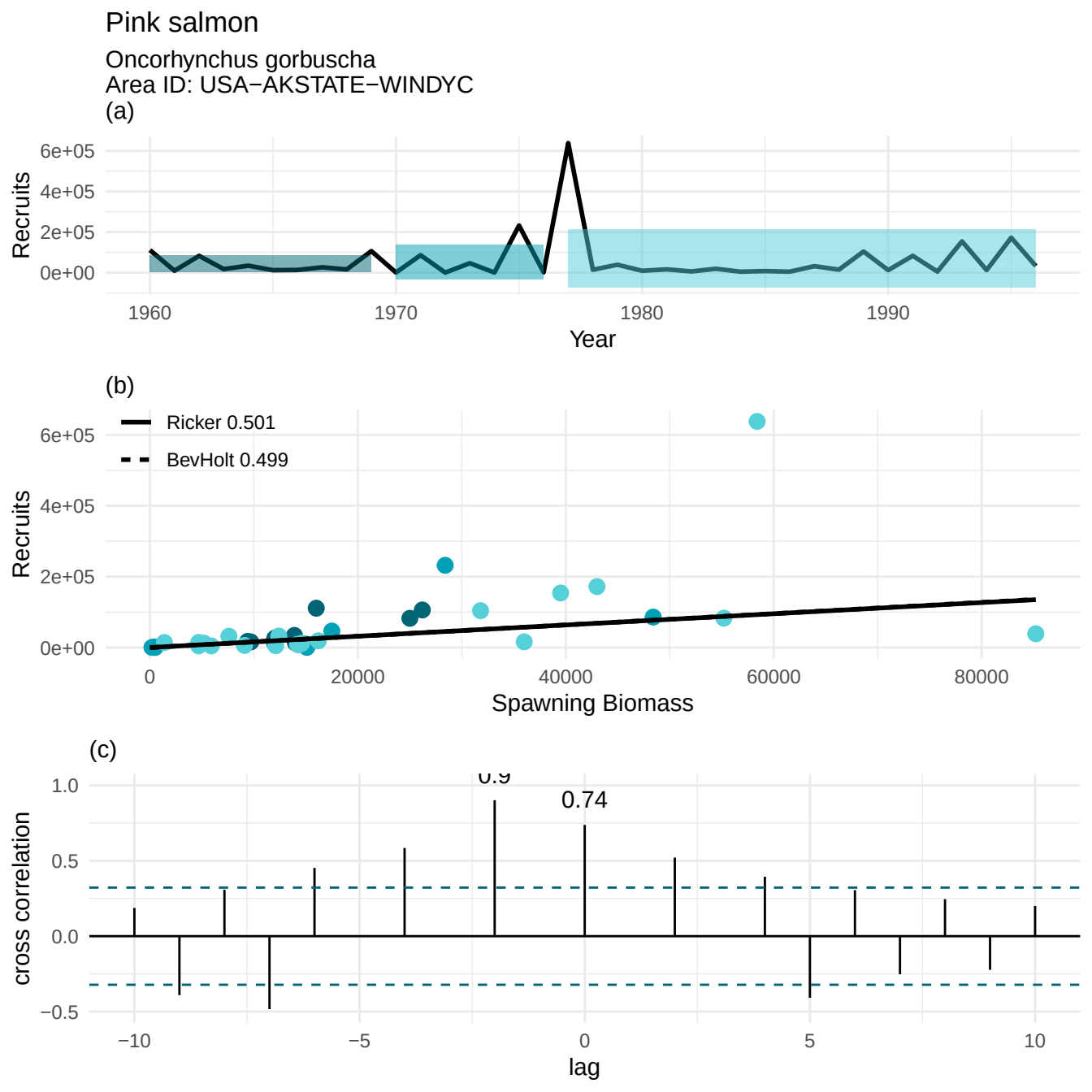

Pink salmon
Oncorhynchus gorbuscha
Area ID: USA−AKSTATE−PWSED
(a)
Recruits
12500000
10000000
7500000
5000000
2500000
0
1970
1980
1990
Year
(b)
Ricker 0.465
BevHolt 0.535
Recruits
Spawning Biomass
0
250000
500000
750000
1000000
(c)
cross correlation
0.78
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

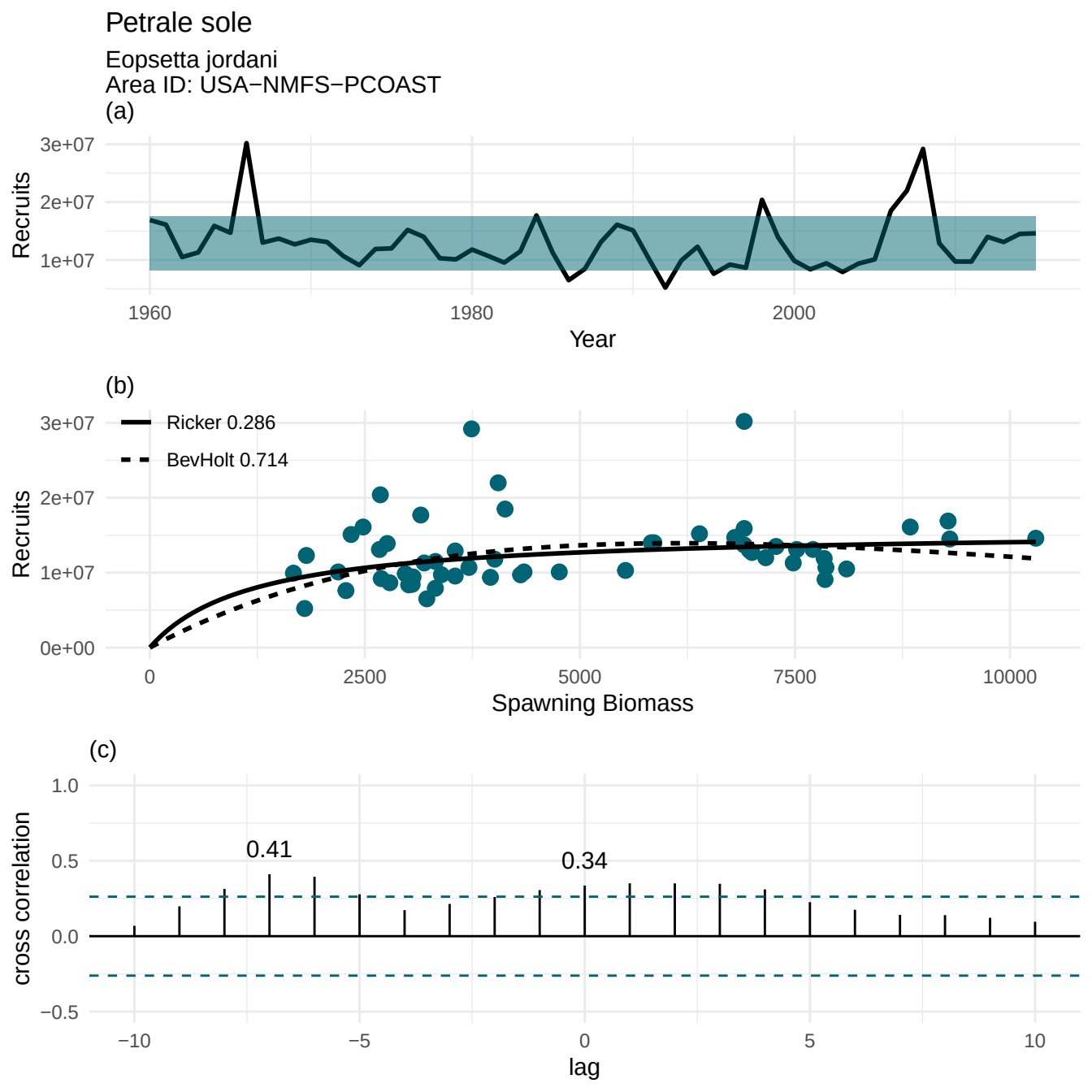

Pink salmon
Oncorhynchus gorbuscha
Area ID: USA−AKSTATE−PWSSED
(a)
Recruits
5e+06
4e+06
3e+06
2e+06
1e+06
0e+00
1970
1980
1990
Year
(b)
Ricker 0.496
BevHolt 0.504
Recruits
0e+00
2e+05
4e+05
6e+05
8e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.71
0.49
−10
−5
0
5
10
lag

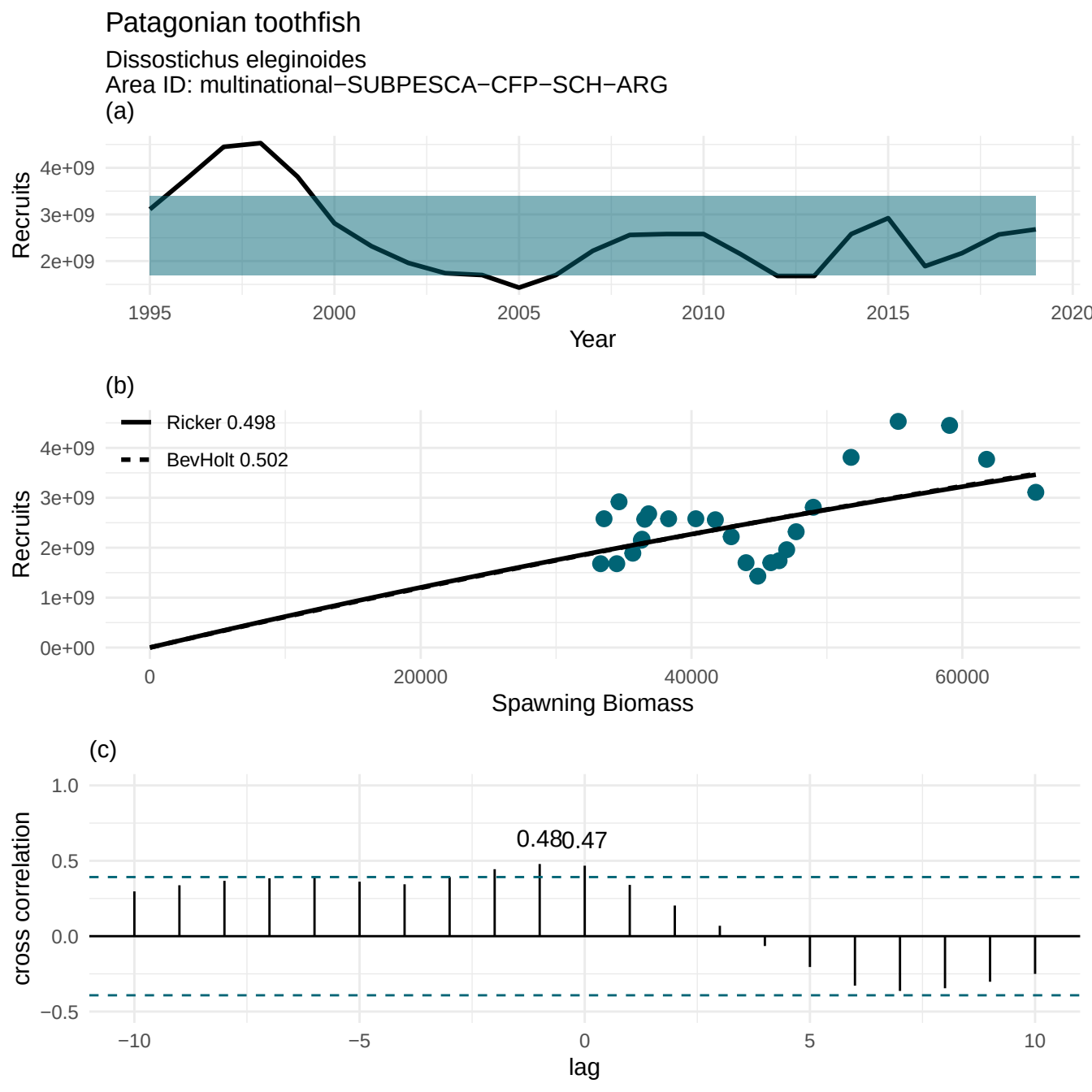

Pink salmon
Oncorhynchus gorbuscha
Area ID: USA−AKSTATE−ROCKYROD
(a)
Recruits
4e+05
3e+05
2e+05
1e+05
0e+00
1960
1970
1980
1990
Year
(b)
Ricker 0.491
BevHolt 0.509
Recruits
4e+05
3e+05
2e+05
1e+05
0e+00
0
50000
100000
150000
200000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.9
0.76
−10
−5
0
5
10
lag

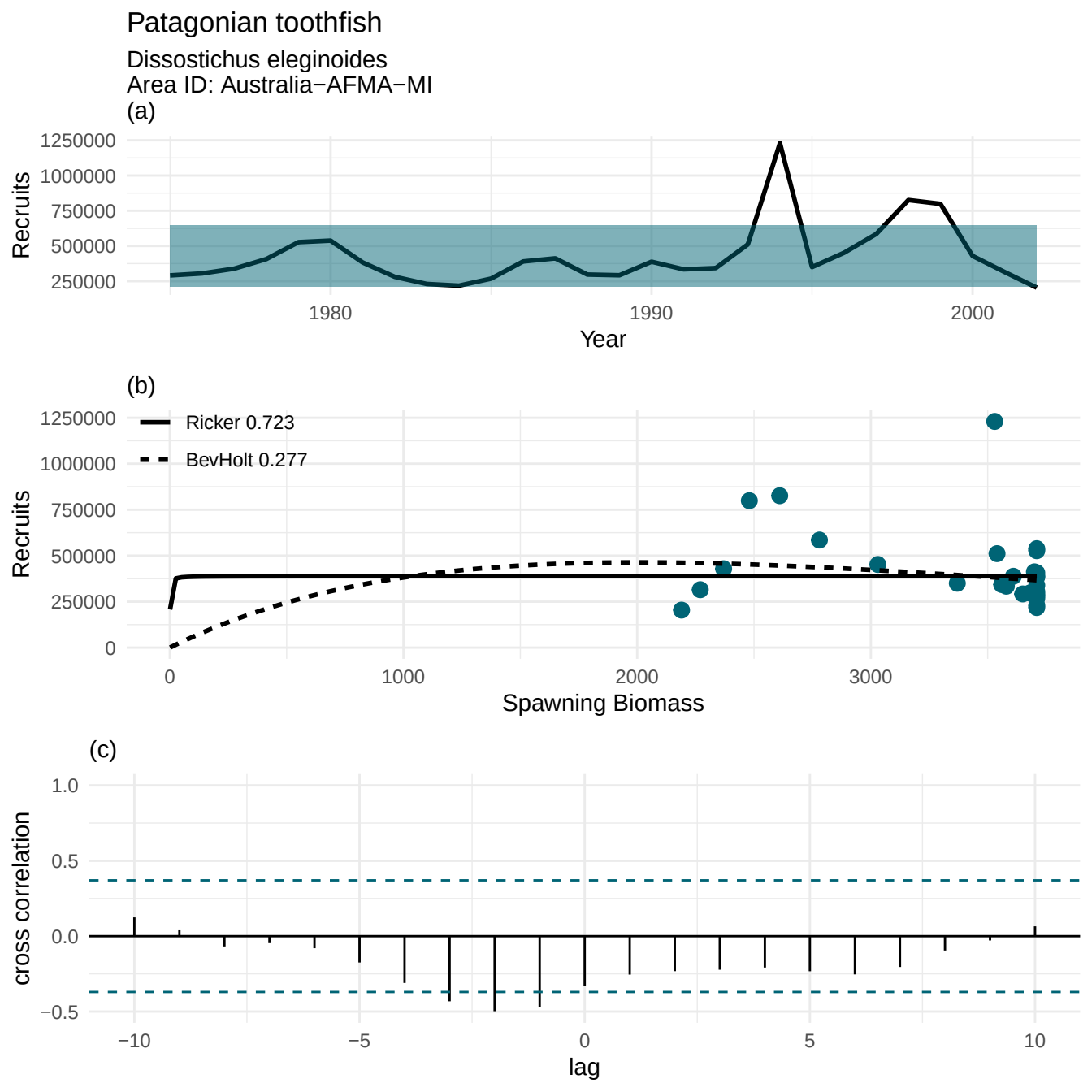

Pink salmon
Oncorhynchus gorbuscha
Area ID: USA−AKSTATE−SELDOVIAB
(a)
Recruits
4e+05
3e+05
2e+05
1e+05
0e+00
1960
1970
1980
1990
Year
(b)
Ricker 0.423
BevHolt 0.577
Recruits
4e+05
3e+05
2e+05
1e+05
0e+00
0
25000
50000
75000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.87
0.46
−10
−5
0
5
10
lag

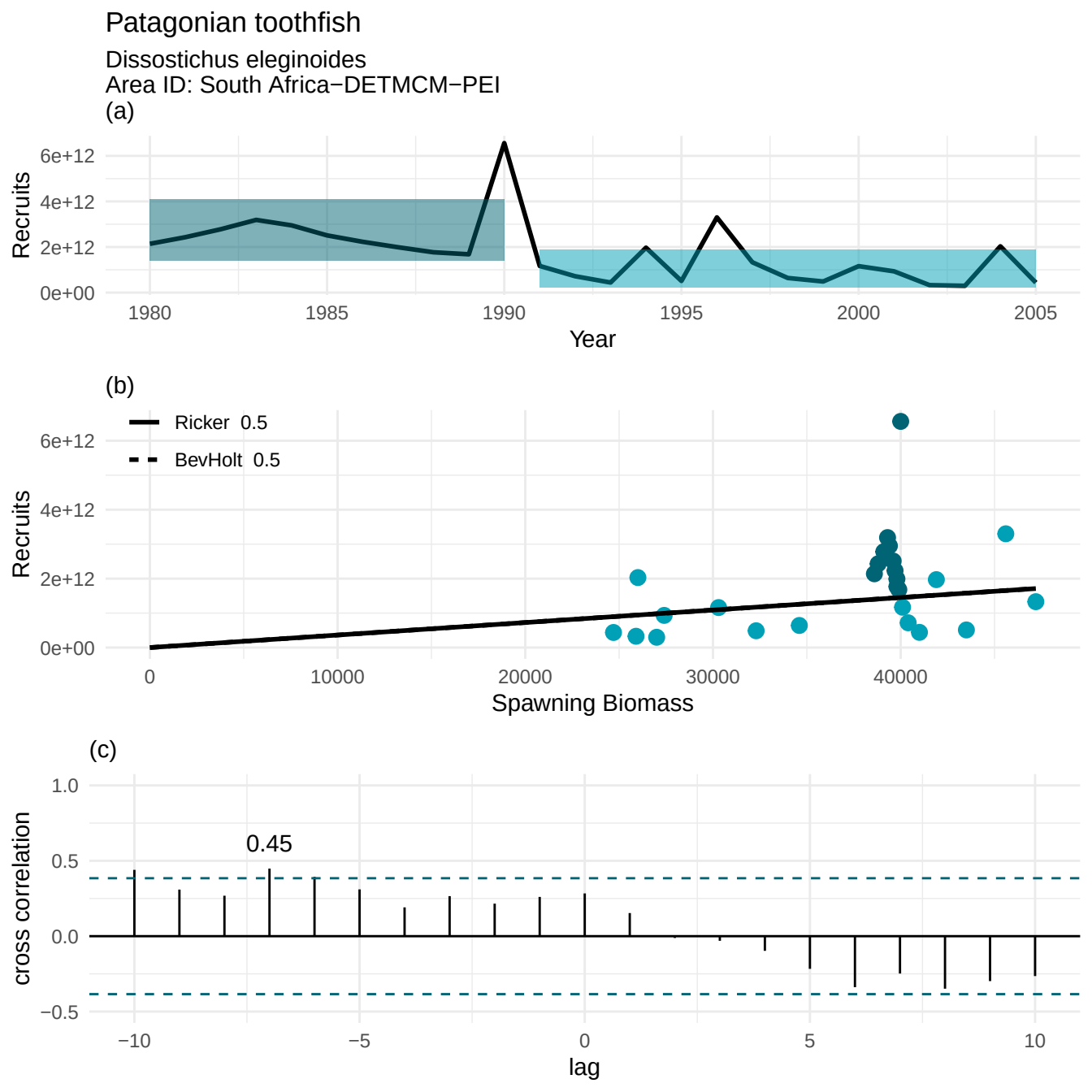

Pink salmon
Oncorhynchus gorbuscha
Area ID: USA−AKSTATE−TUTKASD
(a)
Recruits
2e+06
1e+06
0e+00
1960
1970
1980
1990
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
2e+06
1e+06
0e+00
0
10000
20000
30000
40000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.37
−10
−5
0
5
10
lag


Pink salmon
Oncorhynchus gorbuscha
Area ID: USA−AKSTATE−WINDYC
(a)
Recruits
6e+05
4e+05
2e+05
0e+00
1960
1970
1980
1990
Year
(b)
Ricker 0.501
BevHolt 0.499
Recruits
6e+05
4e+05
2e+05
0e+00
0
20000
40000
60000
80000
Spawning Biomass
(c)
0.9
0.74
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

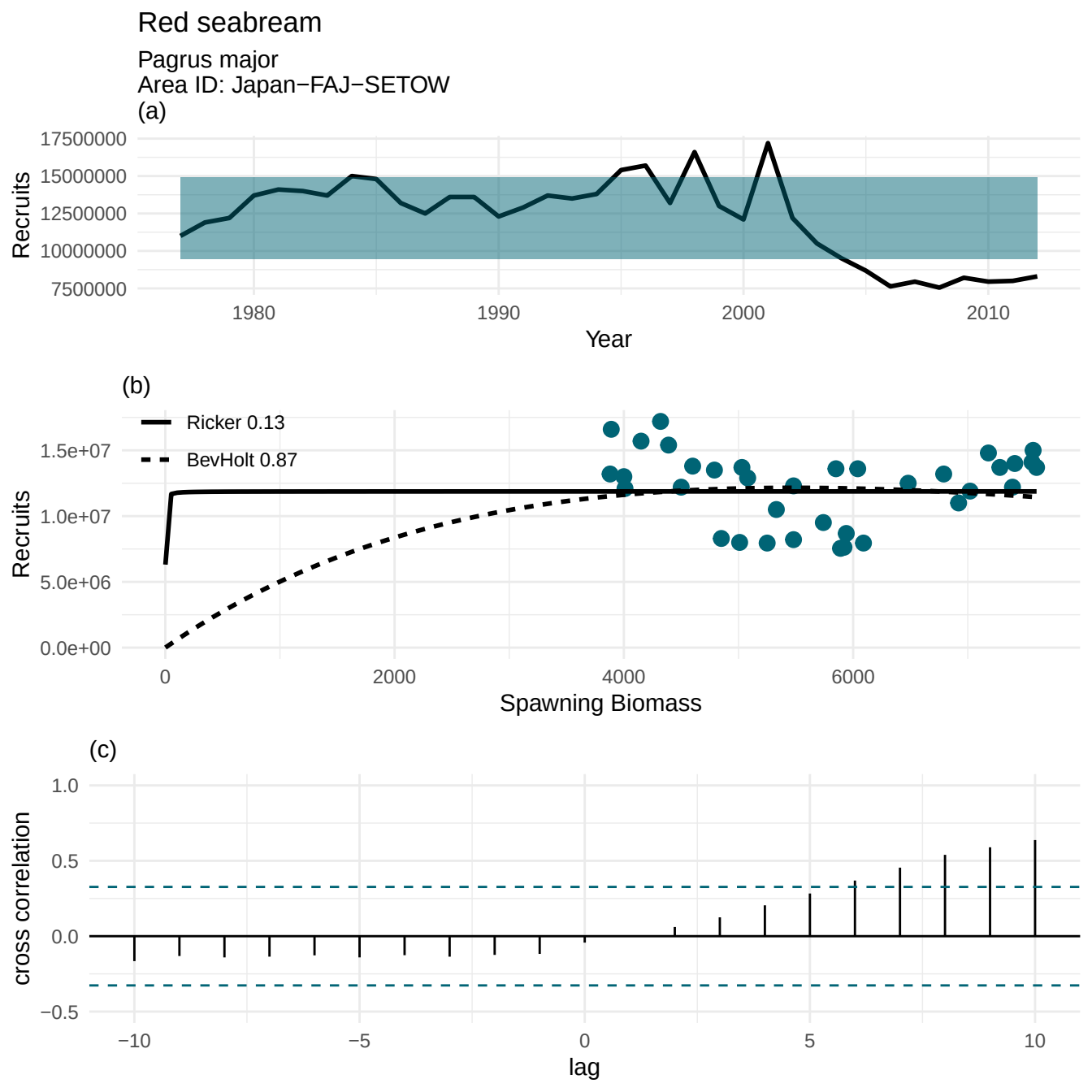

Petrale sole
Eopsetta jordani
Area ID: USA−NMFS−PCOAST
(a)
Recruits
3e+07
2e+07
1e+07
1960
1980
2000
Year
(b)
Ricker 0.286
BevHolt 0.714
Recruits
3e+07
2e+07
1e+07
0e+00
0
2500
5000
7500
10000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.41
0.34
−10
−5
0
5
10
lag

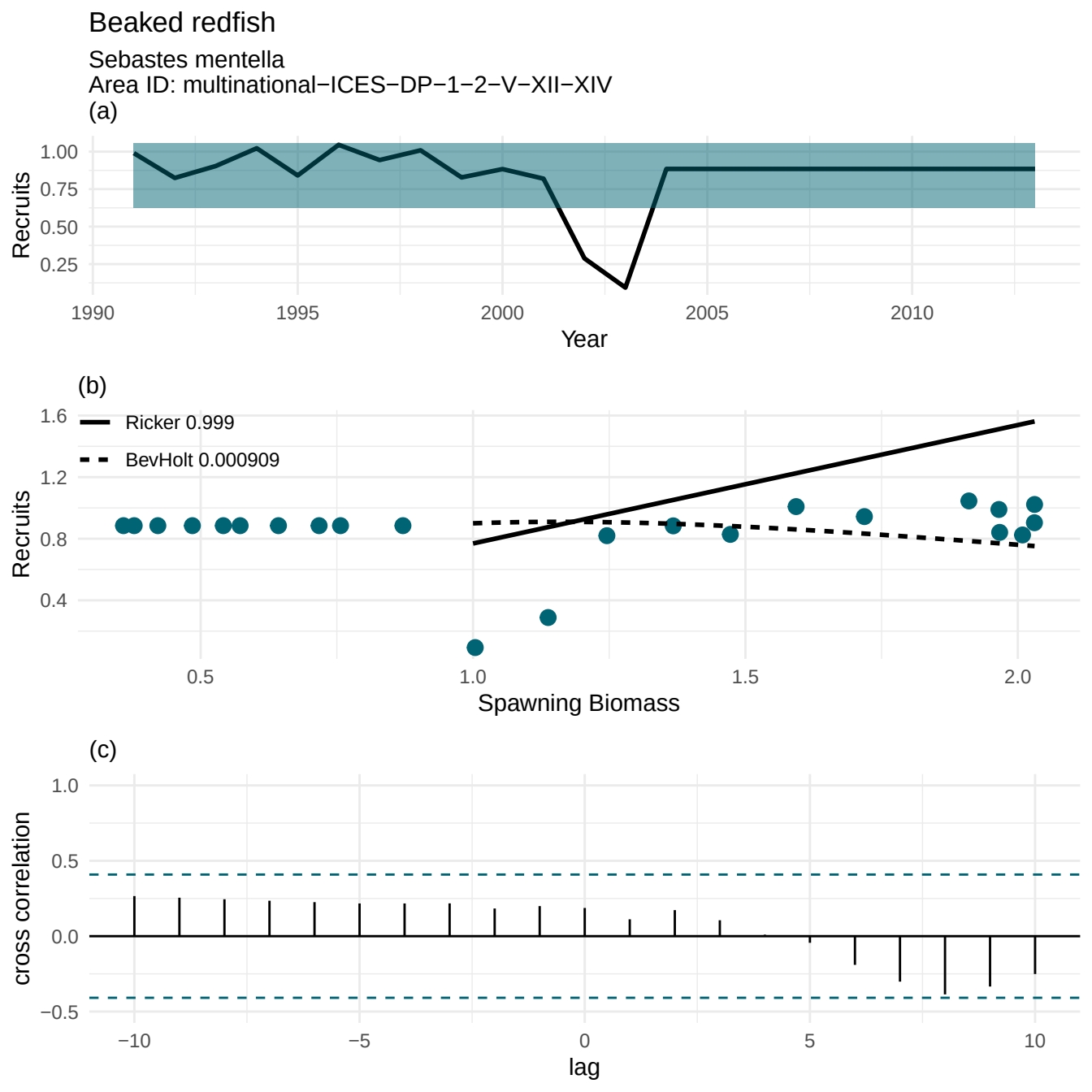

Patagonian toothfish
Dissostichus eleginoides
Area ID: multinational−SUBPESCA−CFP−SCH−ARG
(a)
Recruits
4e+09
3e+09
2e+09
1995
2000
2005
2010
2015
2020
Year
(b)
Ricker 0.498
BevHolt 0.502
Recruits
4e+09
3e+09
2e+09
1e+09
0e+00
0
20000
40000
60000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.48
0.47
−10
−5
0
5
10
lag

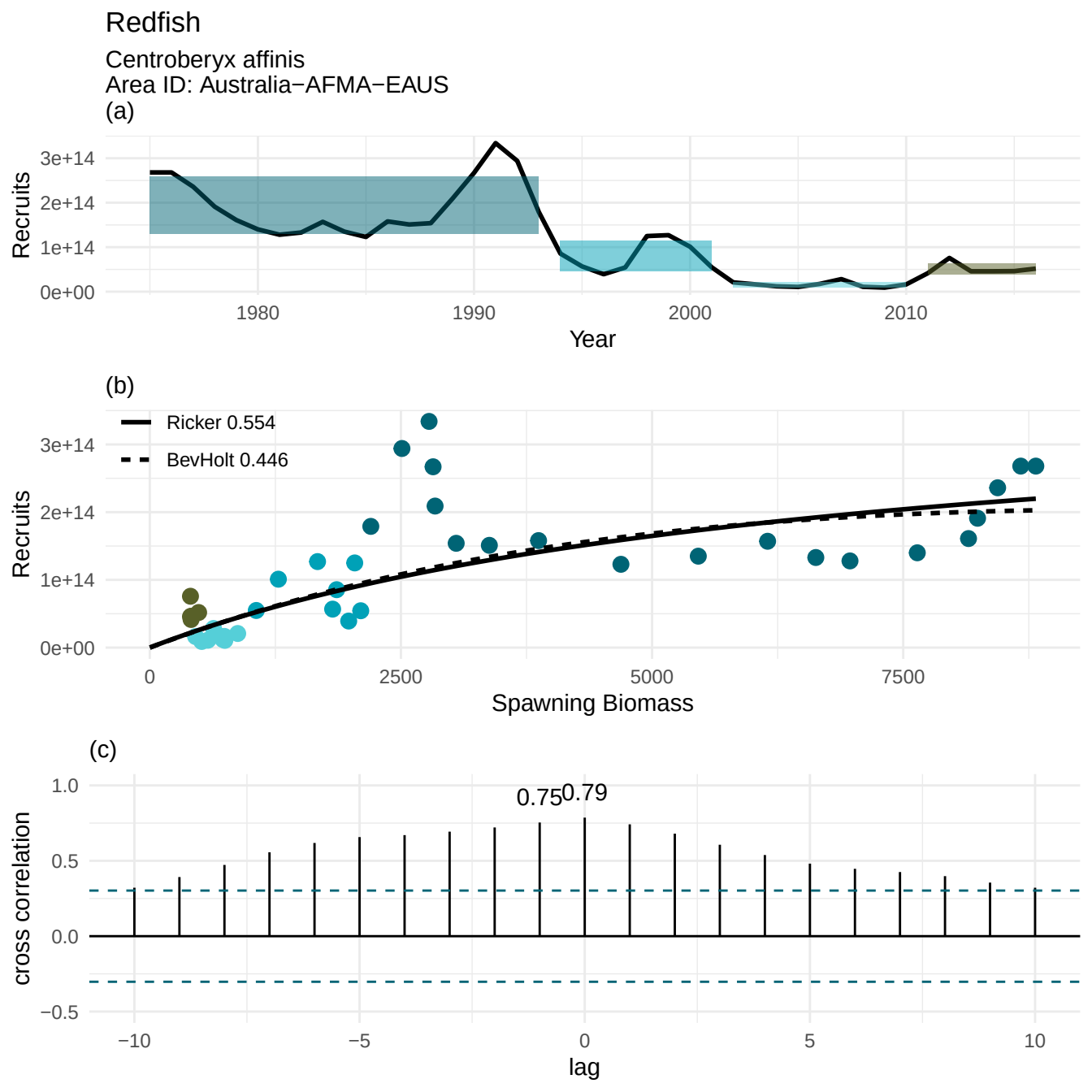

Patagonian toothfish
Dissostichus eleginoides
Area ID: Australia−AFMA−MI
(a)
Recruits
1250000
1000000
750000
500000
250000
1980
1990
2000
Year
(b)
Ricker 0.723
BevHolt 0.277
Recruits
1250000
1000000
750000
500000
250000
0
0
1000
2000
3000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

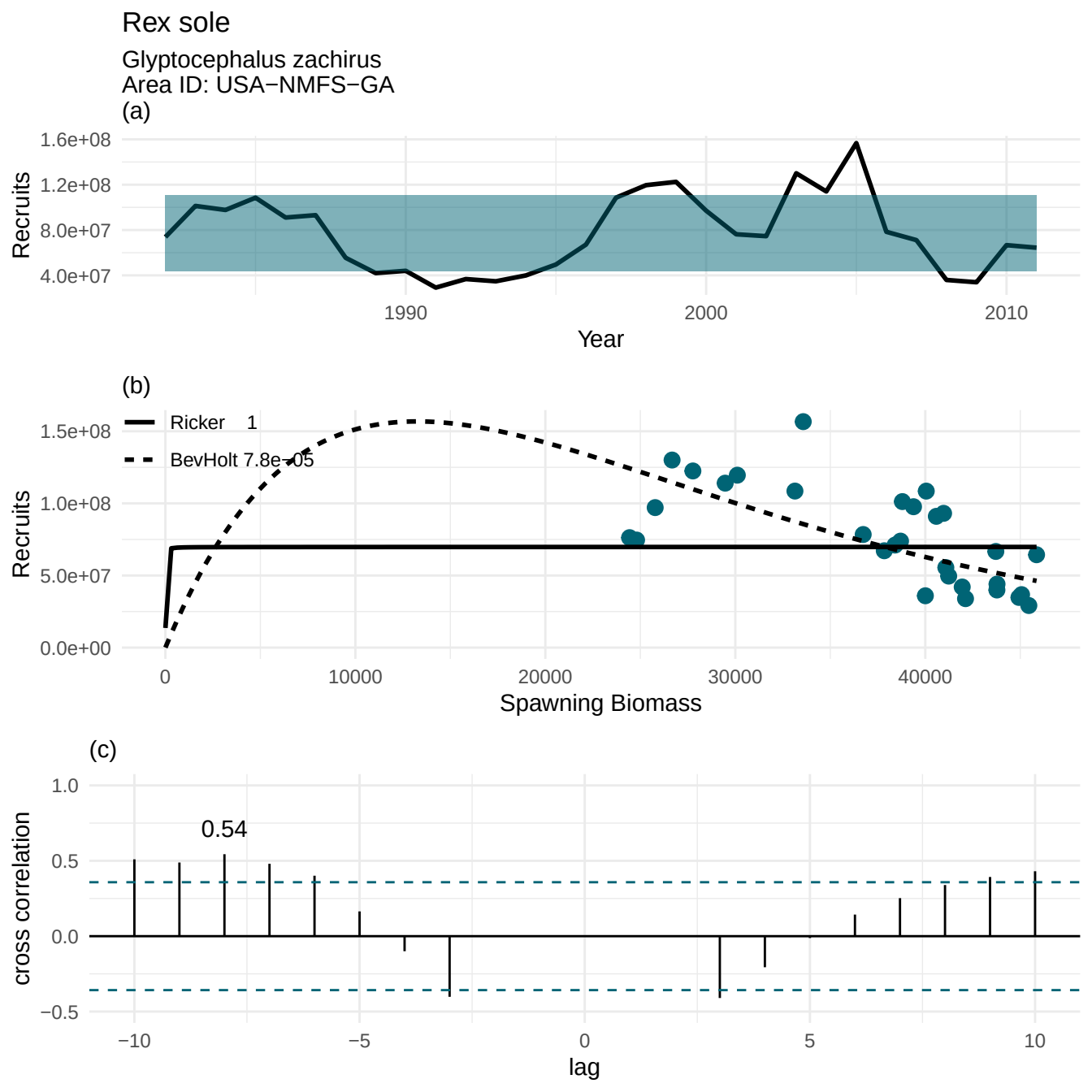

Patagonian toothfish
Dissostichus eleginoides
Area ID: South Africa−DETMCM−PEI
(a)
Recruits
6e+12
4e+12
2e+12
0e+00
1980
1985
1990
1995
2000
2005
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
6e+12
4e+12
2e+12
0e+00
0
10000
20000
30000
40000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.45
−10
−5
0
5
10
lag

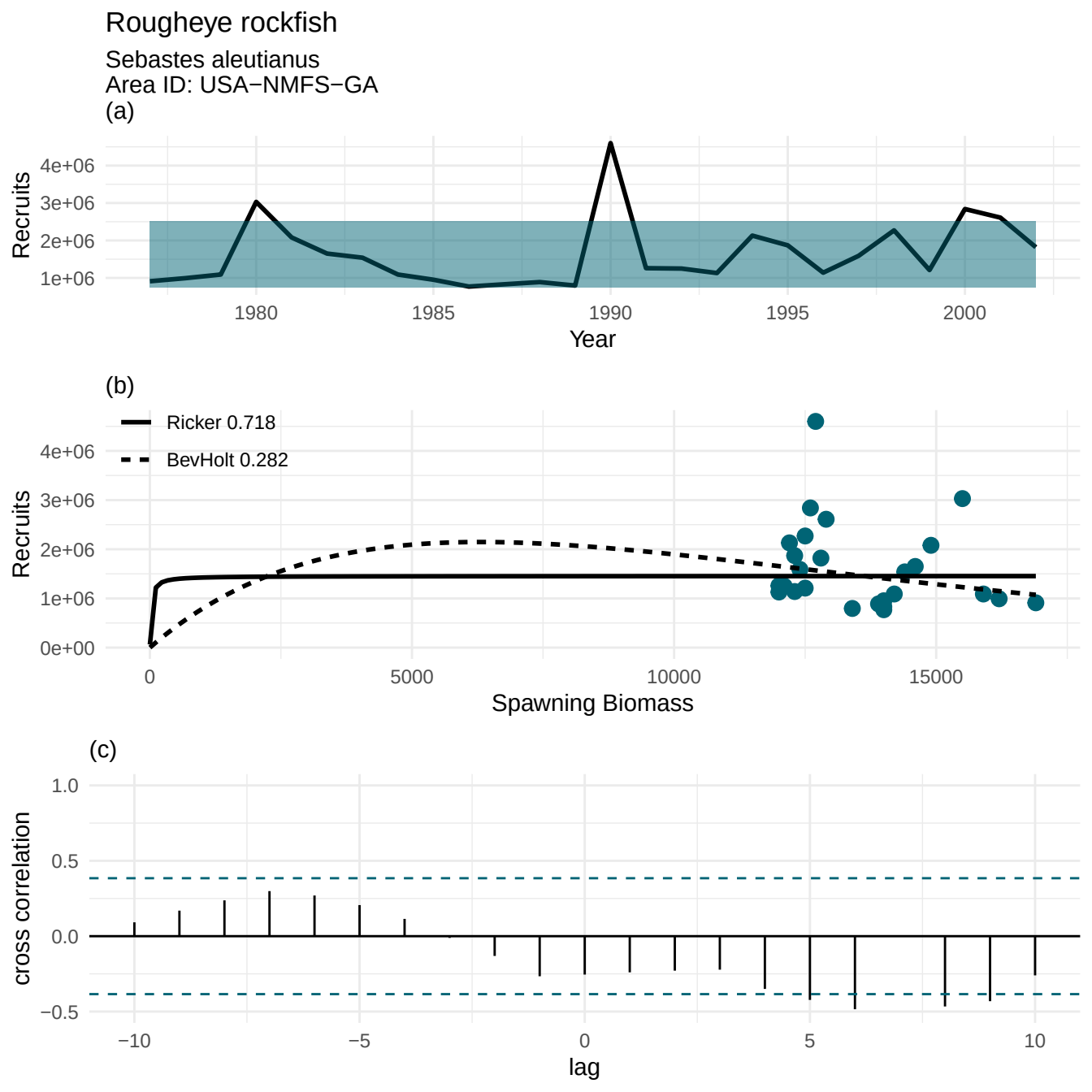
Red seabream
Pagrus major
Area ID: Japan−FAJ−SETOE
(a)
Recruits
12500000
10000000
7500000
5000000
1980
1990
2000
2010
Year
(b)
Ricker 0.992
BevHolt 0.00812
Recruits
1e+07
5e+06
0e+00
0
500
1000
1500
2000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.510.52
−10
−5
0
5
10
lag

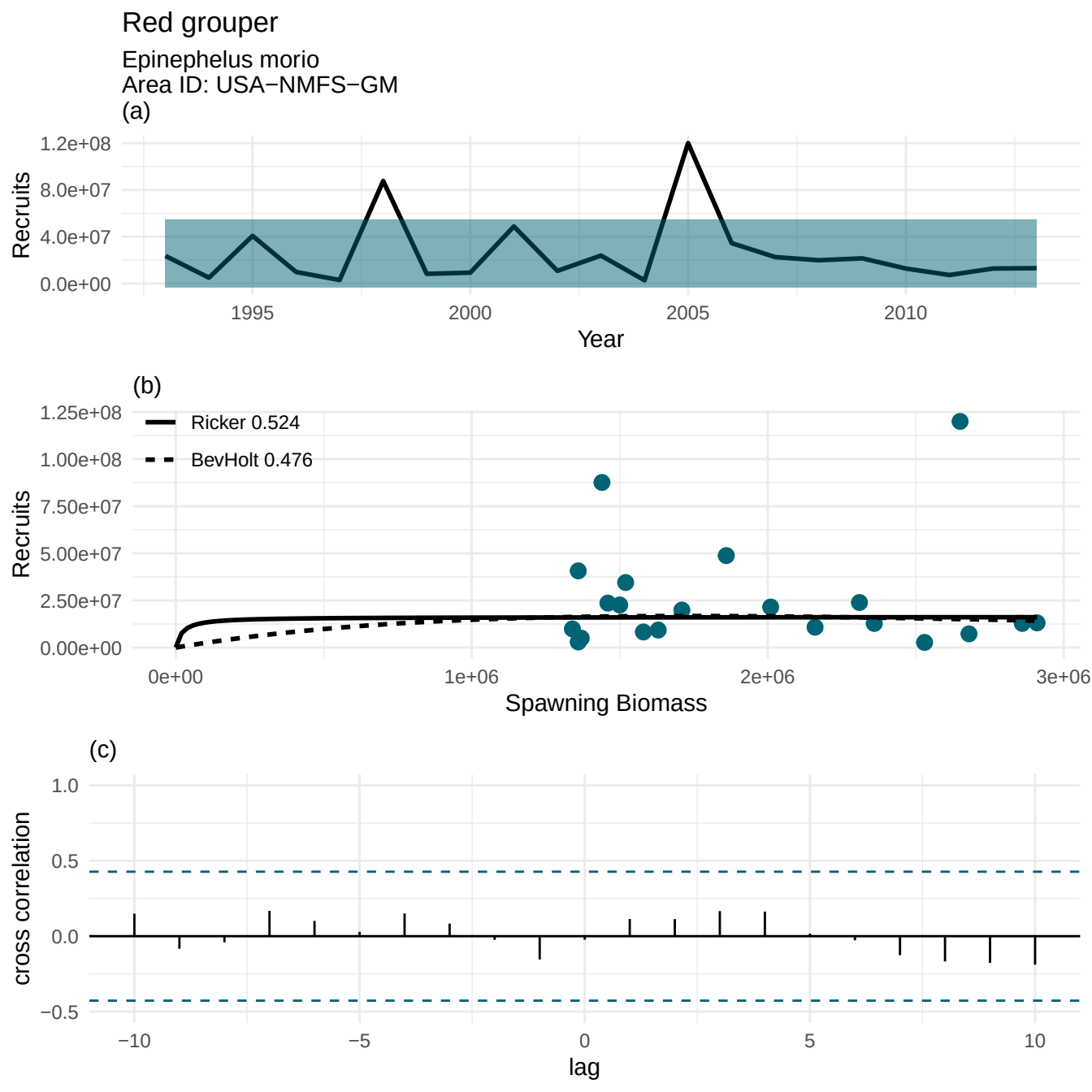

Red seabream
Pagrus major
Area ID: Japan−FAJ−SETOW
(a)
Recruits
17500000
15000000
12500000
10000000
7500000
1980
1990
2000
2010
Year
(b)
Ricker 0.13
BevHolt 0.87
Recruits
1.5e+07
1.0e+07
5.0e+06
0.0e+00
0
2000
4000
6000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

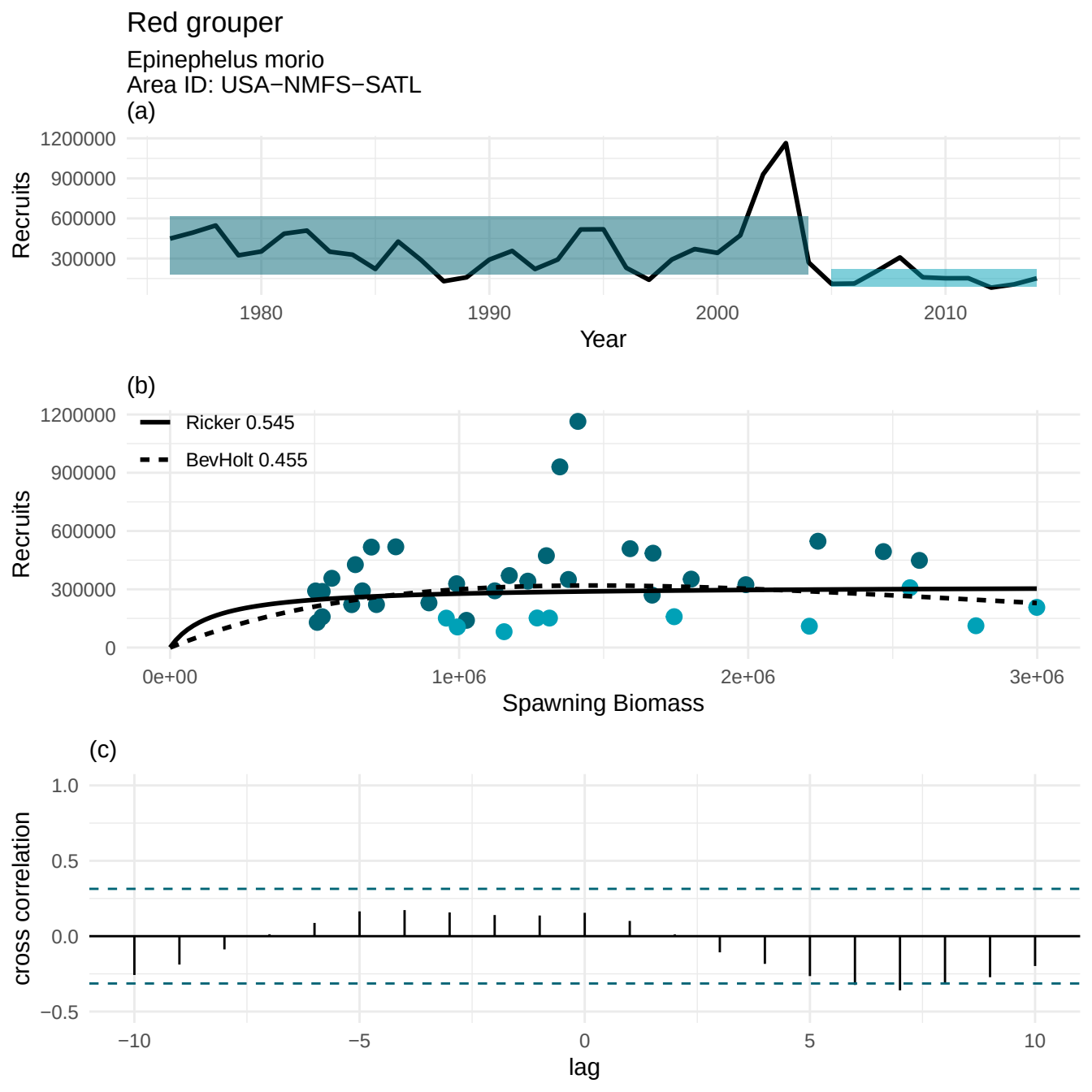

Beaked redfish
Sebastes mentella
Area ID: multinational−ICES−DP−1−2−V−XII−XIV
(a)
Recruits
1.00
0.75
0.50
0.25
1990
1995
2000
2005
2010
Year
(b)
Ricker 0.999
BevHolt 0.000909
Recruits
1.6
1.2
0.8
0.4
0.5
1.0
1.5
2.0
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

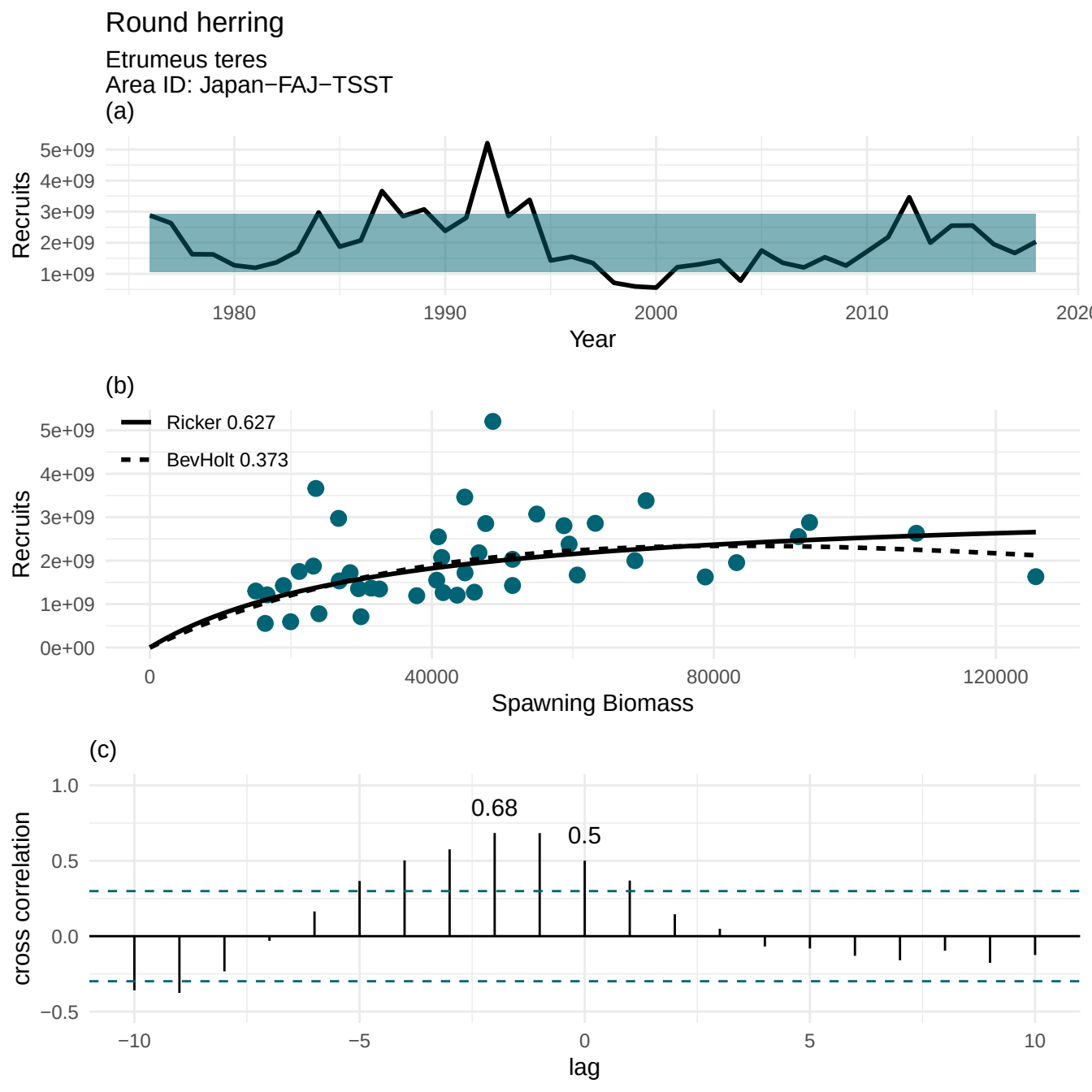

Redfish
Centroberyx affinis
Area ID: Australia−AFMA−EAUS
(a)
Recruits
3e+14
2e+14
1e+14
0e+00
1980
1990
2000
2010
Year
(b)
Ricker 0.554
BevHolt 0.446
Recruits
3e+14
2e+14
1e+14
0e+00
0
2500
5000
7500
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.75
0.79
−10
−5
0
5
10
lag

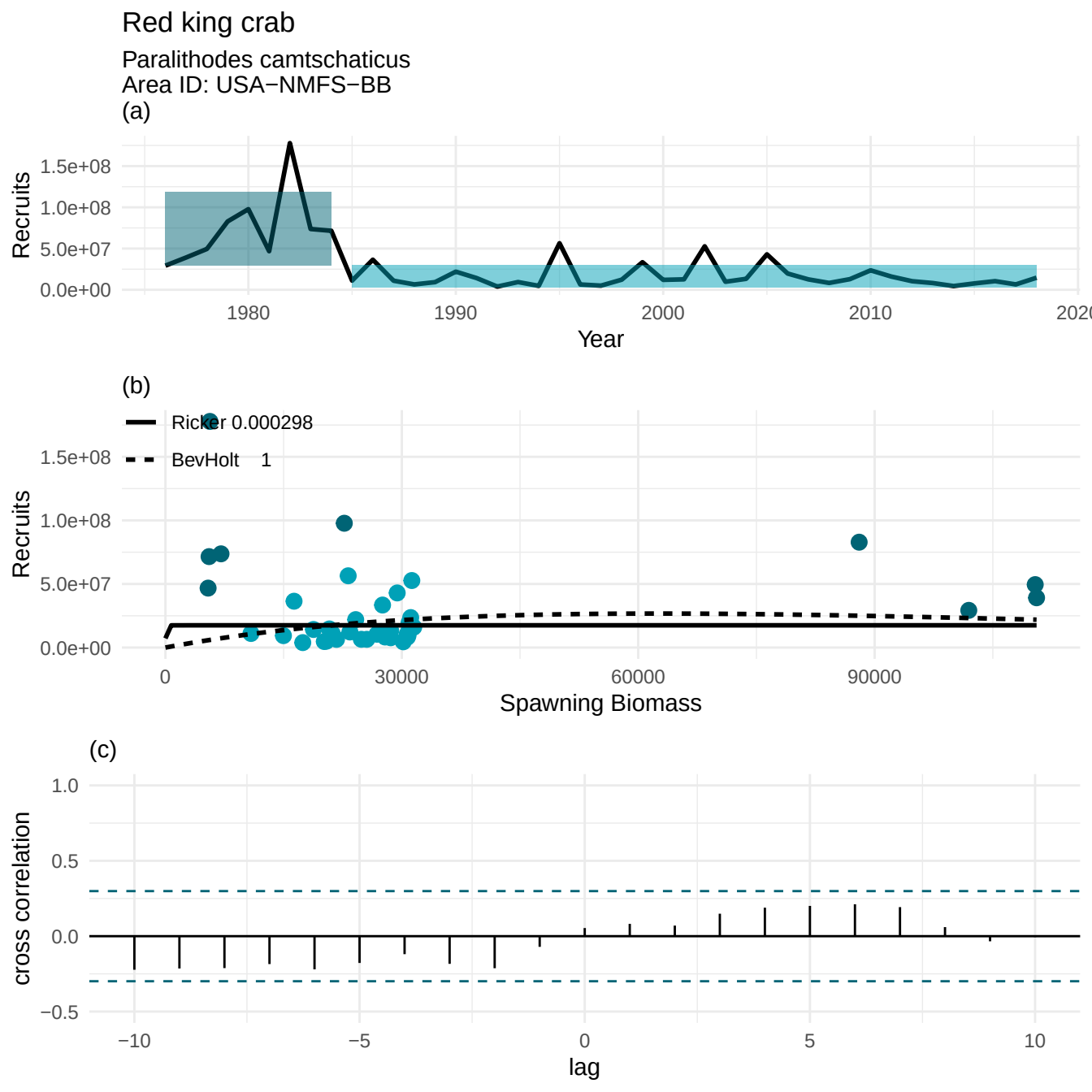

Rex sole
Glyptocephalus zachirus
Area ID: USA−NMFS−GA
(a)
Recruits
1.6e+08
1.2e+08
8.0e+07
4.0e+07
1990
2000
2010
Year
(b)
Ricker 1
BevHolt 7.8e−05
Recruits
1.5e+08
1.0e+08
5.0e+07
0.0e+00
0
10000
20000
30000
40000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.54
−10
−5
0
5
10
lag

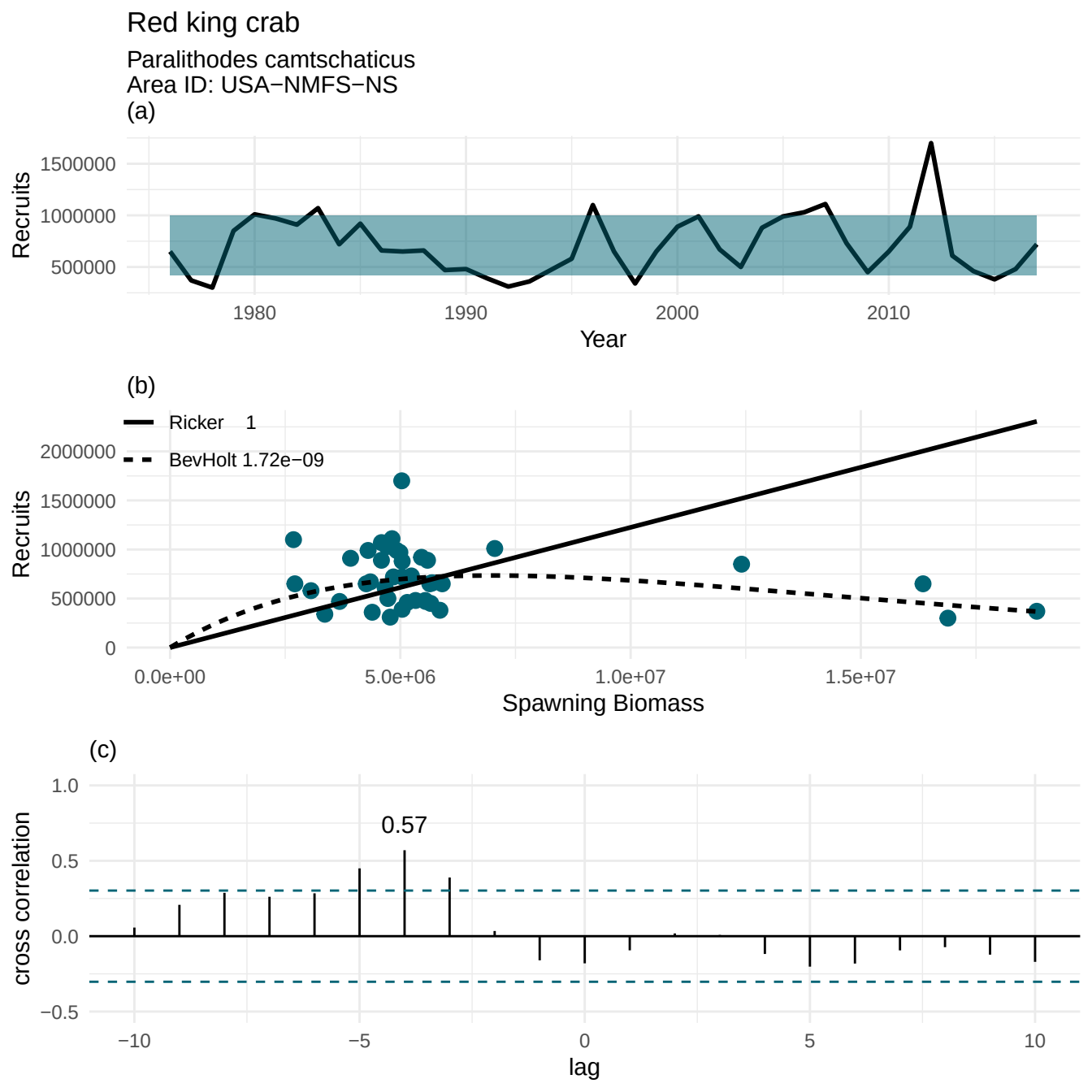

Rougheye rockfish
Sebastes aleutianus
Area ID: USA−NMFS−GA
(a)
Recruits
4e+06
3e+06
2e+06
1e+06
1980
1985
1990
1995
2000
Year
(b)
Ricker 0.718
BevHolt 0.282
Recruits
4e+06
3e+06
2e+06
1e+06
0e+00
0
5000
10000
15000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

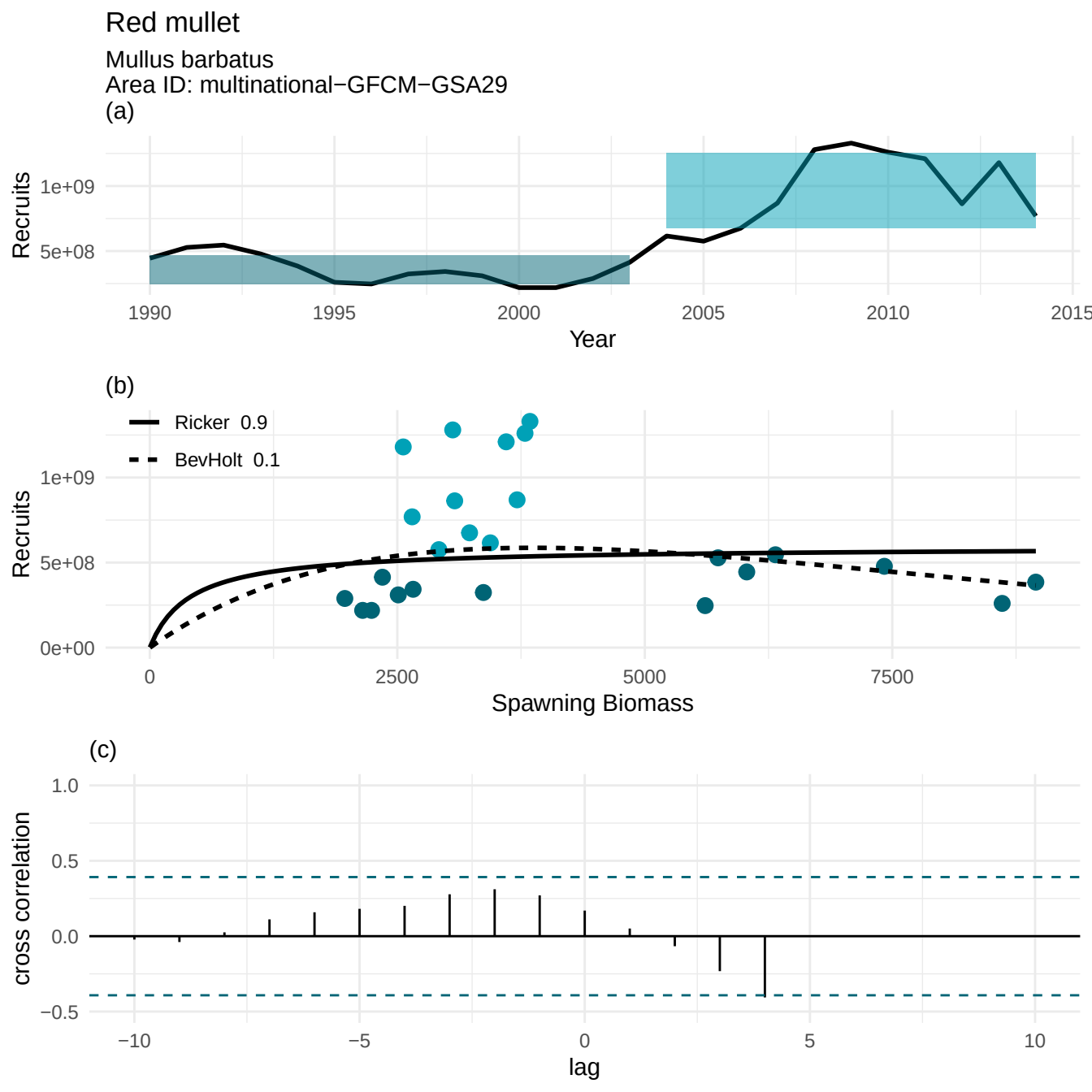

Red grouper
Epinephelus morio
Area ID: USA−NMFS−GM
(a)
Recruits
1.2e+08
8.0e+07
4.0e+07
0.0e+00
1995
2000
2005
2010
Year
(b)
Ricker 0.524
BevHolt 0.476
Recruits
1.25e+08
1.00e+08
7.50e+07
5.00e+07
2.50e+07
0.00e+00
0e+00
1e+06
2e+06
3e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

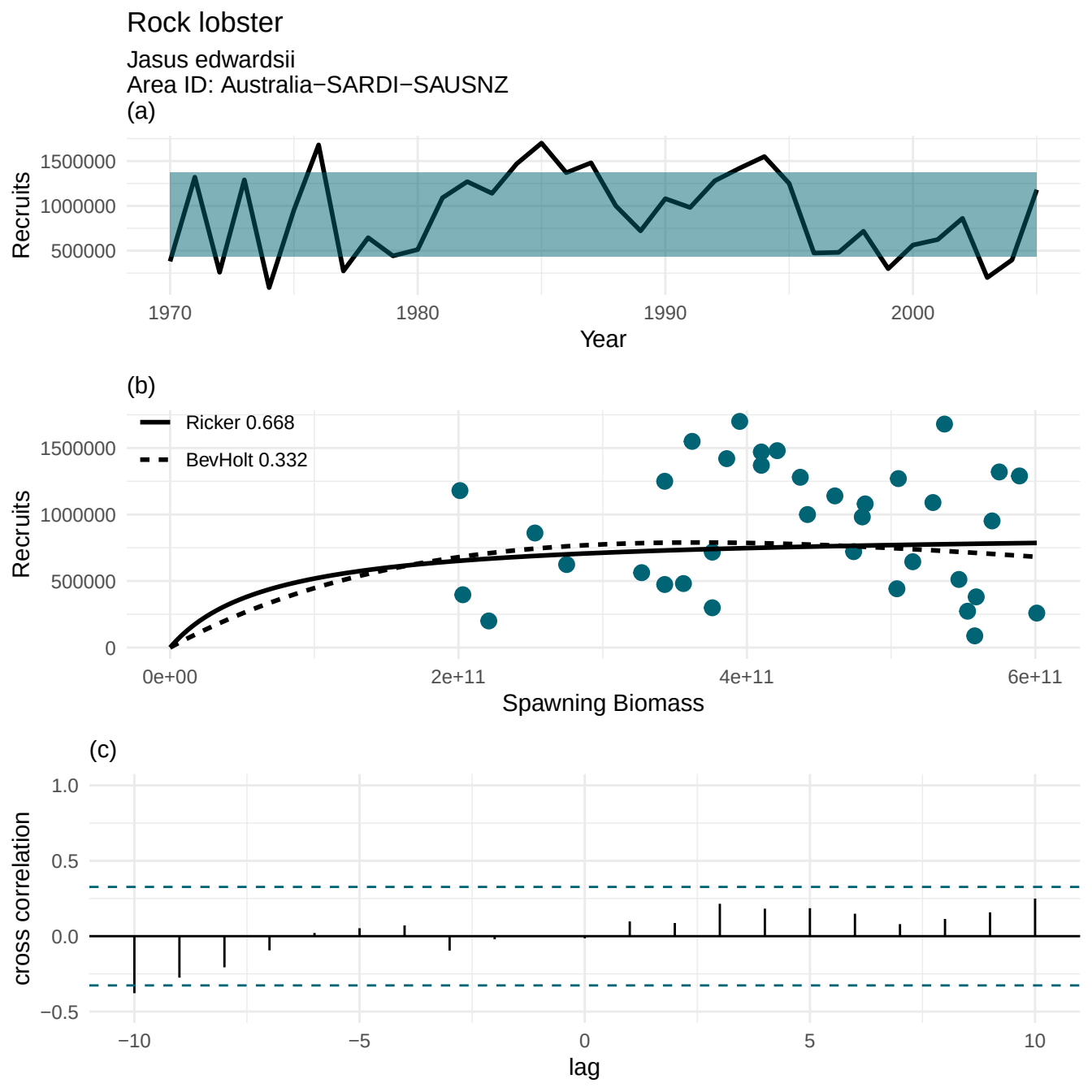

Red grouper
Epinephelus morio
Area ID: USA−NMFS−SATL
(a)
Recruits
1200000
900000
600000
300000
1980
1990
2000
2010
Year
(b)
Ricker 0.545
BevHolt 0.455
Recruits
1200000
900000
600000
300000
0
0e+00
1e+06
2e+06
3e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

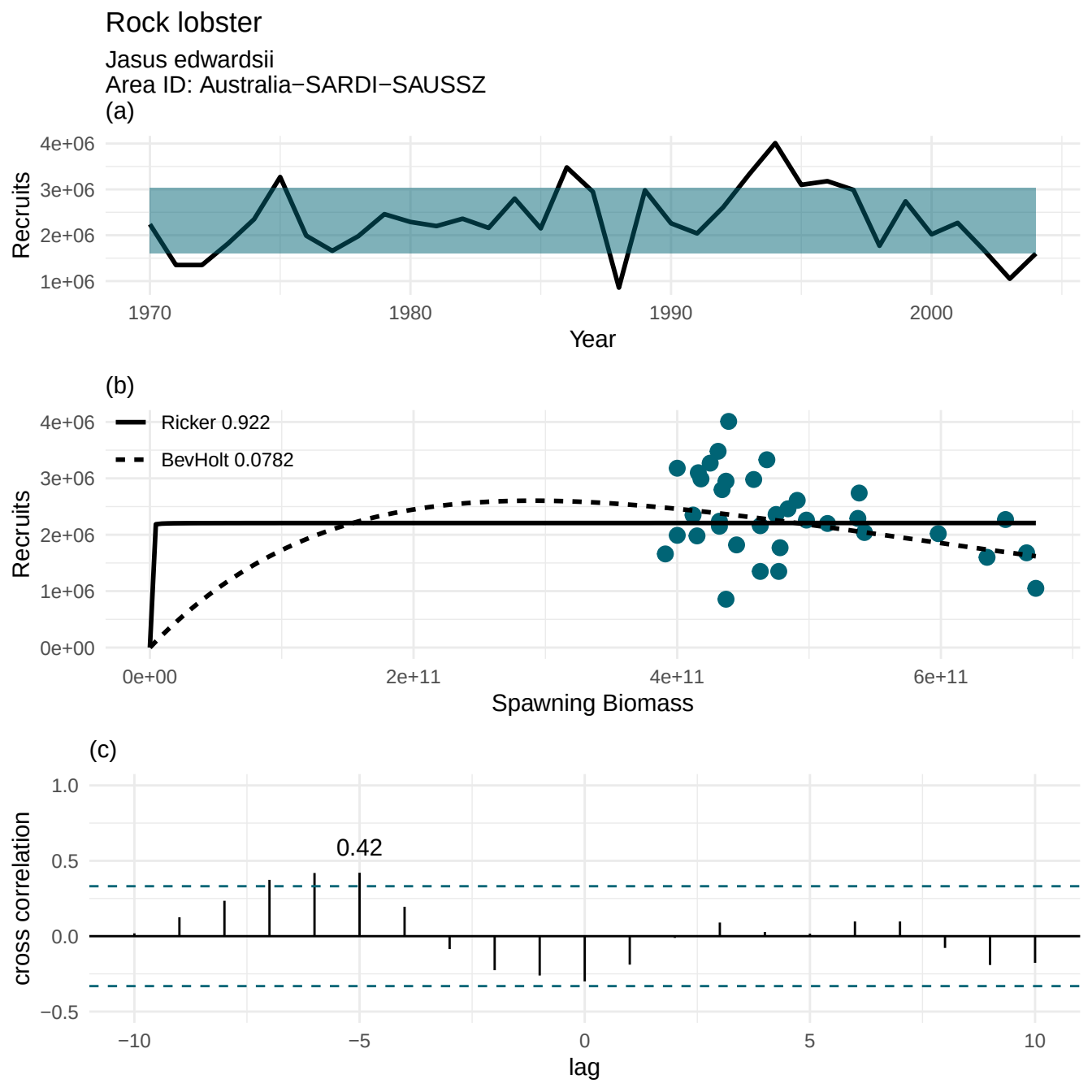

Round herring
Etrumeus teres
Area ID: Japan−FAJ−TSST
(a)
Recruits
5e+09
4e+09
3e+09
2e+09
1e+09
1980
1990
2000
2010
Year
(b)
Ricker 0.627
BevHolt 0.373
Recruits
0e+00
0
40000
80000
120000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.68
0.5
−10
−5
0
5
10
lag

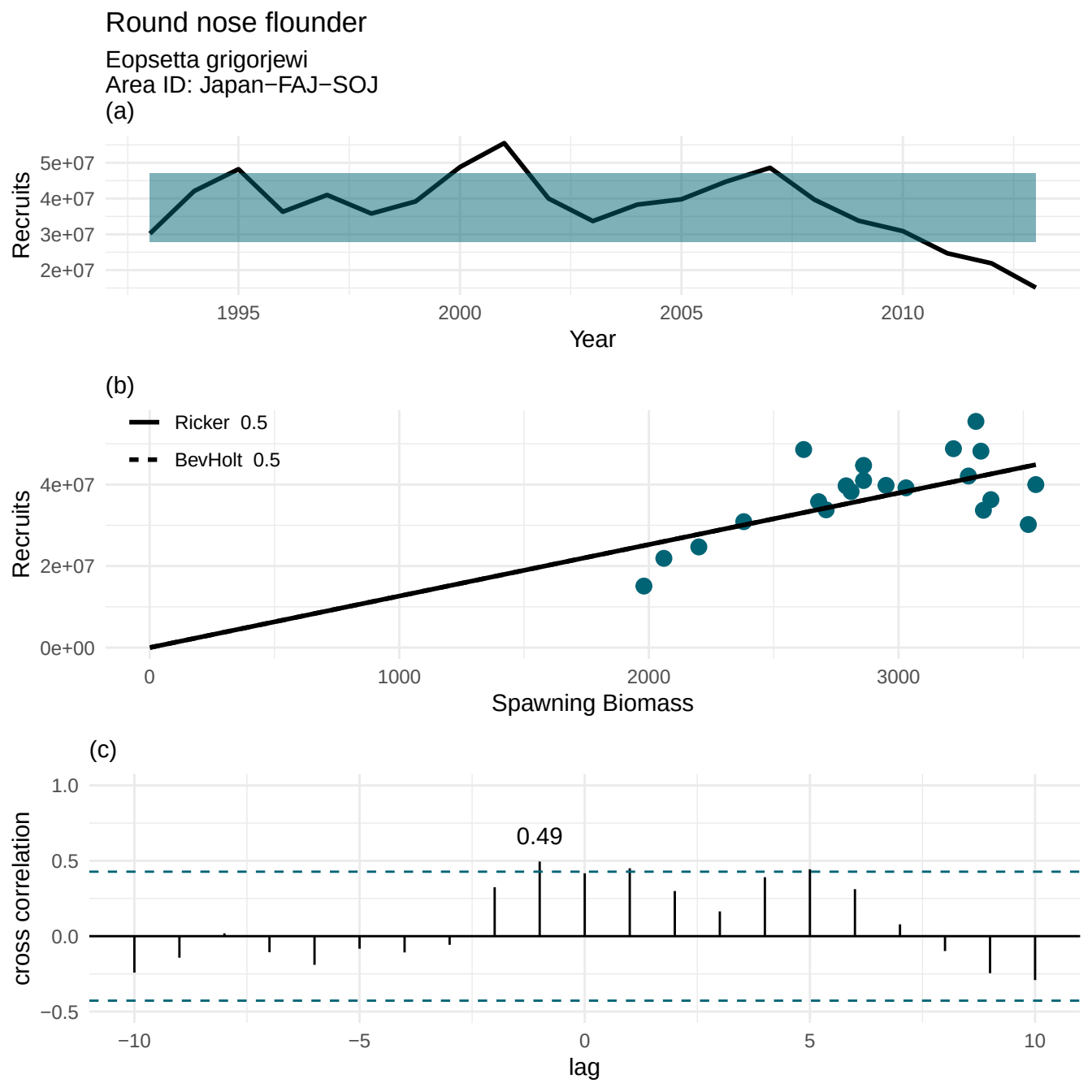

Red king crab
Paralithodes camtschaticus
Area ID: USA−NMFS−BB
(a)
Recruits
1.5e+08
1.0e+08
5.0e+07
0.0e+00
1980
1990
2000
2010
Year
(b)
Ricker 0.000298
BevHolt 1
Recruits
1.5e+08
1.0e+08
5.0e+07
0.0e+00
0
30000
60000
90000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

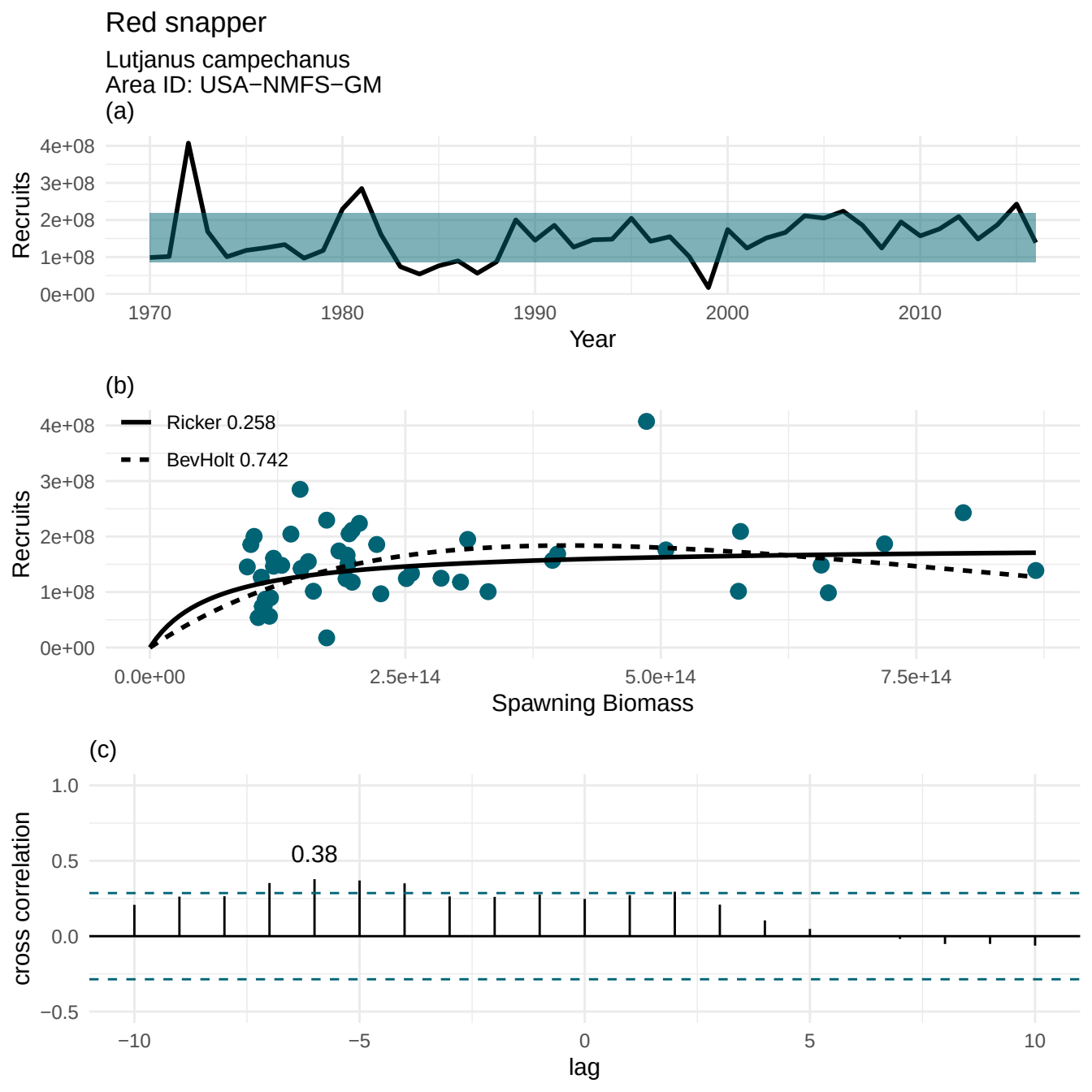

Red king crab
Paralithodes camtschaticus
Area ID: USA−NMFS−NS
(a)
Recruits
1500000
1000000
500000
1980
1990
2000
2010
Year
(b)
Ricker 1
BevHolt 1.72e−09
Recruits
2000000
1500000
1000000
500000
0
0.0e+00
5.0e+06
1.0e+07
1.5e+07
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.57
−10
−5
0
5
10
lag

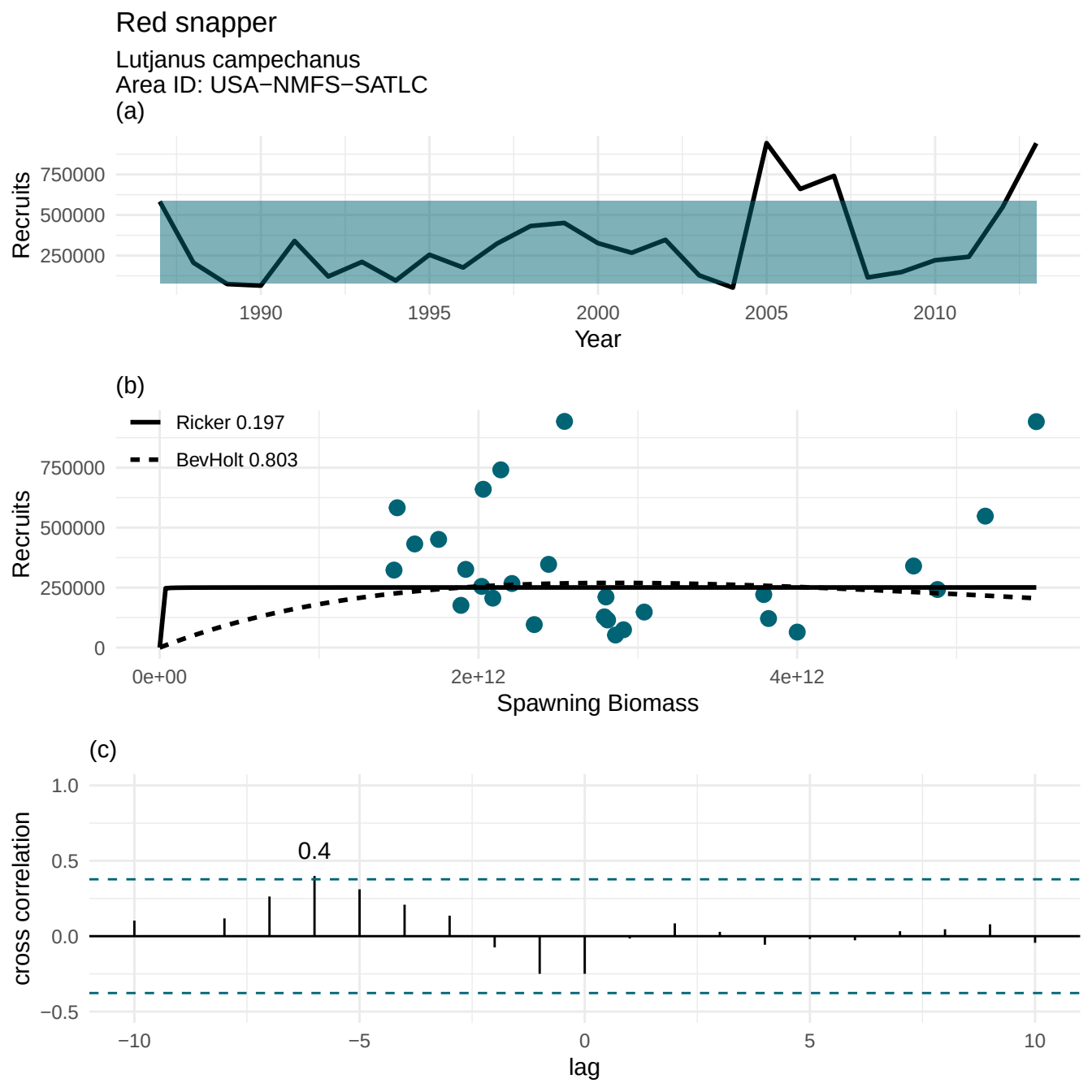

Red mullet
Mullus barbatus
Area ID: multinational−GFCM−GSA29
(a)
Recruits
1e+09
5e+08
1990
1995
2000
2005
2010
2015
Year
(b)
Ricker 0.9
BevHolt 0.1
Recruits
1e+09
5e+08
0e+00
0
2500
5000
7500
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

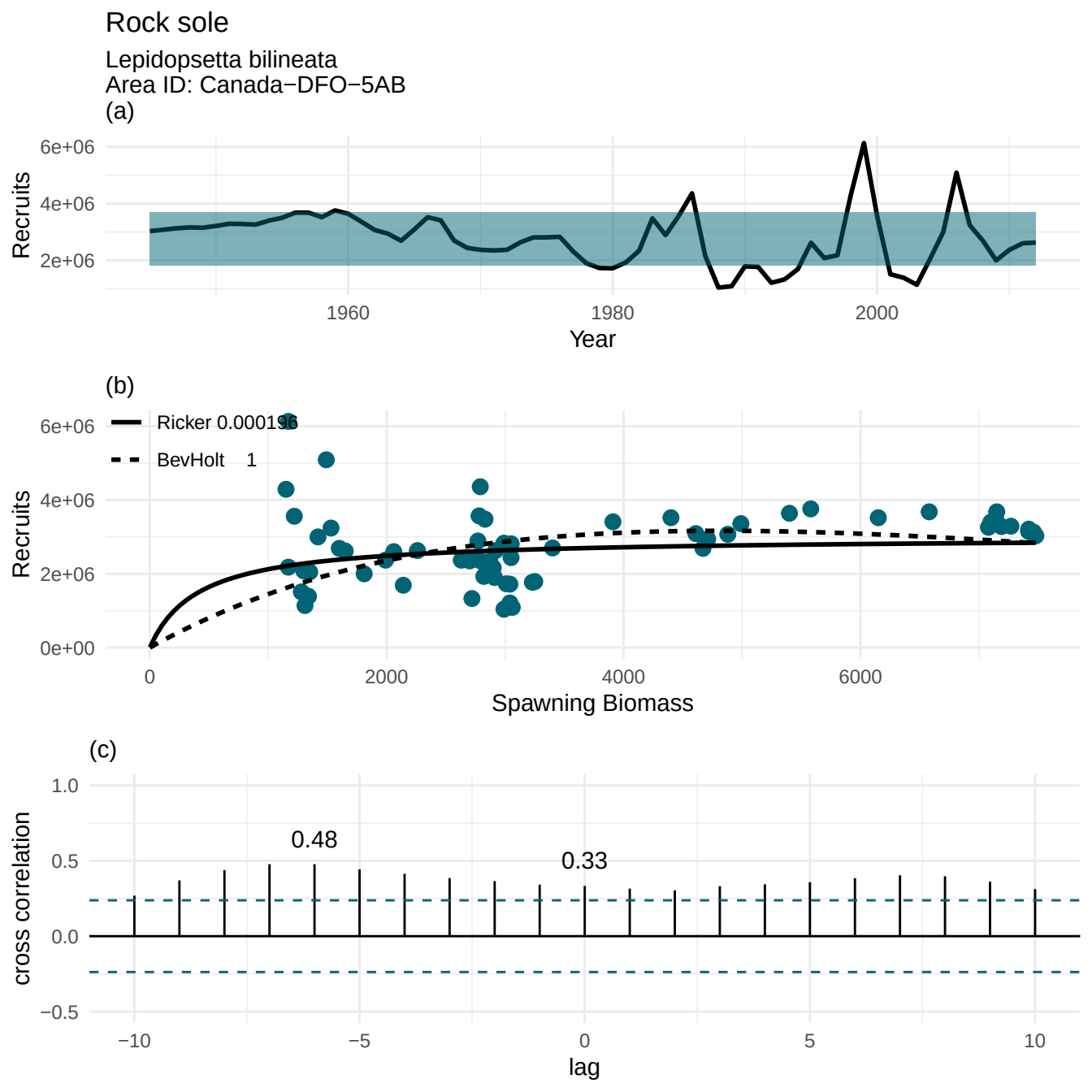

Rock lobster
Jasus edwardsii
Area ID: Australia−SARDI−SAUSNZ
(a)
Recruits
1500000
1000000
500000
1970
1980
1990
2000
Year
(b)
Ricker 0.668
BevHolt 0.332
Recruits
1500000
1000000
500000
0
0e+00
2e+11
4e+11
6e+11
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

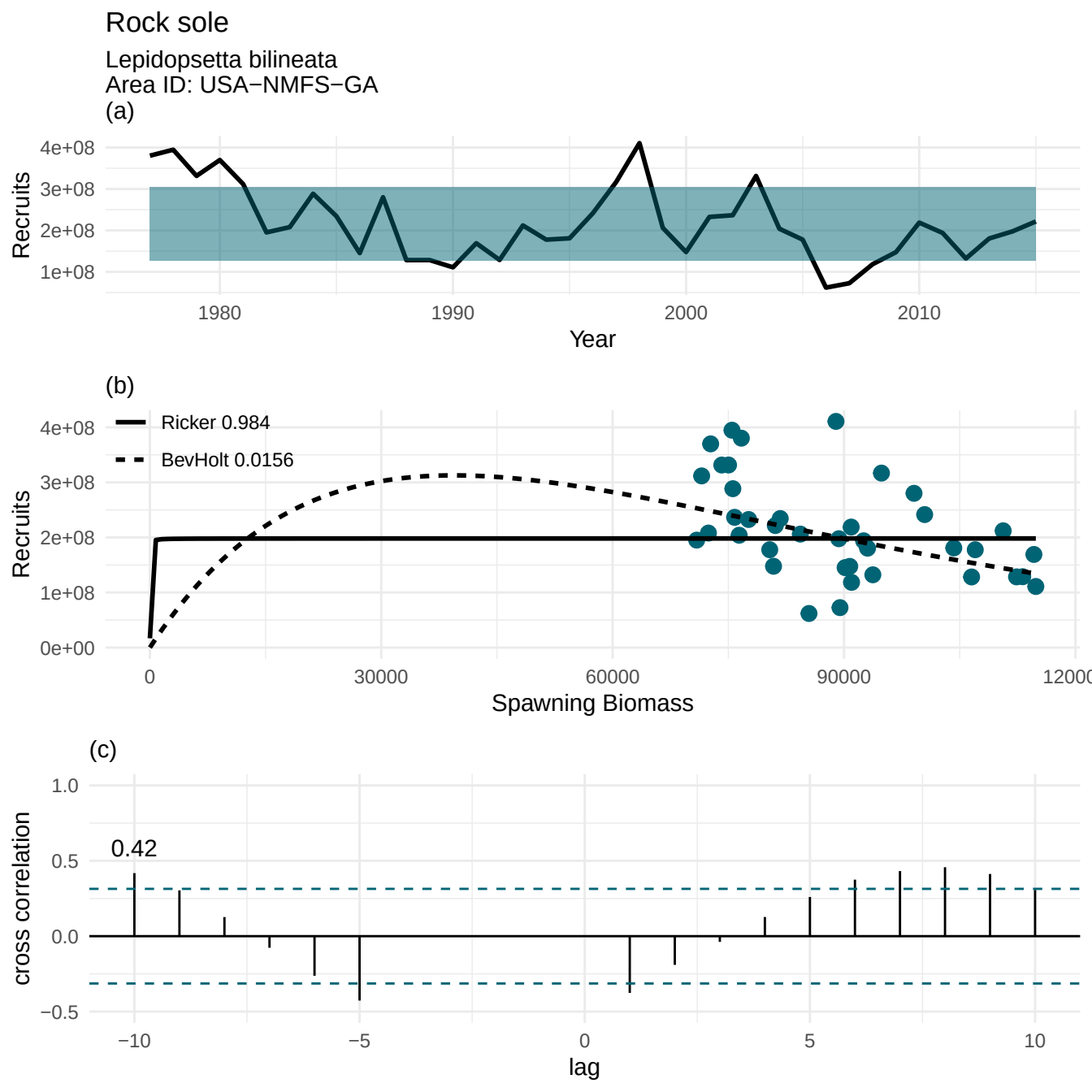

Rock lobster
Jasus edwardsii
Area ID: Australia−SARDI−SAUSSZ
(a)
Recruits
4e+06
3e+06
2e+06
1e+06
1970
1980
1990
2000
Year
(b)
Ricker 0.922
BevHolt 0.0782
Recruits
4e+06
3e+06
2e+06
1e+06
0e+00
0e+00
2e+11
4e+11
6e+11
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.42
−10
−5
0
5
10
lag

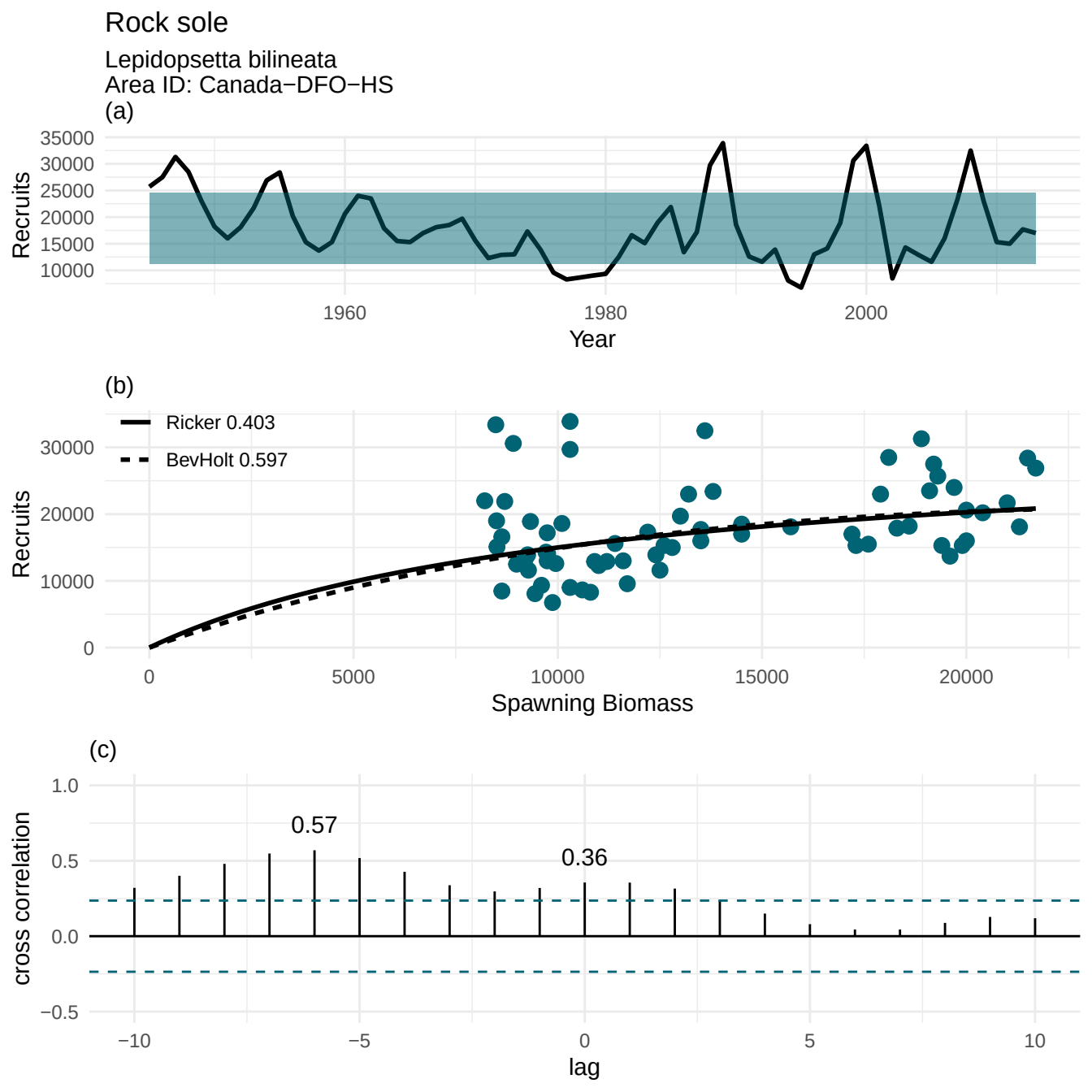

Round nose flounder
Eopsetta grigorjewi
Area ID: Japan−FAJ−SOJ
(a)
Recruits
5e+07
4e+07
3e+07
2e+07
1995
2000
2005
2010
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
4e+07
2e+07
0e+00
0
1000
2000
3000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.49
−10
−5
0
5
10
lag

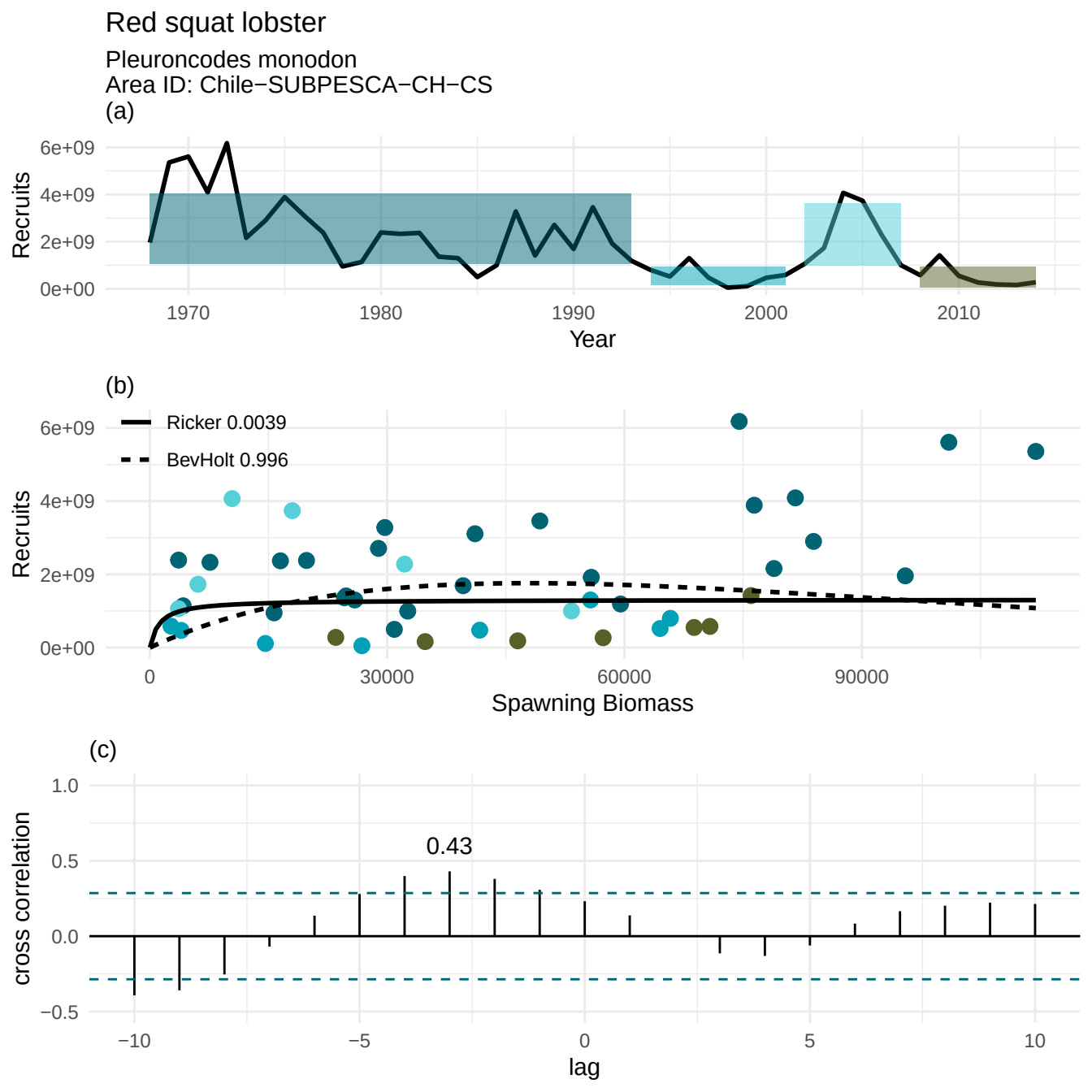

Red snapper
Lutjanus campechanus
Area ID: USA−NMFS−GM
(a)
Recruits
4e+08
3e+08
2e+08
1e+08
0e+00
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.258
BevHolt 0.742
Recruits
4e+08
3e+08
2e+08
1e+08
0e+00
0.0e+00
2.5e+14
5.0e+14
7.5e+14
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.38
−10
−5
0
5
10
lag

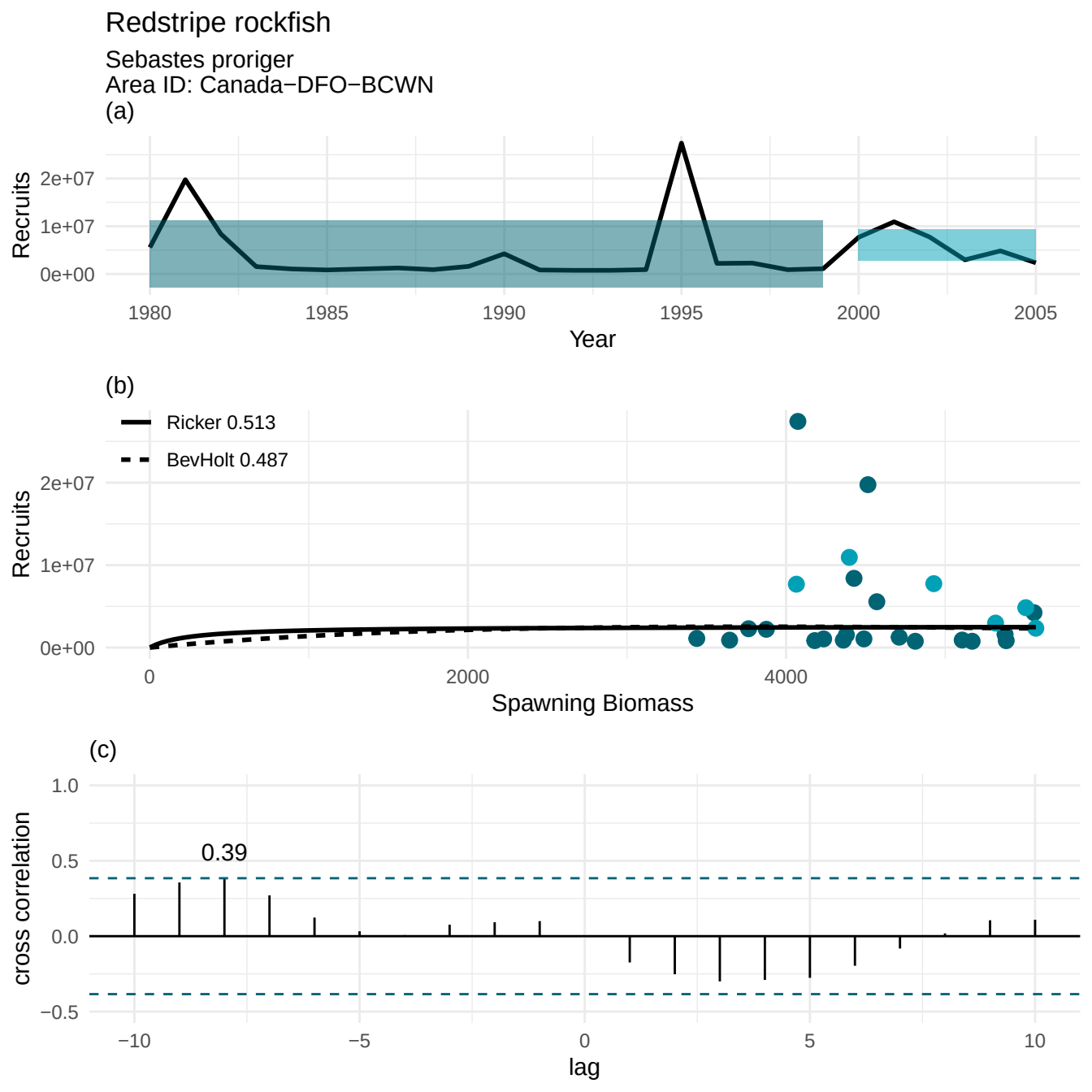

Red snapper
Lutjanus campechanus
Area ID: USA−NMFS−SATLC
(a)
Recruits
750000
500000
250000
1990
1995
2000
2005
2010
Year
(b)
Ricker 0.197
BevHolt 0.803
Recruits
750000
500000
250000
0
0e+00
2e+12
4e+12
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.4
−10
−5
0
5
10
lag

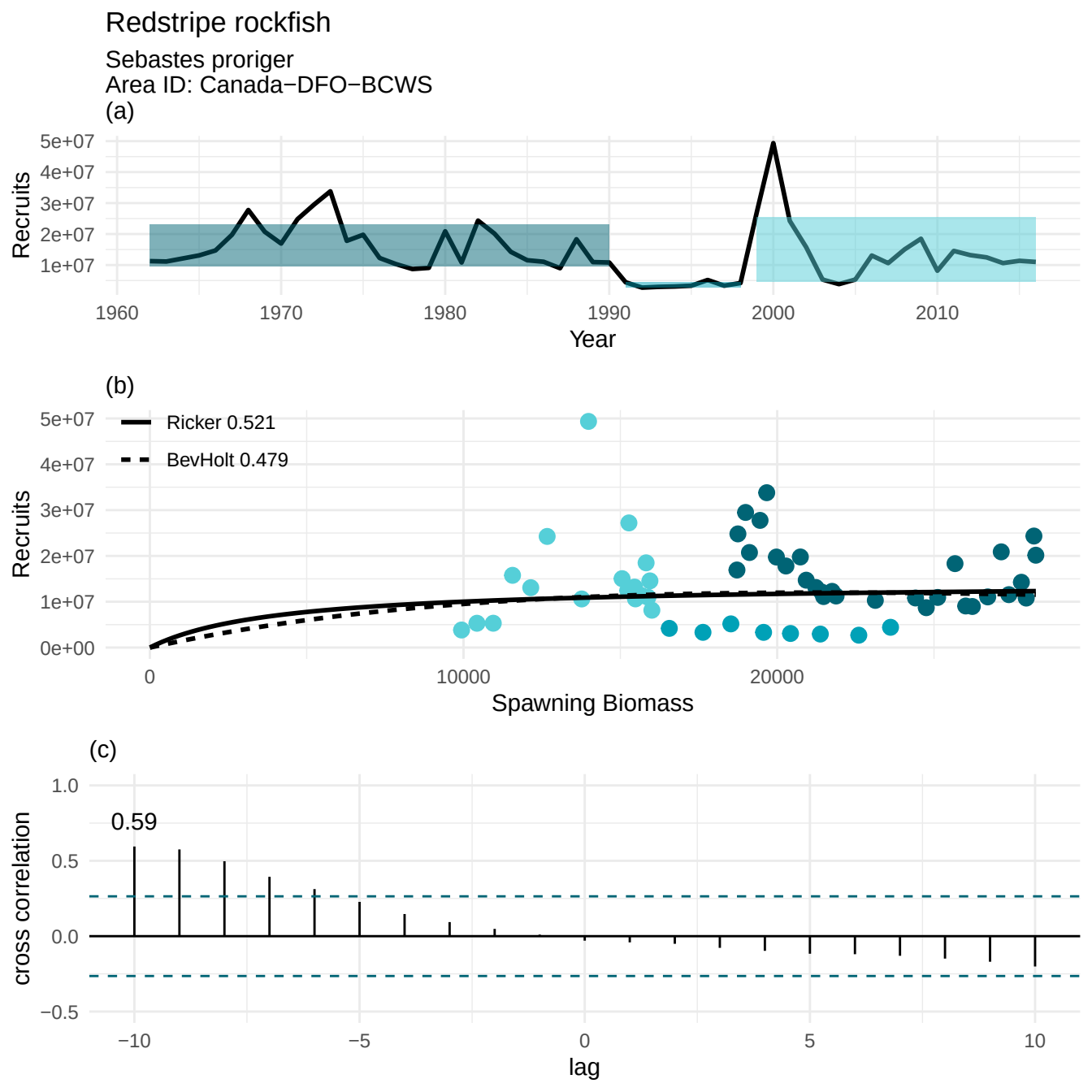

Rock sole
Lepidopsetta bilineata
Area ID: Canada−DFO−5AB
(a)
Recruits
6e+06
4e+06
2e+06
1960
1980
2000
Year
(b)
Ricker 0.000196
BevHolt 1
Recruits
6e+06
4e+06
2e+06
0e+00
0
2000
4000
6000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.48
0.33
−10
−5
0
5
10
lag

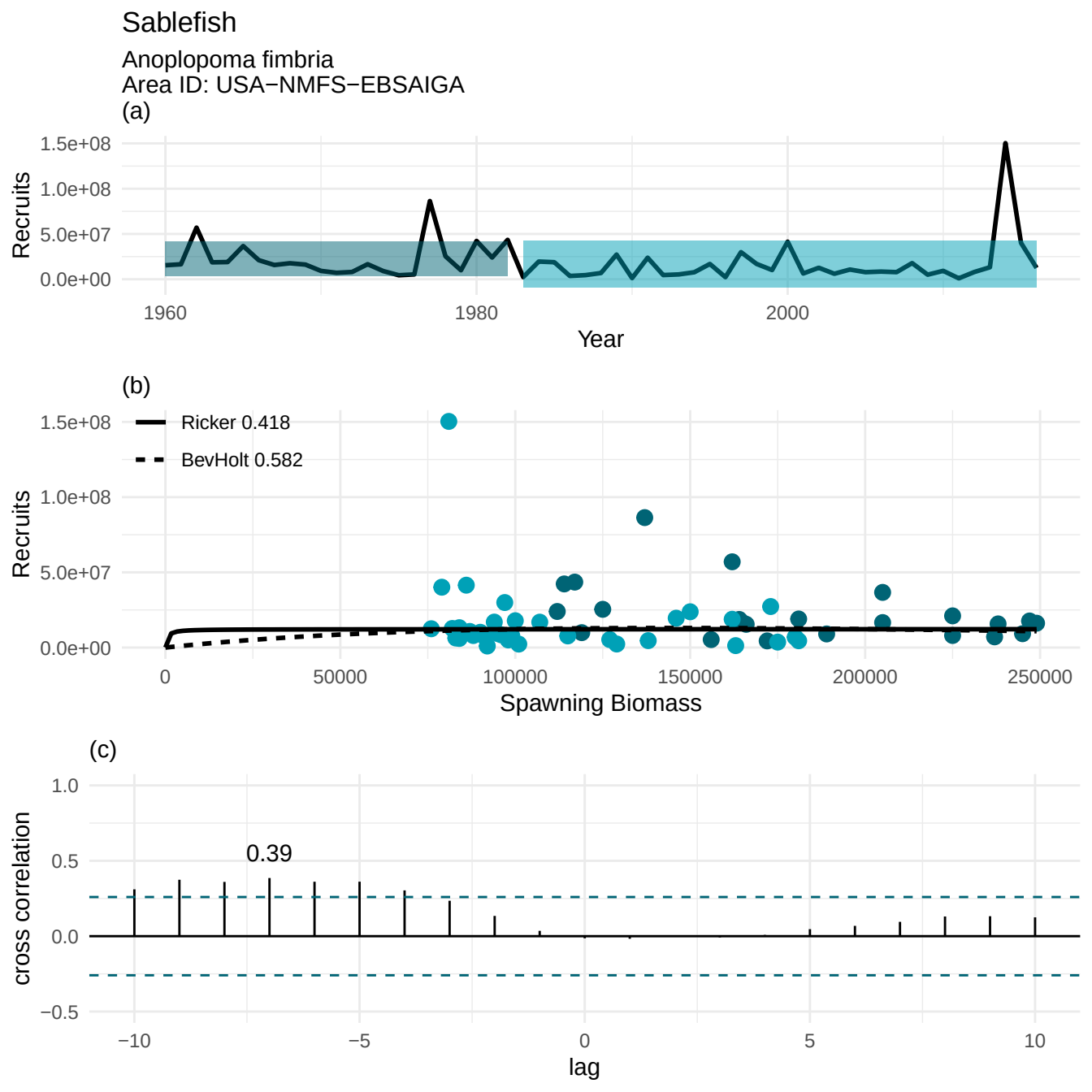

Rock sole
Lepidopsetta bilineata
Area ID: USA−NMFS−GA
(a)
Recruits
4e+08
3e+08
2e+08
1e+08
1980
1990
2000
2010
Year
(b)
Ricker 0.984
BevHolt 0.0156
Recruits
4e+08
3e+08
2e+08
1e+08
0e+00
0
30000
60000
90000
12000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.42
−10
−5
0
5
10
lag

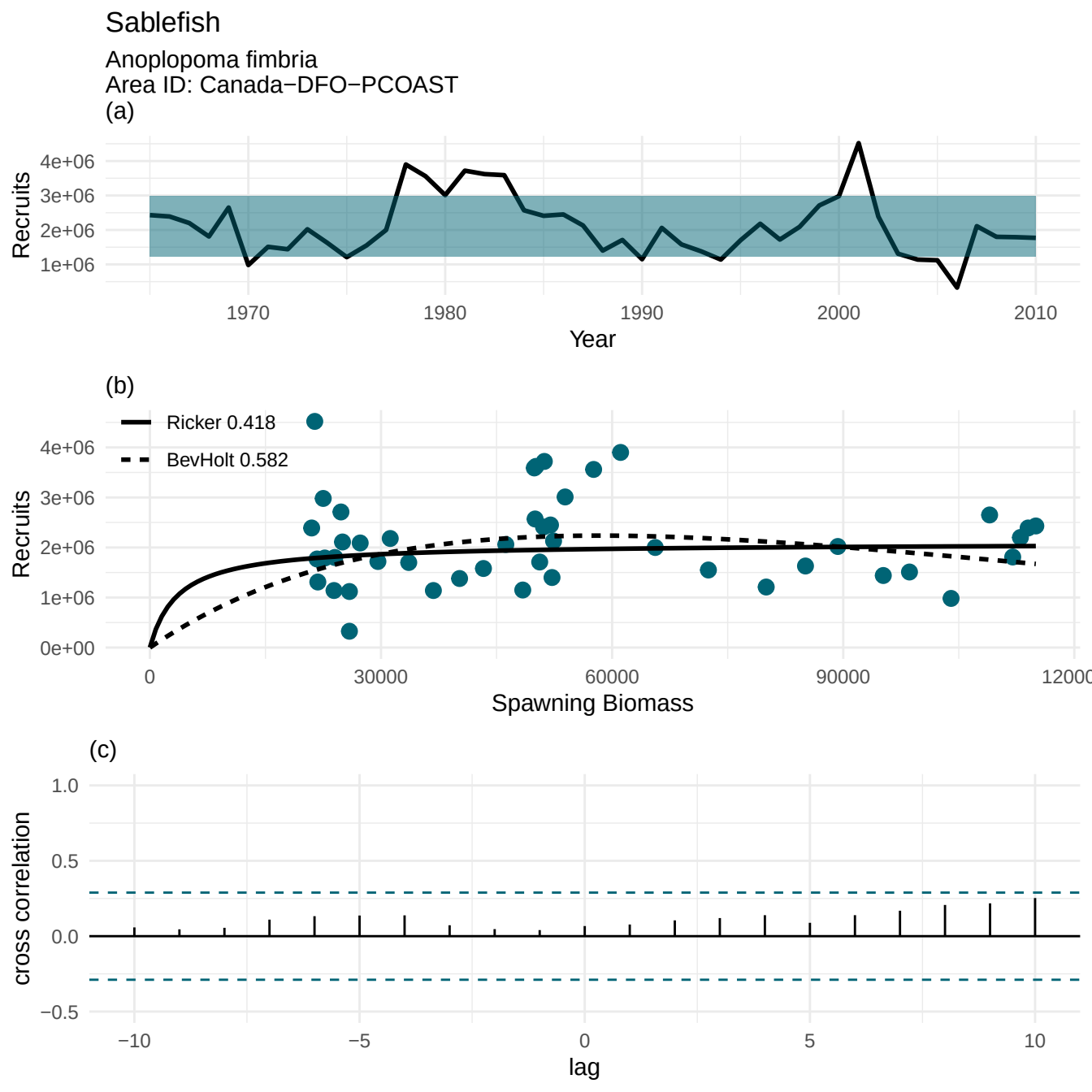

Rock sole
Lepidopsetta bilineata
Area ID: Canada−DFO−HS
(a)
Recruits
35000
30000
25000
20000
15000
10000
1960
1980
2000
Year
(b)
Ricker 0.403
BevHolt 0.597
Recruits
30000
20000
10000
0
0
5000
10000
15000
20000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.57
0.36
−10
−5
0
5
10
lag

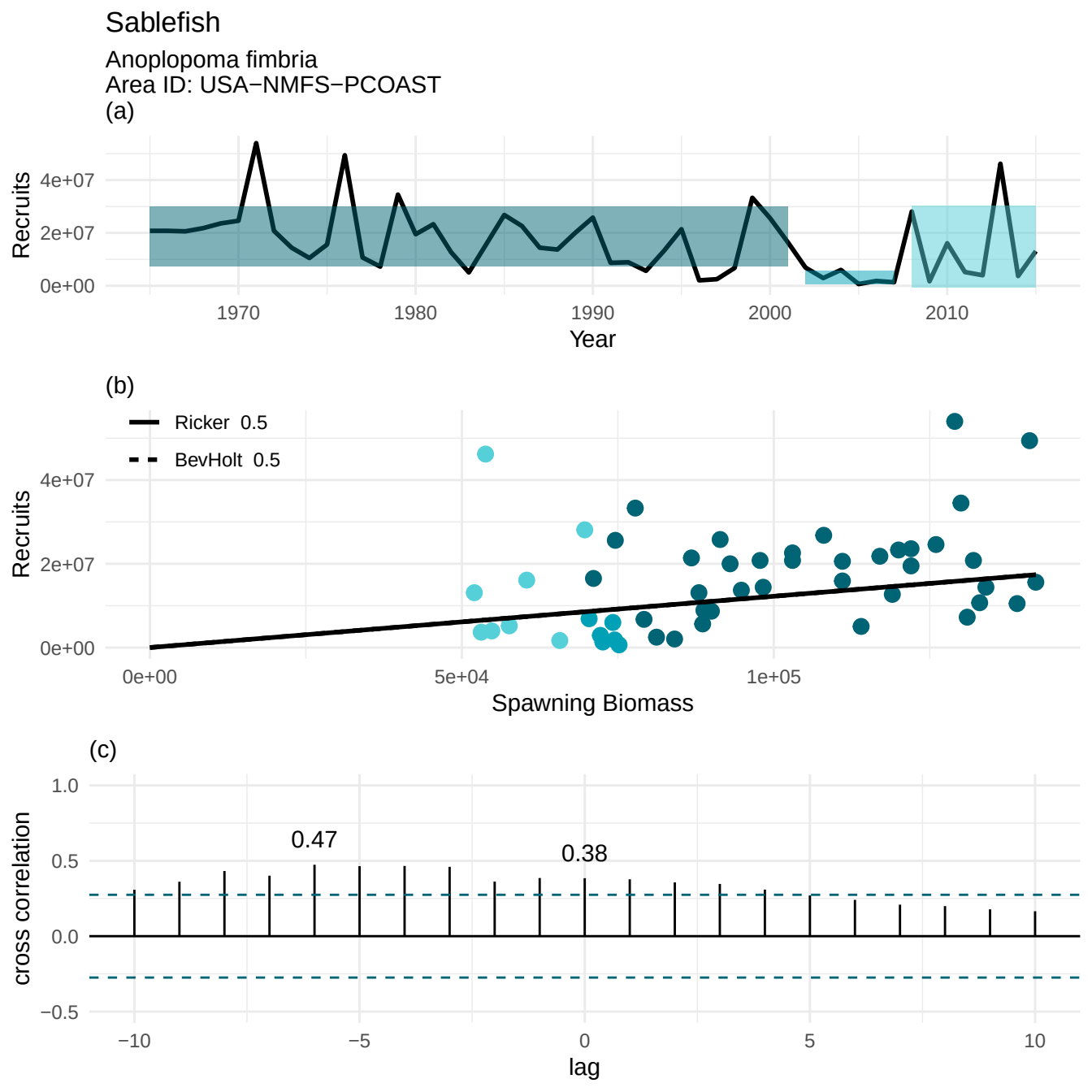

Red squat lobster
Pleuroncodes monodon
Area ID: Chile−SUBPESCA−CH−CS
(a)
Recruits
6e+09
4e+09
2e+09
0e+00
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.0039
BevHolt 0.996
Recruits
6e+09
4e+09
2e+09
0e+00
0
30000
60000
90000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.43
−10
−5
0
5
10
lag

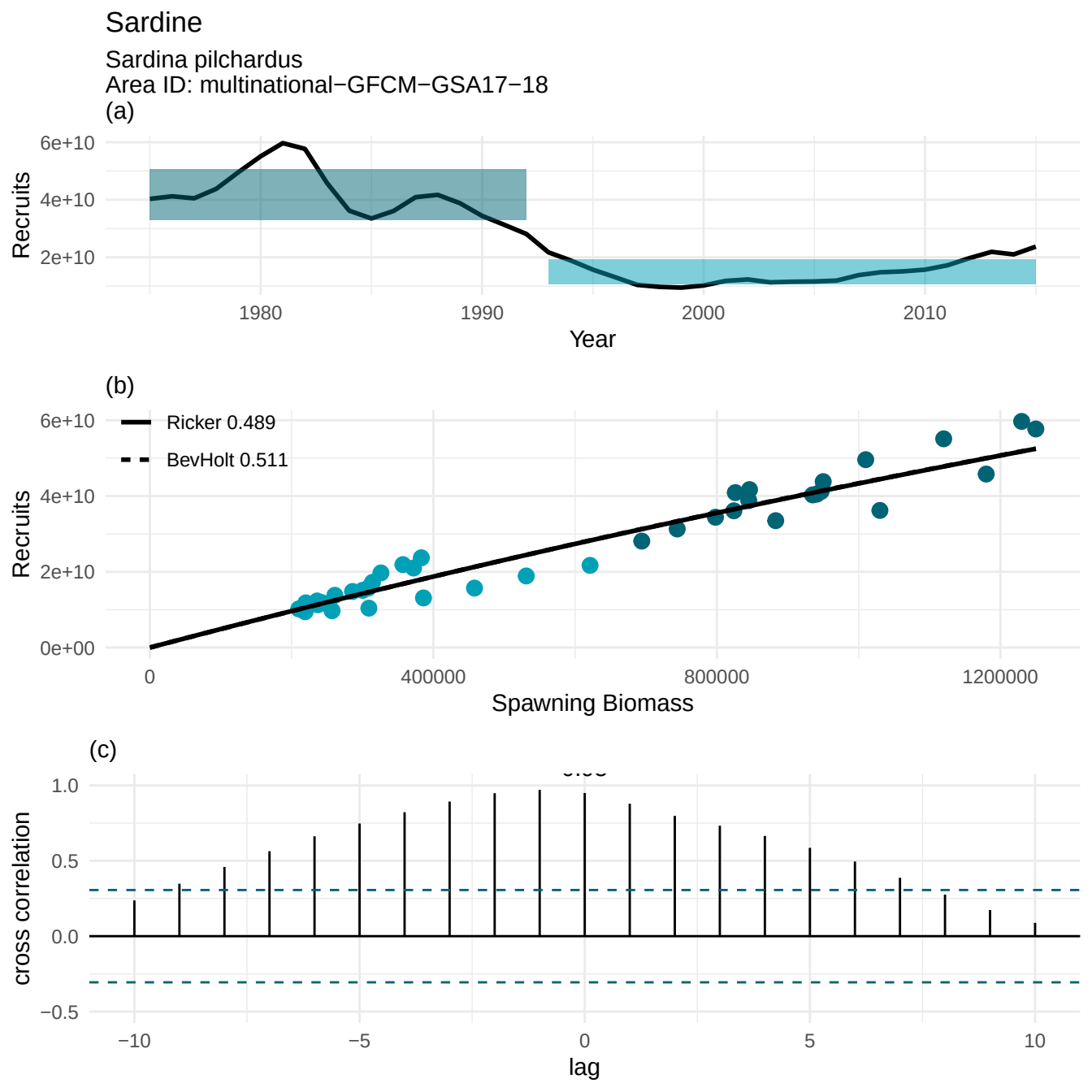

Redstripe rockfish
Sebastes proriger
Area ID: Canada−DFO−BCWN
(a)
Recruits
2e+07
1e+07
0e+00
1980
1985
1990
1995
2000
2005
Year
(b)
Ricker 0.513
BevHolt 0.487
Recruits
2e+07
1e+07
0e+00
0
2000
4000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.39
−10
−5
0
5
10
lag

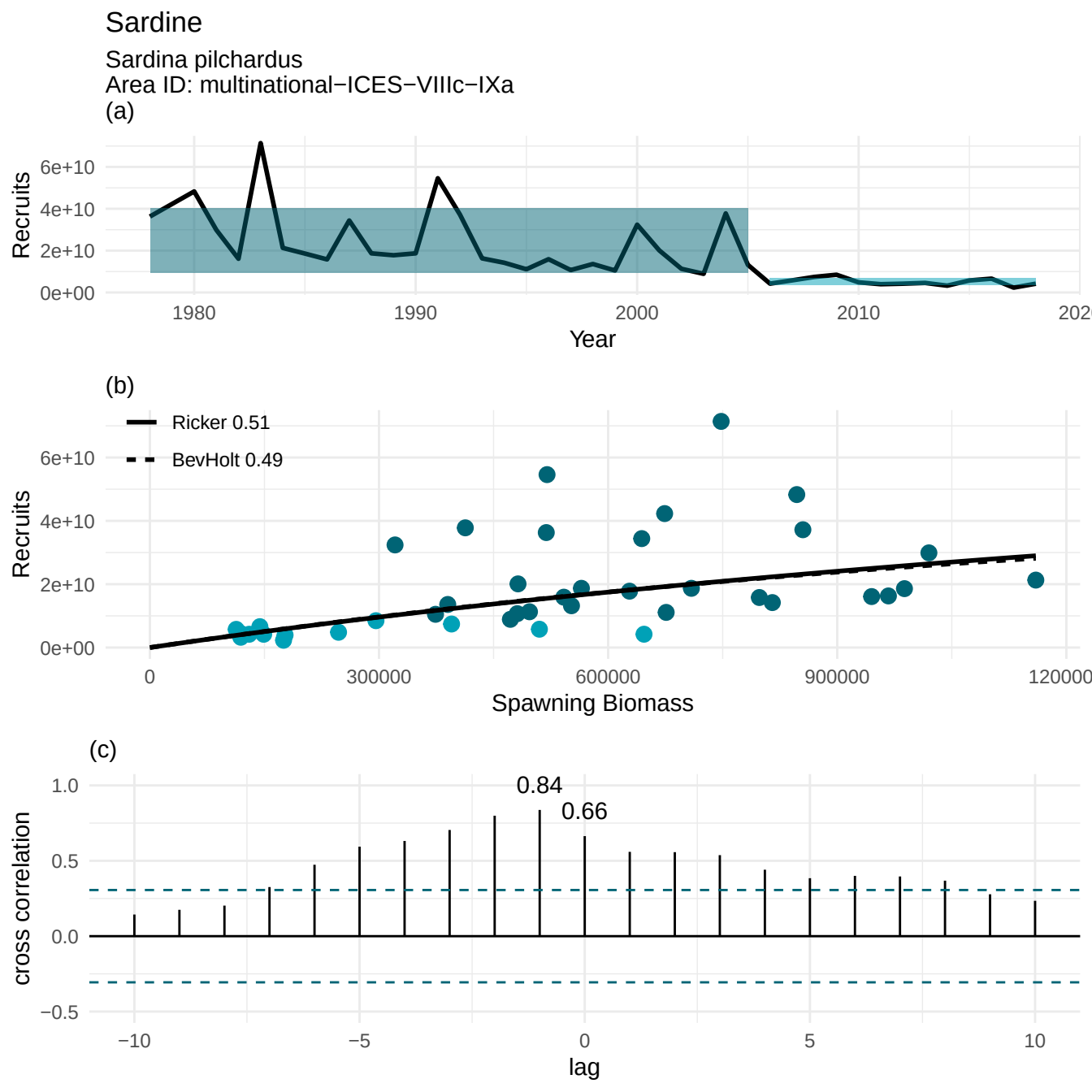

Redstripe rockfish
Sebastes proriger
Area ID: Canada−DFO−BCWS
(a)
Recruits
5e+07
4e+07
3e+07
2e+07
1e+07
1960
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.521
BevHolt 0.479
Recruits
5e+07
4e+07
3e+07
2e+07
1e+07
0e+00
0
10000
20000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.59
−10
−5
0
5
10
lag

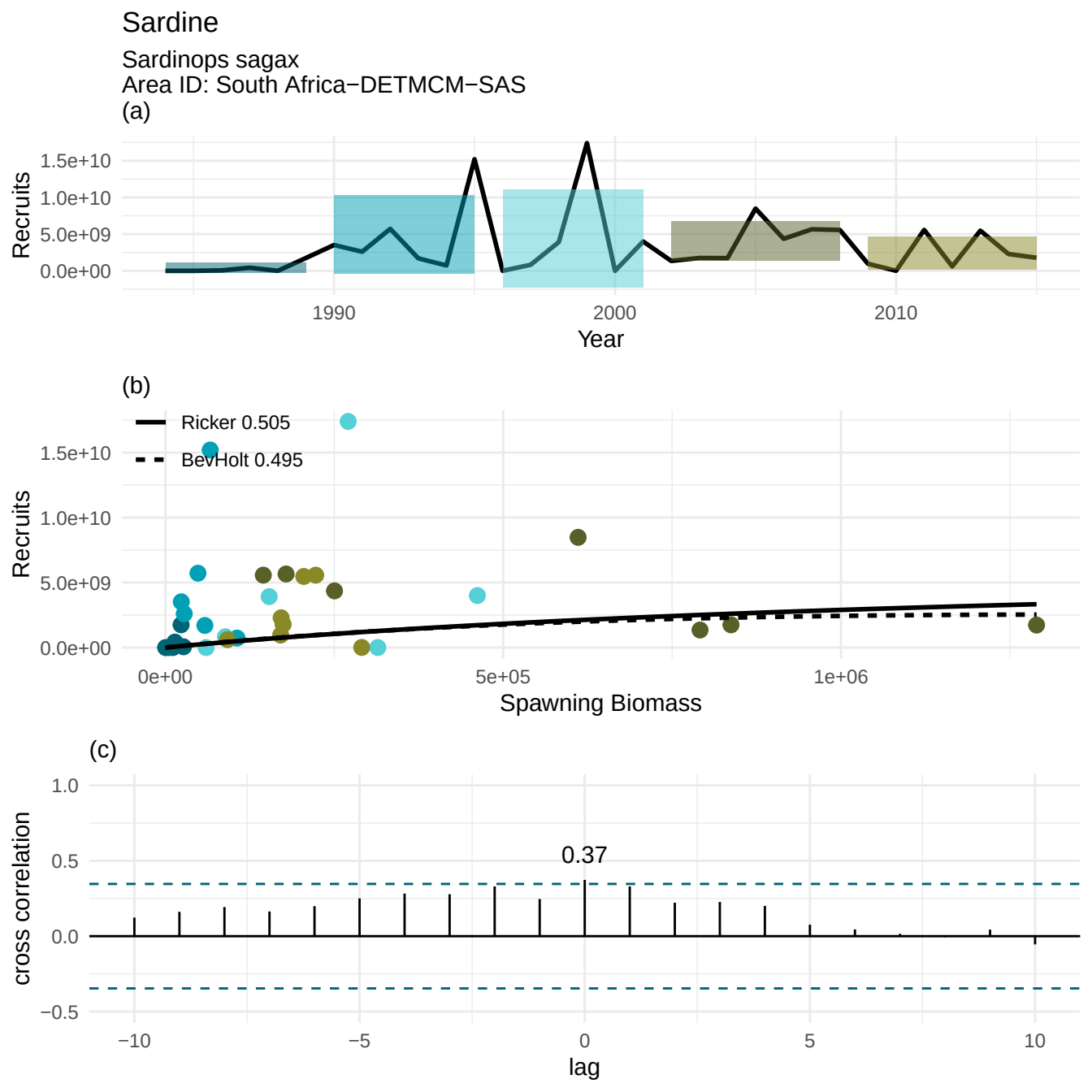

Sablefish
Anoplopoma fimbria
Area ID: USA−NMFS−EBSAIGA
(a)
Recruits
1.5e+08
1.0e+08
5.0e+07
0.0e+00
1960
1980
2000
Year
(b)
Ricker 0.418
BevHolt 0.582
Recruits
1.5e+08
1.0e+08
5.0e+07
0.0e+00
0
50000
100000
150000
200000
250000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.39
−10
−5
0
5
10
lag

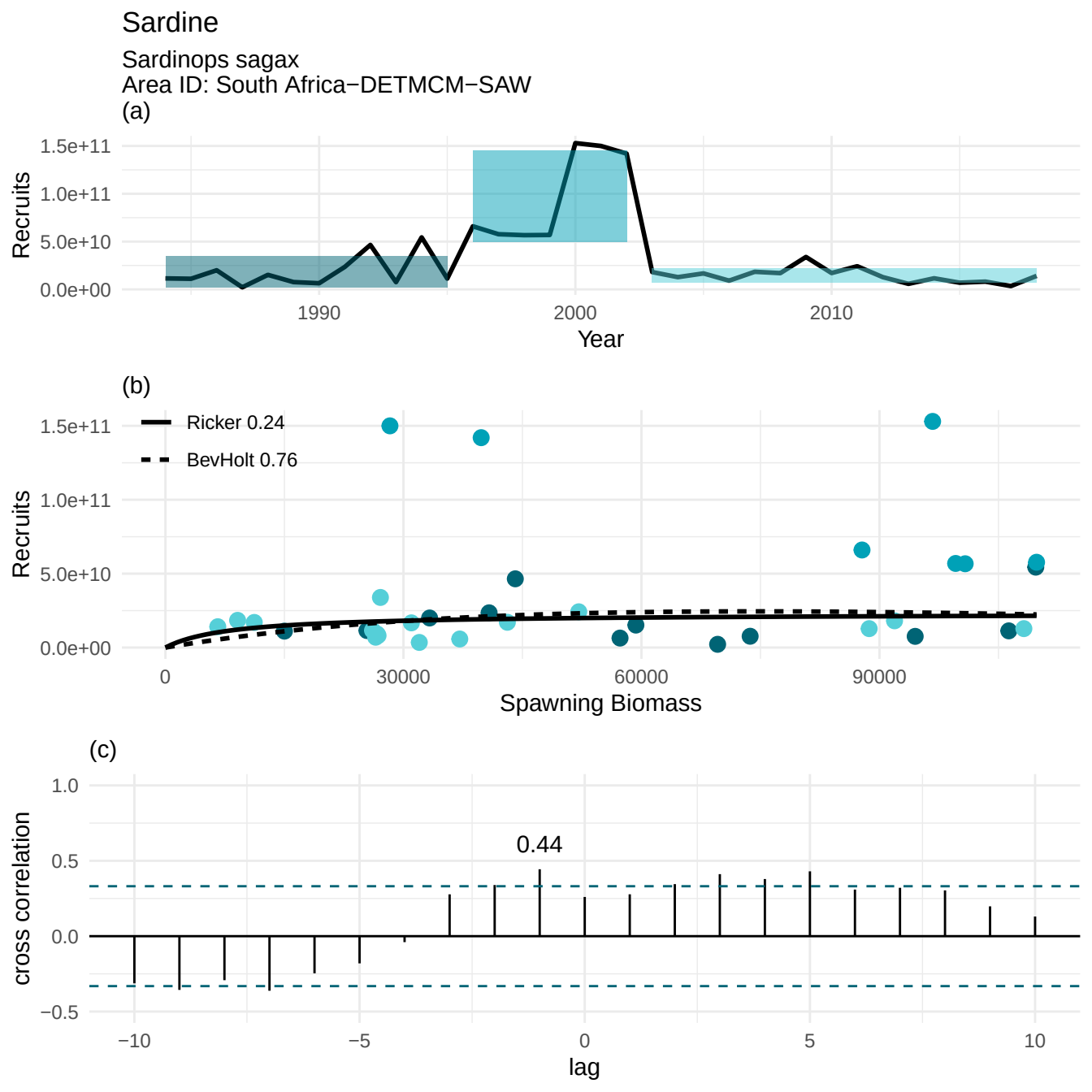

Sablefish
Anoplopoma fimbria
Area ID: Canada−DFO−PCOAST
(a)
Recruits
4e+06
3e+06
2e+06
1e+06
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.418
BevHolt 0.582
Recruits
4e+06
3e+06
2e+06
1e+06
0e+00
0
30000
60000
90000
12000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

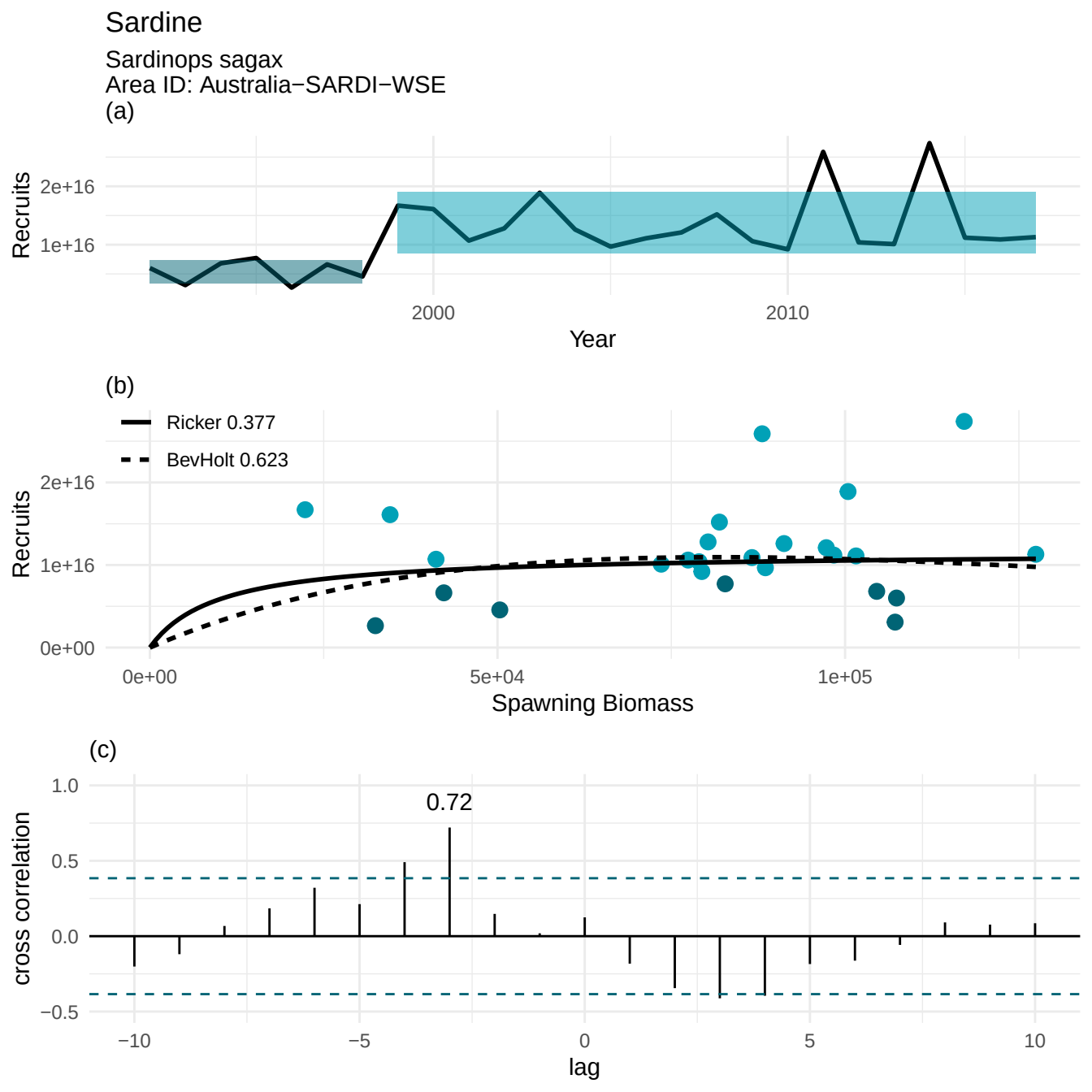

Sablefish
Anoplopoma fimbria
Area ID: USA−NMFS−PCOAST
(a)
Recruits
4e+07
2e+07
0e+00
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
4e+07
2e+07
0e+00
0e+00
5e+04
1e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.47
0.38
−10
−5
0
5
10
lag

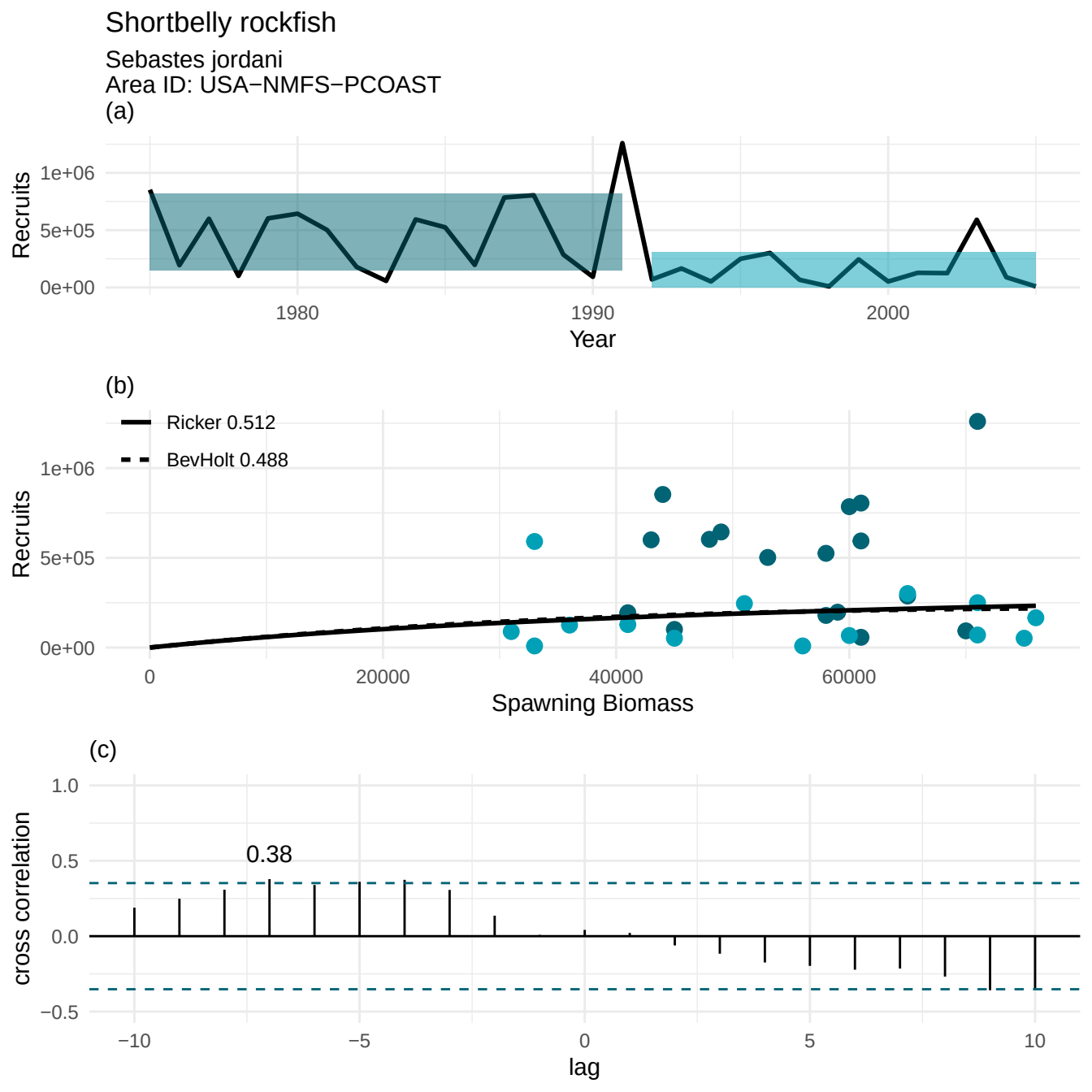

Sardine
Sardina pilchardus
Area ID: multinational−GFCM−GSA17−18
(a)
Recruits
6e+10
4e+10
2e+10
1980
1990
2000
2010
Year
(b)
Ricker 0.489
BevHolt 0.511
Recruits
6e+10
4e+10
2e+10
0e+00
0
400000
800000
1200000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

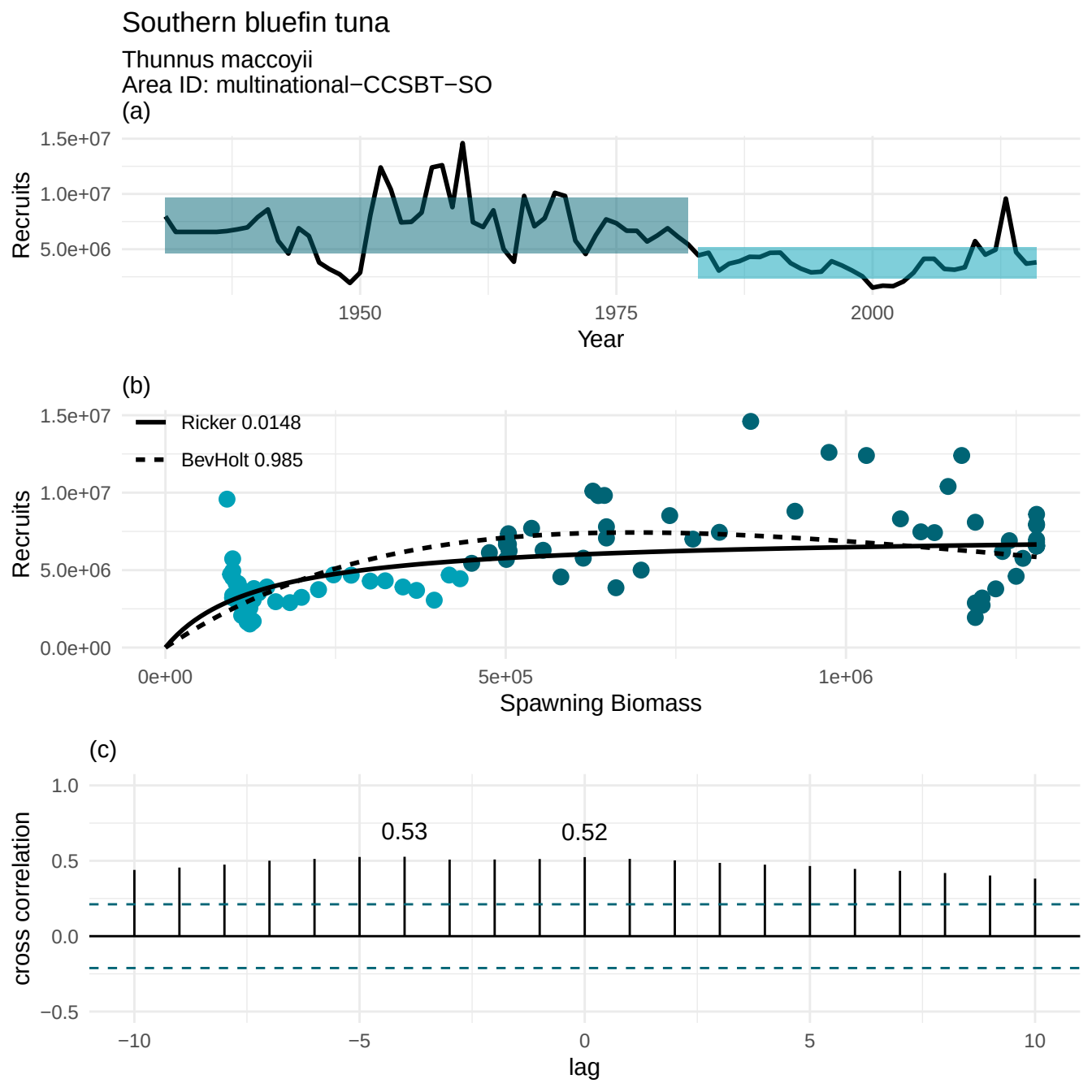

Sardine
Sardina pilchardus
Area ID: multinational−ICES−VIIIc−IXa
(a)
Recruits
6e+10
4e+10
2e+10
0e+00
1980
1990
2000
2010
202
Year
(b)
Ricker 0.51
BevHolt 0.49
Recruits
6e+10
4e+10
2e+10
0e+00
0
300000
600000
900000
120000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.84
0.66
−10
−5
0
5
10
lag

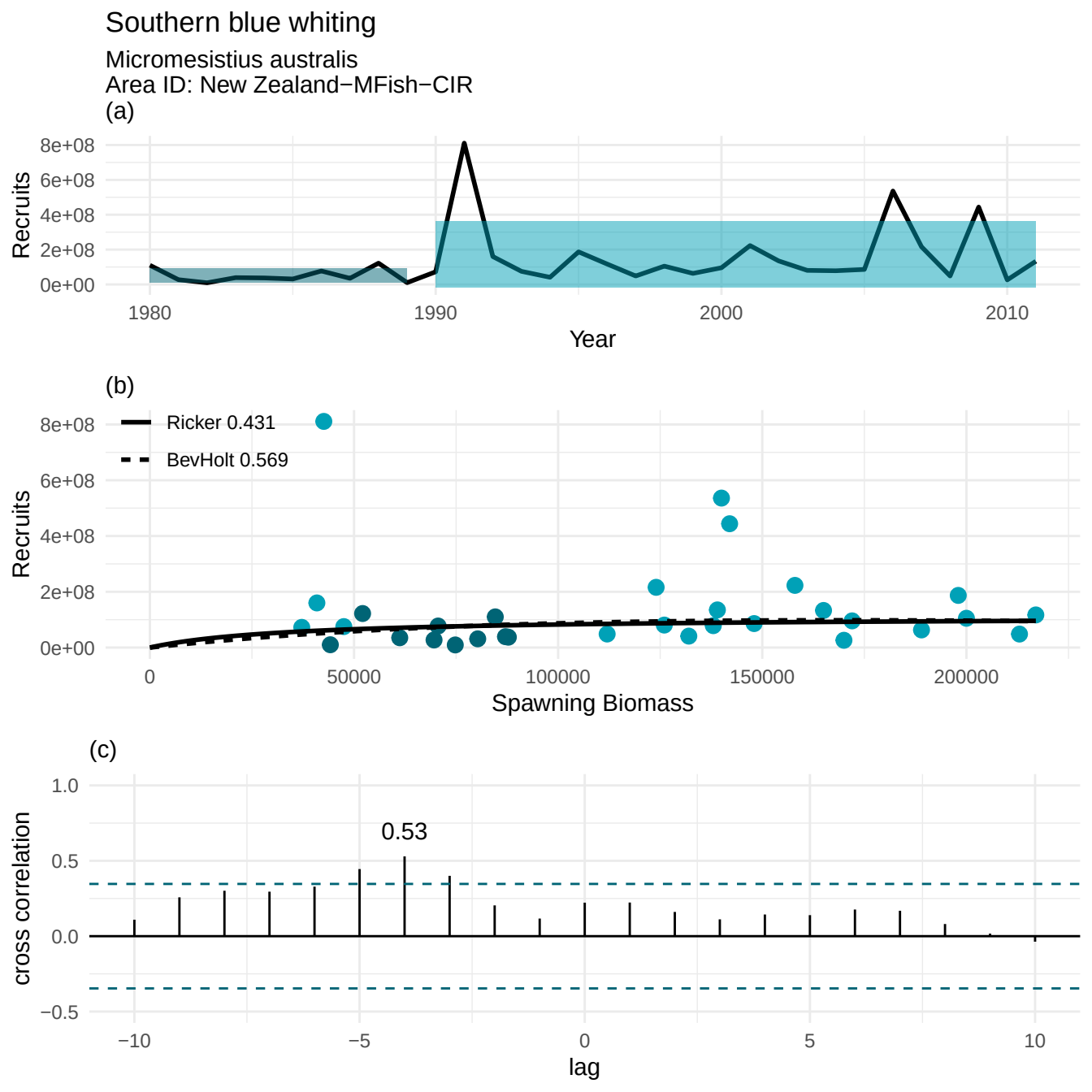

Sardine
Sardinops sagax
Area ID: South Africa−DETMCM−SAS
(a)
Recruits
1.5e+10
1.0e+10
5.0e+09
0.0e+00
1990
2000
2010
Year
(b)
Ricker 0.505
BevHolt 0.495
Recruits
1.5e+10
1.0e+10
5.0e+09
0.0e+00
0e+00
5e+05
1e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.37
−10
−5
0
5
10
lag

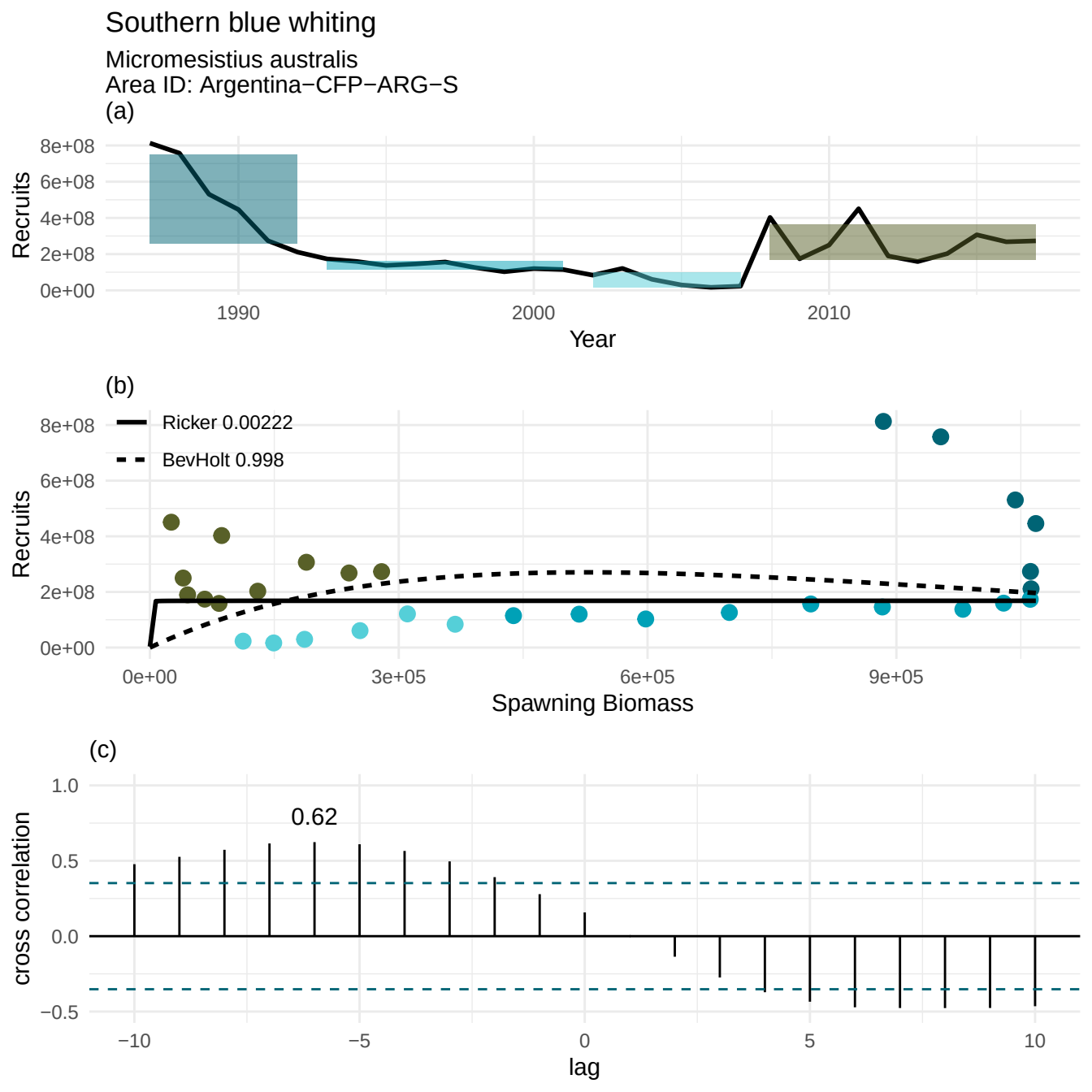

Sardine
Sardinops sagax
Area ID: South Africa−DETMCM−SAW
(a)
Recruits
1.5e+11
1.0e+11
5.0e+10
0.0e+00
1990
2000
2010
Year
(b)
Ricker 0.24
BevHolt 0.76
Recruits
1.5e+11
1.0e+11
5.0e+10
0.0e+00
0
30000
60000
90000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.44
−10
−5
0
5
10
lag

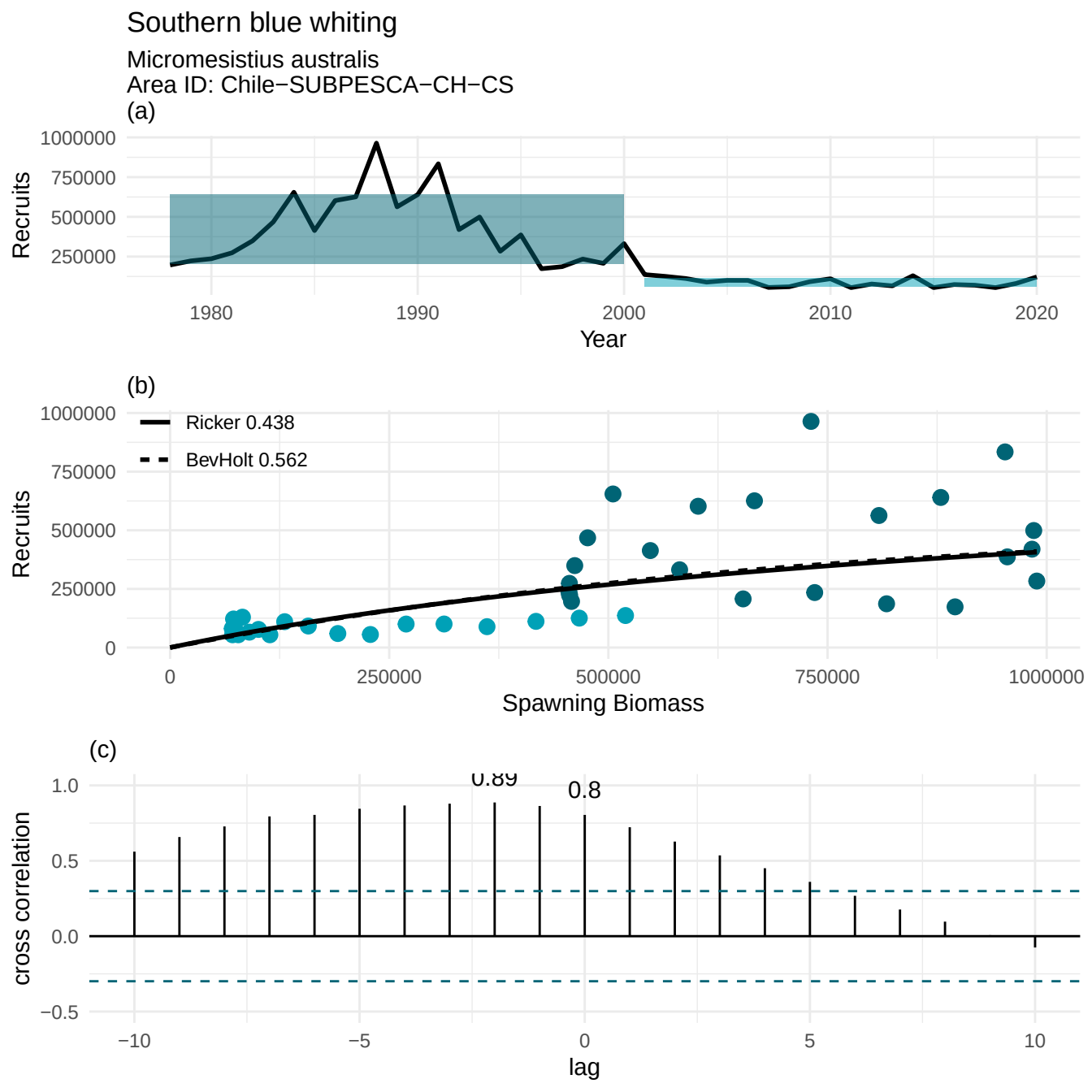

Sardine
Sardinops sagax
Area ID: Australia−SARDI−WSE
(a)
Recruits
2e+16
1e+16
2000
2010
Year
(b)
Ricker 0.377
BevHolt 0.623
Recruits
2e+16
1e+16
0e+00
0e+00
5e+04
1e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.72
−10
−5
0
5
10
lag

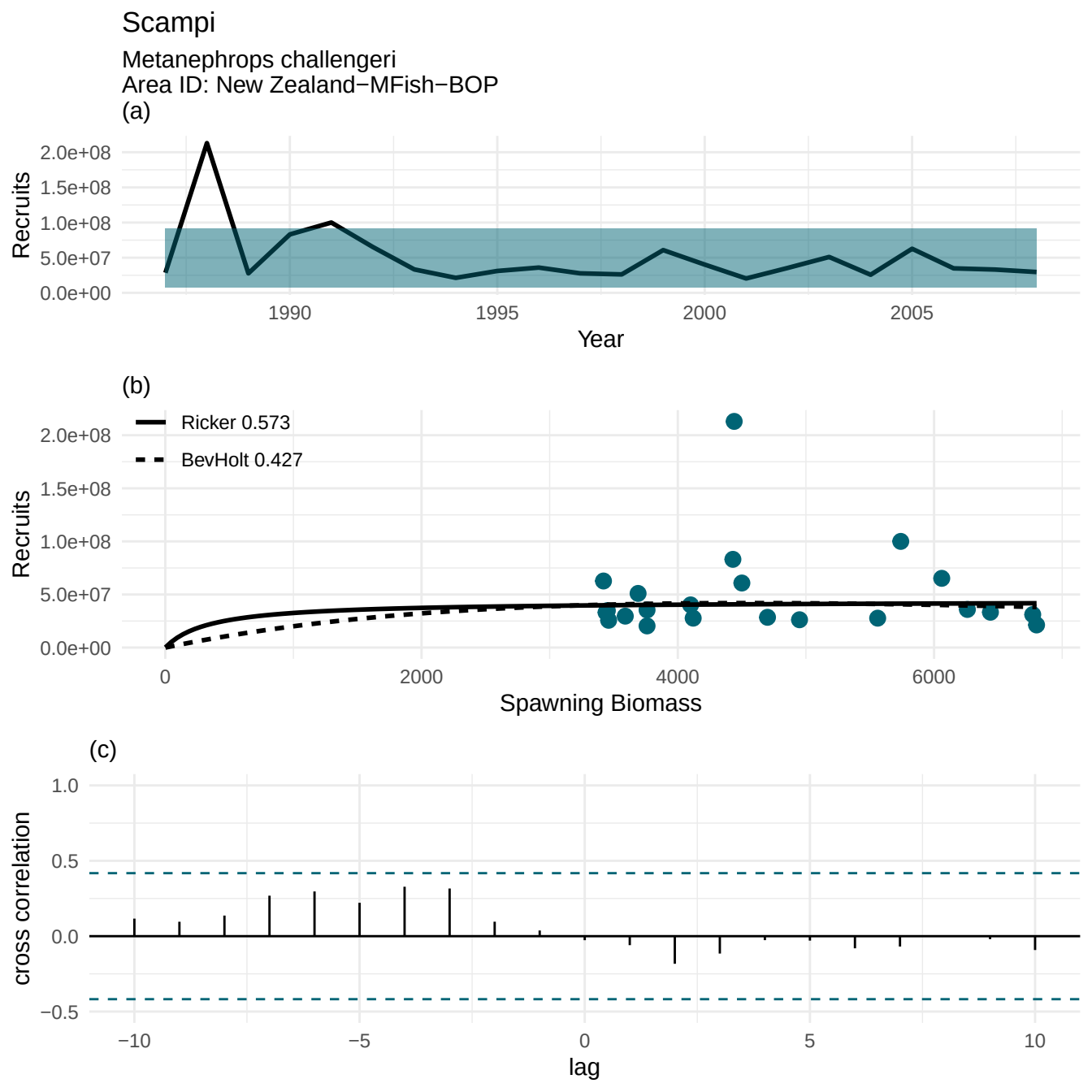

Shortbelly rockfish
Sebastes jordani
Area ID: USA−NMFS−PCOAST
(a)
Recruits
1e+06
5e+05
0e+00
1980
1990
2000
Year
(b)
Ricker 0.512
BevHolt 0.488
Recruits
1e+06
5e+05
0e+00
0
20000
40000
60000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.38
−10
−5
0
5
10
lag

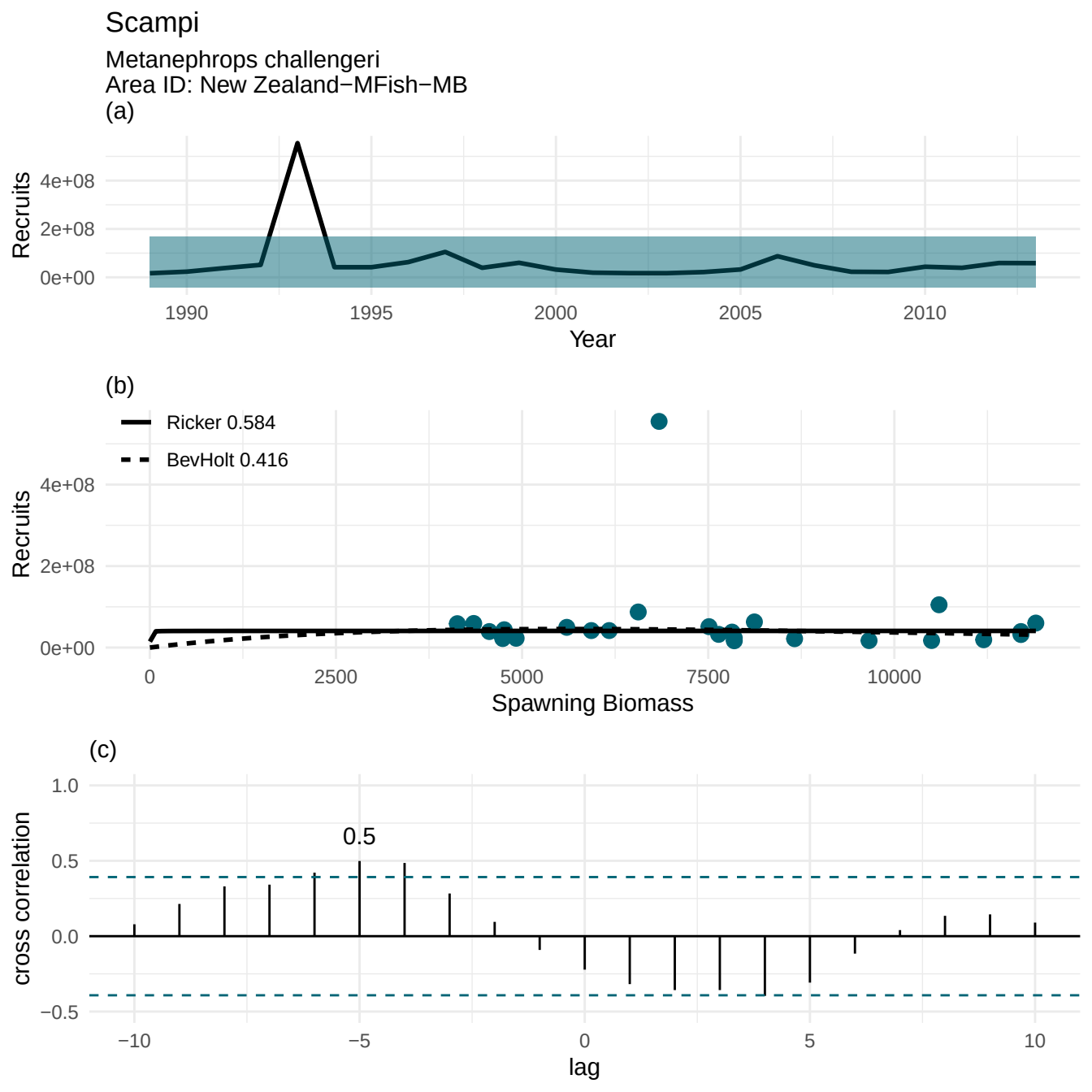

Southern bluefin tuna
Thunnus maccoyii
Area ID: multinational−CCSBT−SO
(a)
Recruits
1.5e+07
1.0e+07
5.0e+06
1950
1975
2000
Year
(b)
Ricker 0.0148
BevHolt 0.985
Recruits
1.5e+07
1.0e+07
5.0e+06
0.0e+00
0e+00
5e+05
1e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.53
0.52
−10
−5
0
5
10
lag

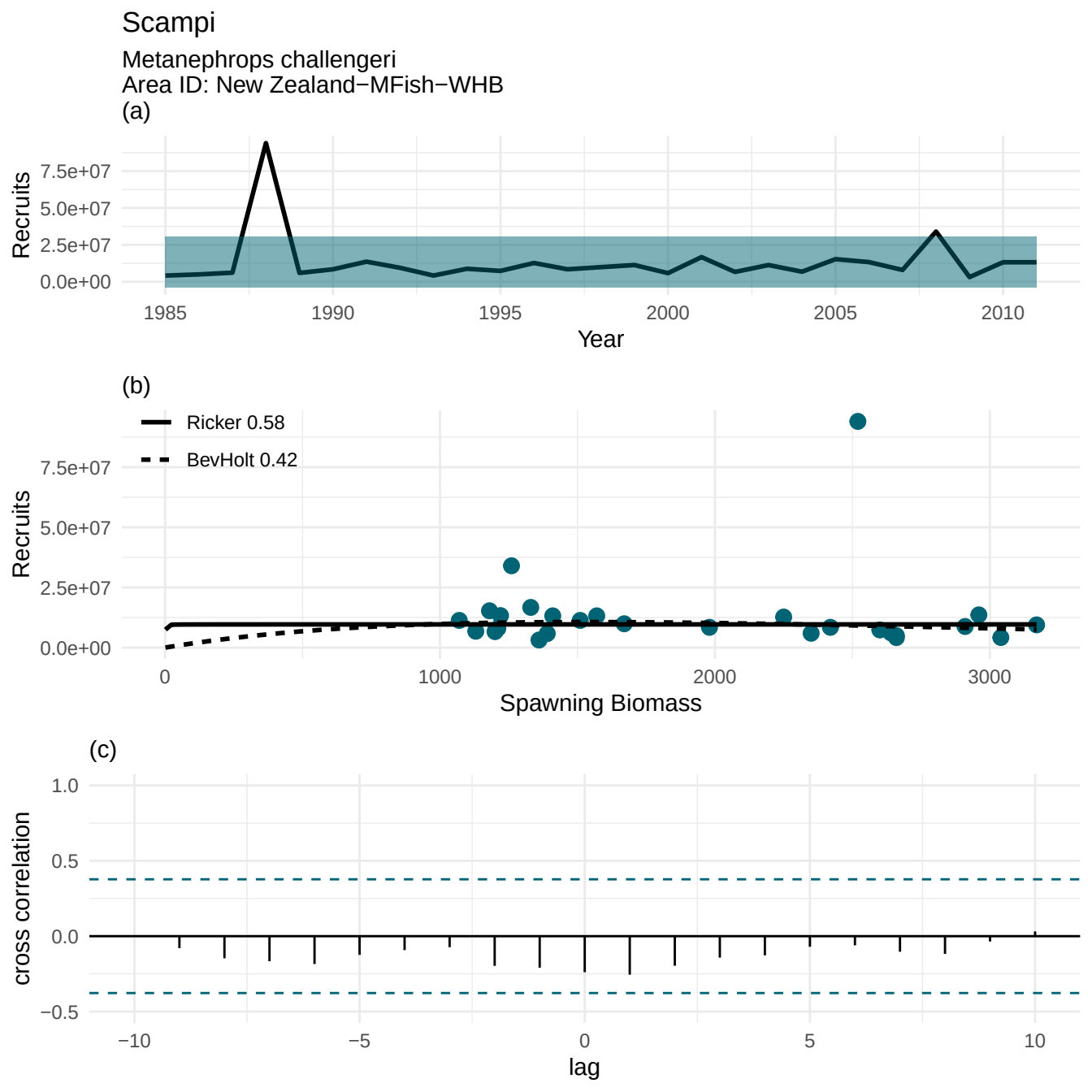

Southern blue whiting
Micromesistius australis
Area ID: New Zealand−MFish−CIR
(a)
Recruits
8e+08
6e+08
4e+08
2e+08
0e+00
1980
1990
2000
2010
Year
(b)
Ricker 0.431
BevHolt 0.569
Recruits
8e+08
6e+08
4e+08
2e+08
0e+00
0
50000
100000
150000
200000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.53
−10
−5
0
5
10
lag

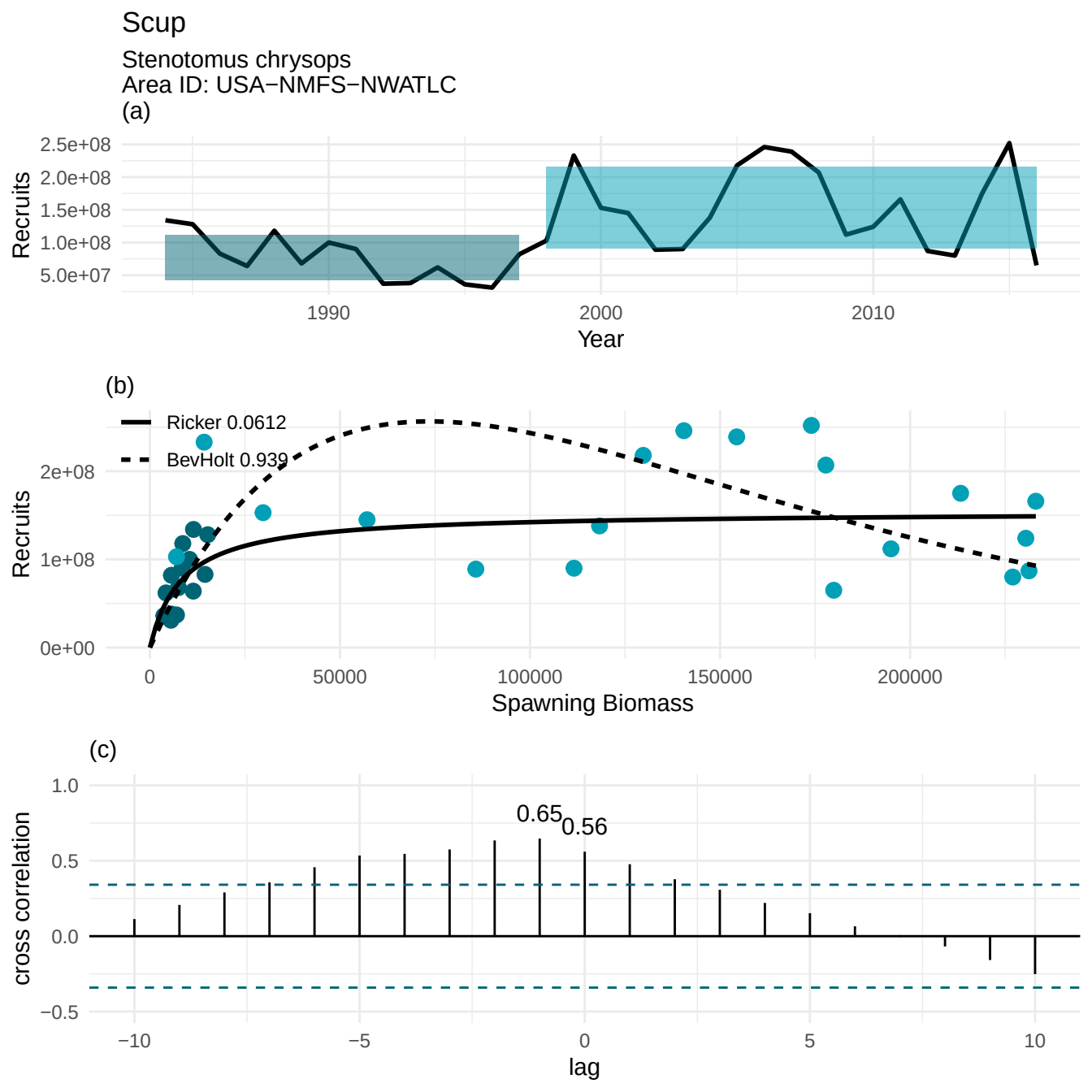

Southern blue whiting
Micromesistius australis
Area ID: Argentina−CFP−ARG−S
(a)
Recruits
8e+08
6e+08
4e+08
2e+08
0e+00
1990
2000
2010
Year
(b)
Ricker 0.00222
BevHolt 0.998
Recruits
0e+00
3e+05
6e+05
9e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.62
−10
−5
0
5
10
lag

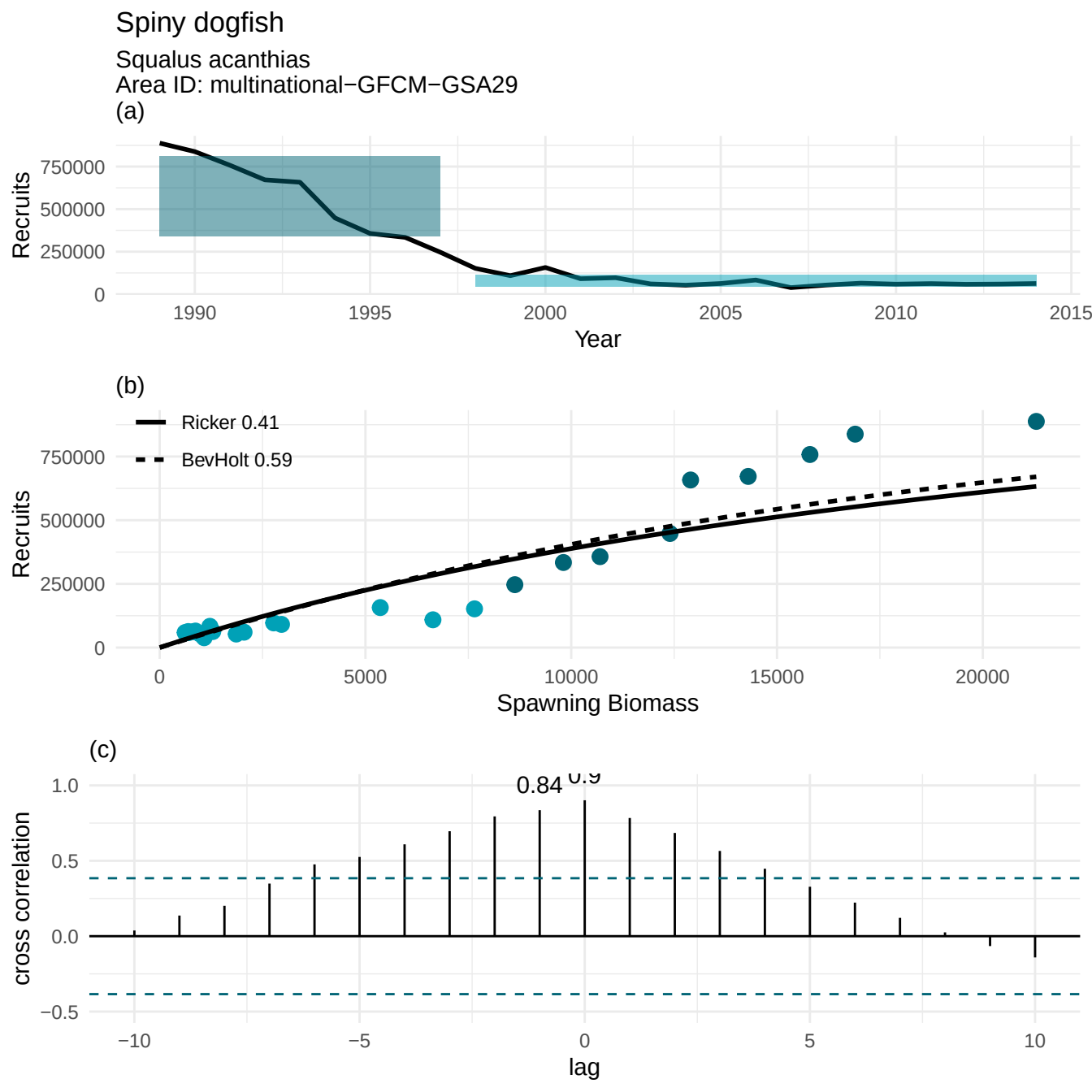

Southern blue whiting
Micromesistius australis
Area ID: Chile−SUBPESCA−CH−CS
(a)
Recruits
1000000
750000
500000
250000
1980
1990
2000
2010
2020
Year
(b)
Ricker 0.438
BevHolt 0.562
Recruits
1000000
750000
500000
250000
0
0
250000
500000
750000
1000000
Spawning Biomass
(c)
0.89
0.8
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

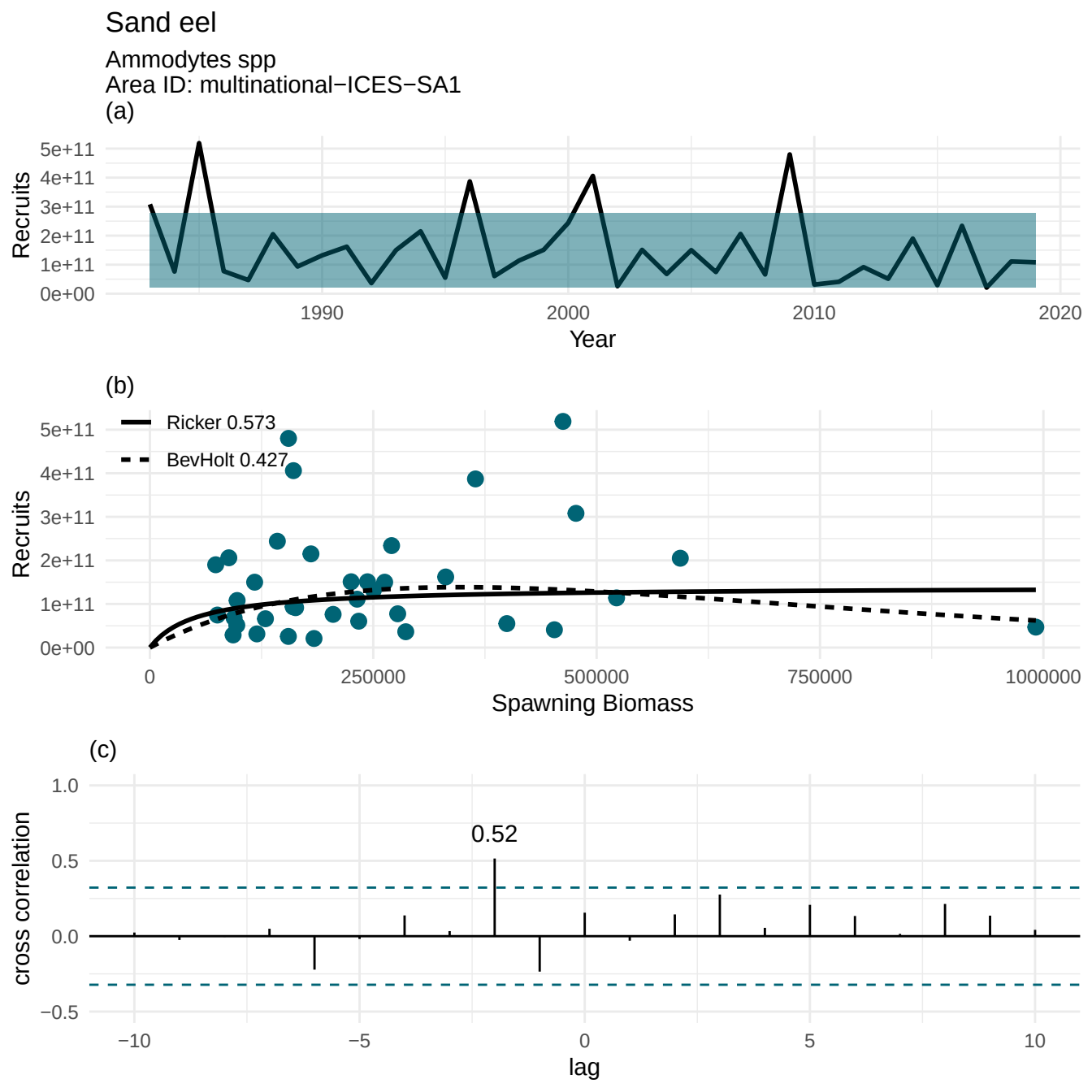

Scampi
Metanephrops challengeri
Area ID: New Zealand−MFish−BOP
(a)
Recruits
2.0e+08
1.5e+08
1.0e+08
5.0e+07
0.0e+00
1990
1995
2000
2005
Year
(b)
Ricker 0.573
BevHolt 0.427
Recruits
2.0e+08
1.5e+08
1.0e+08
5.0e+07
0.0e+00
0
2000
4000
6000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

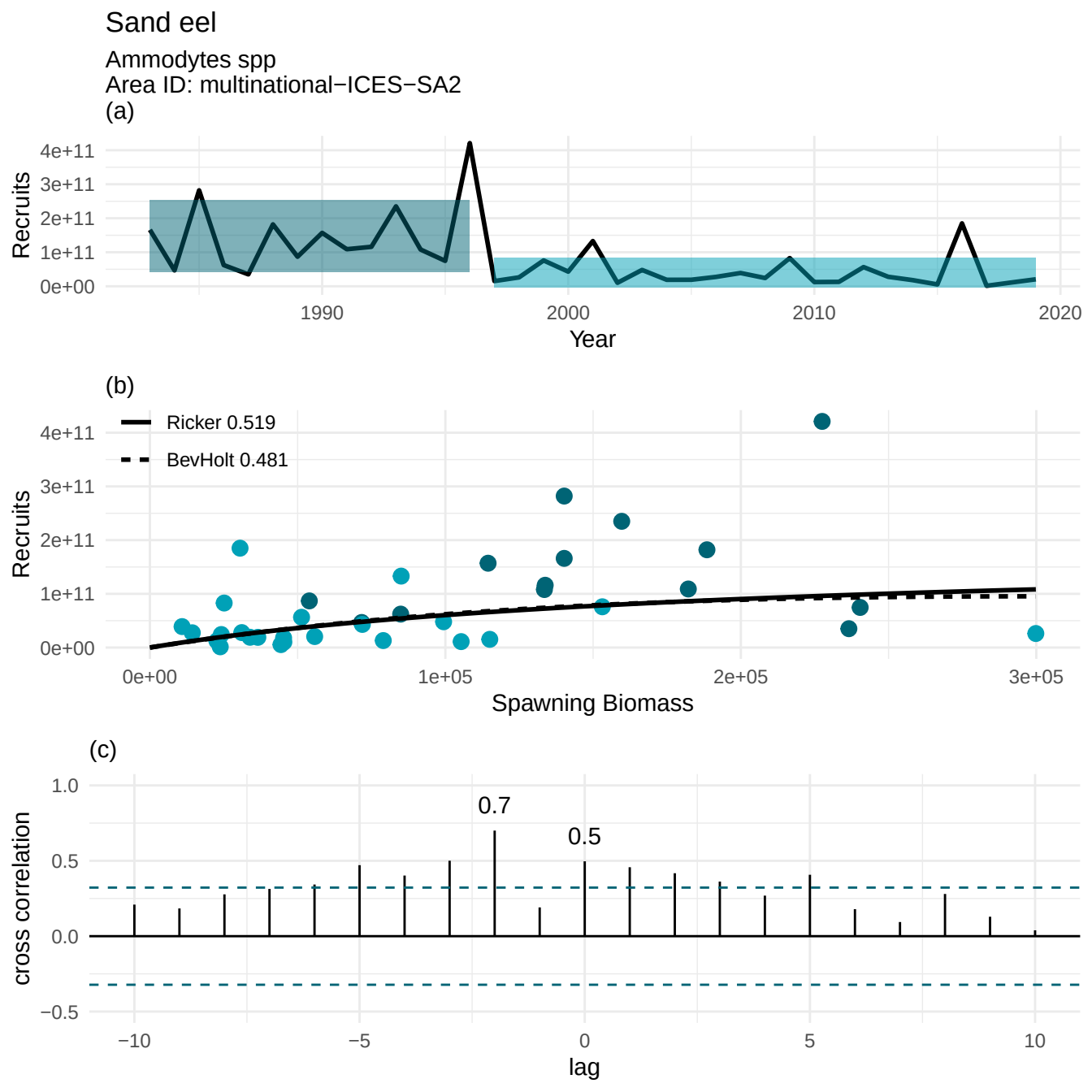

Scampi
Metanephrops challengeri
Area ID: New Zealand−MFish−MB
(a)
Recruits
4e+08
2e+08
0e+00
1990
1995
2000
2005
2010
Year
(b)
Ricker 0.584
BevHolt 0.416
Recruits
4e+08
2e+08
0e+00
0
2500
5000
7500
10000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.5
−10
−5
0
5
10
lag

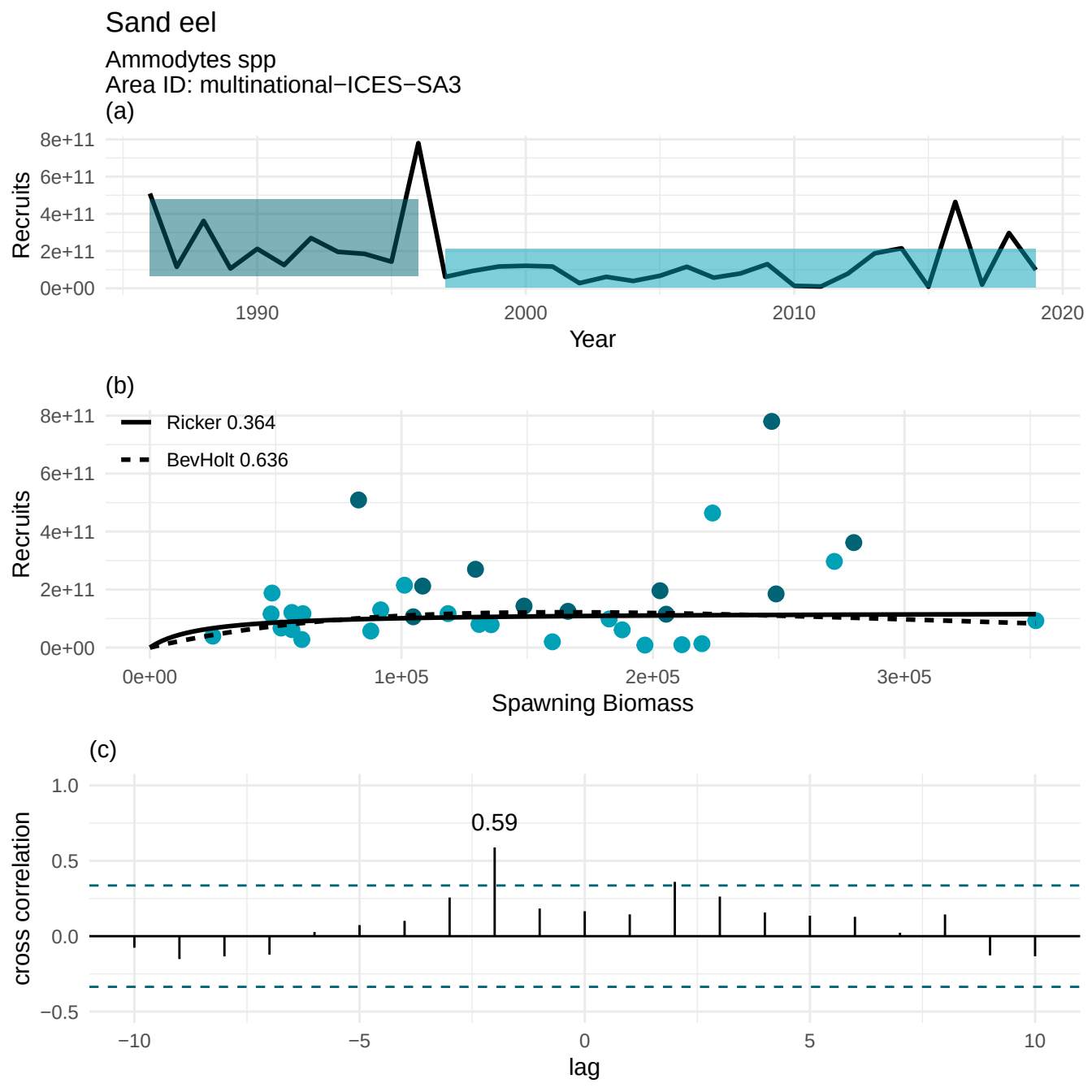

Scampi
Metanephrops challengeri
Area ID: New Zealand−MFish−WHB
(a)
Recruits
7.5e+07
5.0e+07
2.5e+07
0.0e+00
1985
1990
1995
2000
2005
2010
Year
(b)
Ricker 0.58
BevHolt 0.42
Recruits
7.5e+07
5.0e+07
2.5e+07
0.0e+00
0
1000
2000
3000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

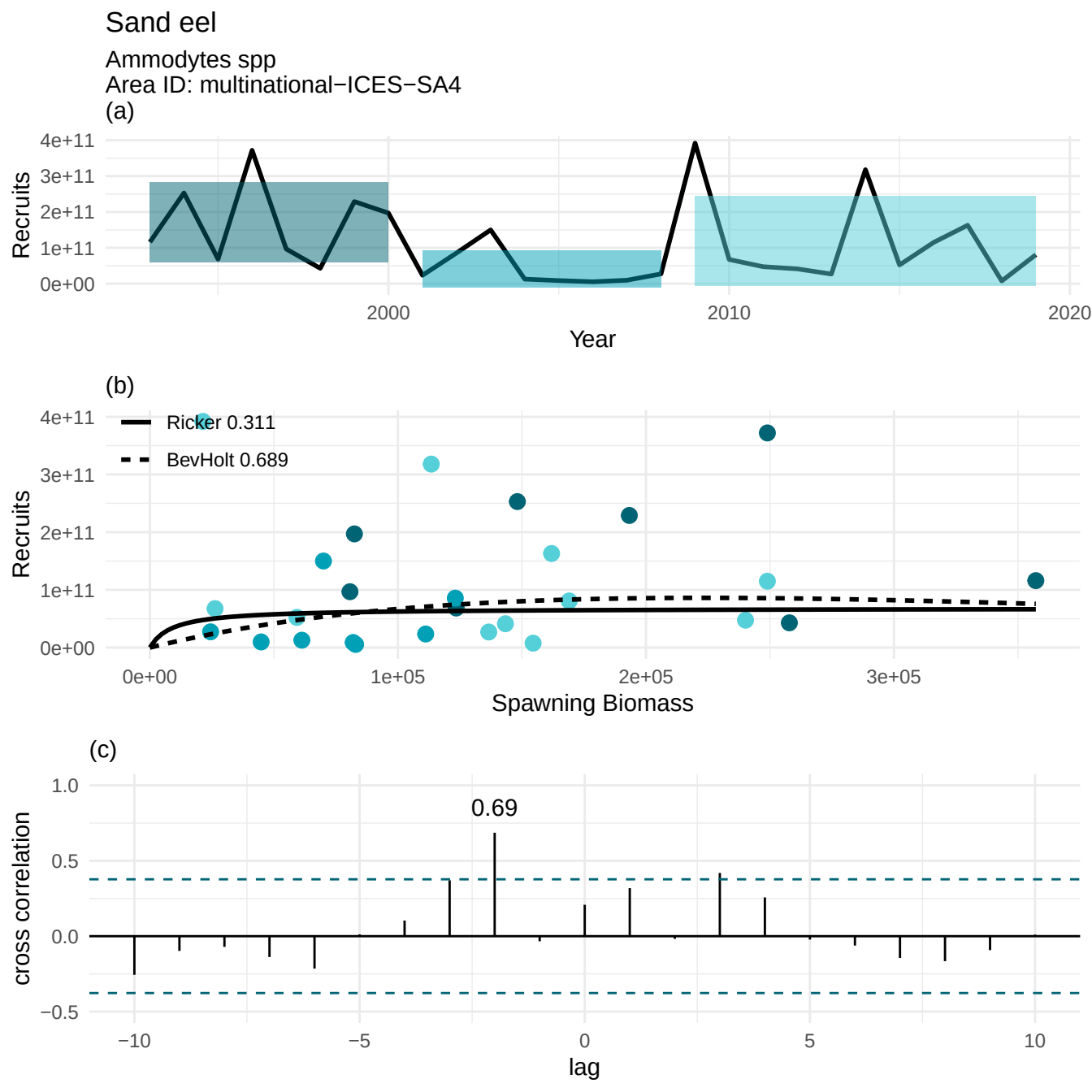

Scup
Stenotomus chrysops
Area ID: USA−NMFS−NWATLC
(a)
Recruits
2.5e+08
2.0e+08
1.5e+08
1.0e+08
5.0e+07
1990
2000
2010
Year
(b)
Ricker 0.0612
BevHolt 0.939
Recruits
2e+08
1e+08
0e+00
0
50000
100000
150000
200000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.65
0.56
−10
−5
0
5
10
lag

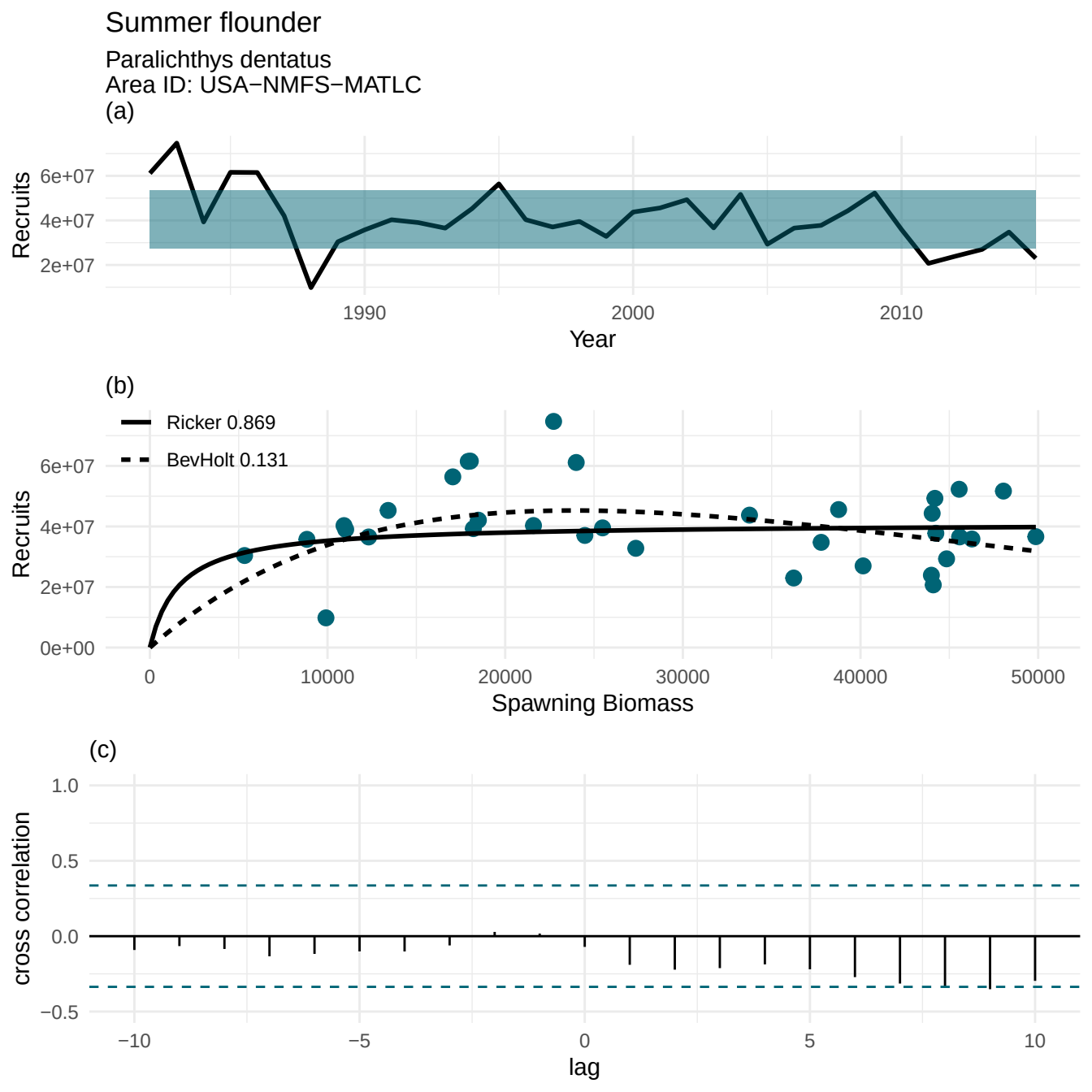

Spiny dogfish
Squalus acanthias
Area ID: multinational−GFCM−GSA29
(a)
Recruits
750000
500000
250000
0
1990
1995
2000
2005
2010
2015
Year
(b)
Ricker 0.41
BevHolt 0.59
Recruits
750000
500000
250000
0
0
5000
10000
15000
20000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.84
0.9
−10
−5
0
5
10
lag

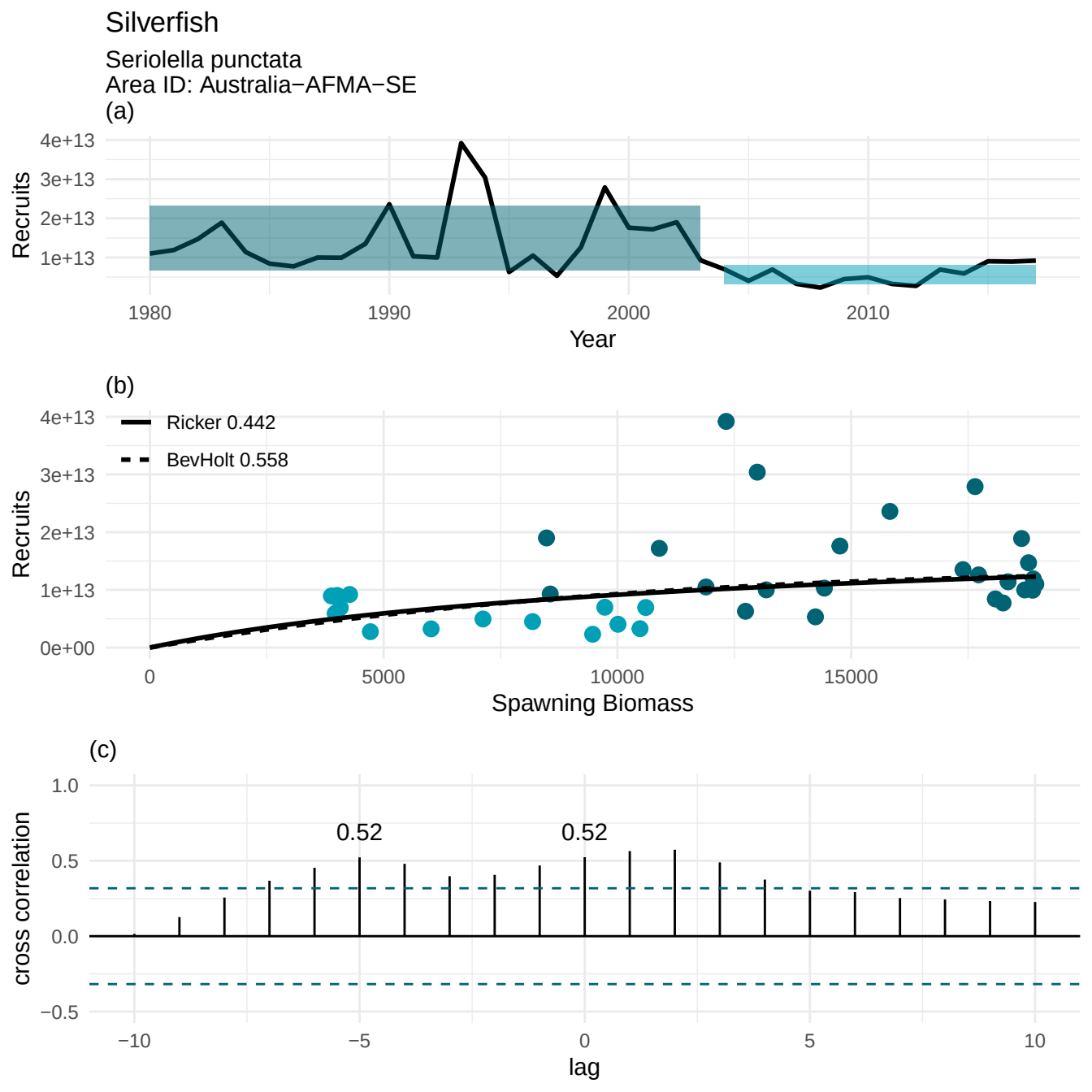

Sand eel
Ammodytes spp
Area ID: multinational−ICES−SA1
(a)
Recruits
5e+11
4e+11
3e+11
2e+11
1e+11
0e+00
1990
2000
2010
2020
Year
(b)
Ricker 0.573
BevHolt 0.427
Recruits
5e+11
4e+11
3e+11
2e+11
1e+11
0e+00
0
250000
500000
750000
1000000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.52
−10
−5
0
5
10
lag

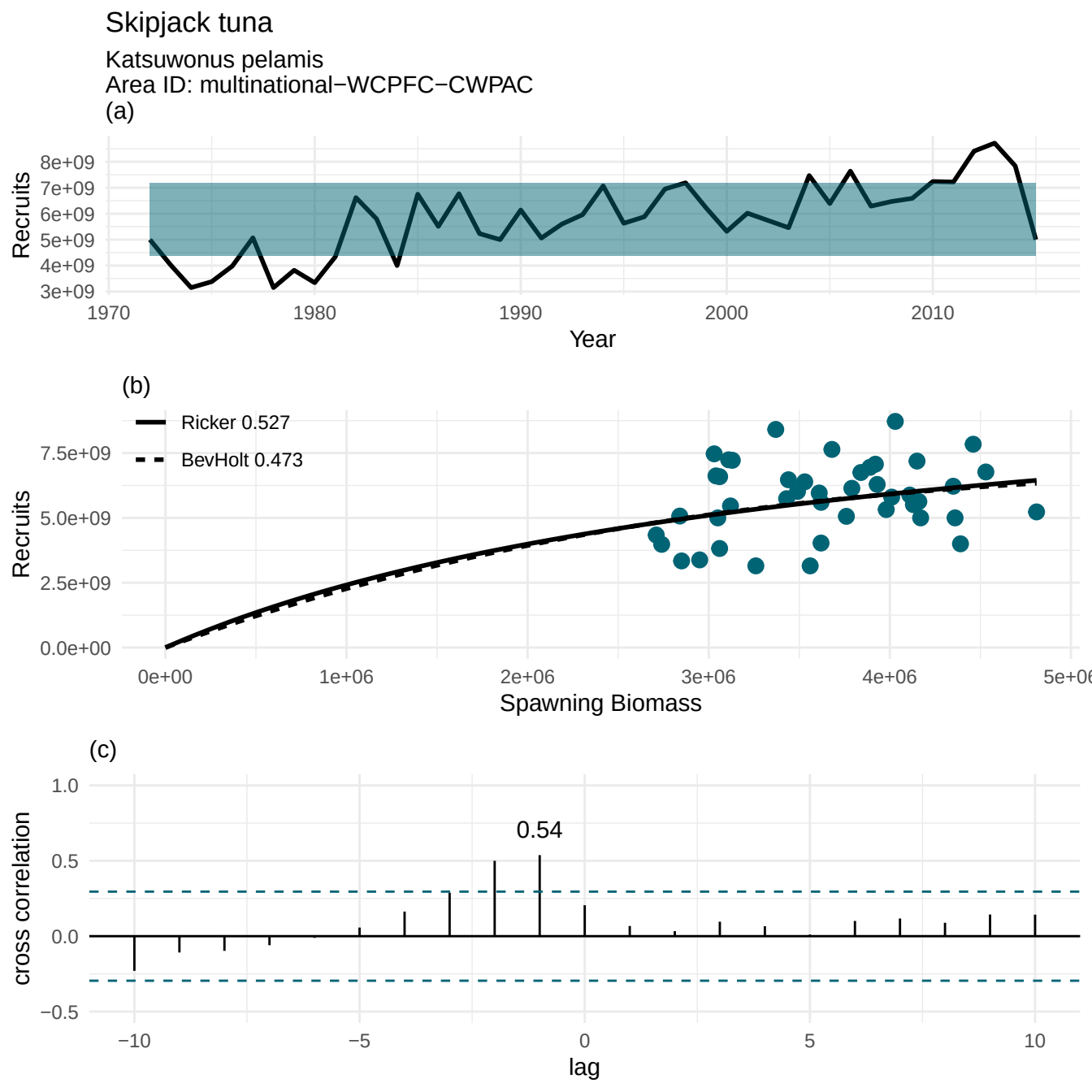

Sand eel
Ammodytes spp
Area ID: multinational−ICES−SA2
(a)
Recruits
4e+11
3e+11
2e+11
1e+11
0e+00
1990
2000
2010
2020
Year
(b)
Ricker 0.519
BevHolt 0.481
Recruits
4e+11
3e+11
2e+11
1e+11
0e+00
0e+00
1e+05
2e+05
3e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.7
0.5
−10
−5
0
5
10
lag

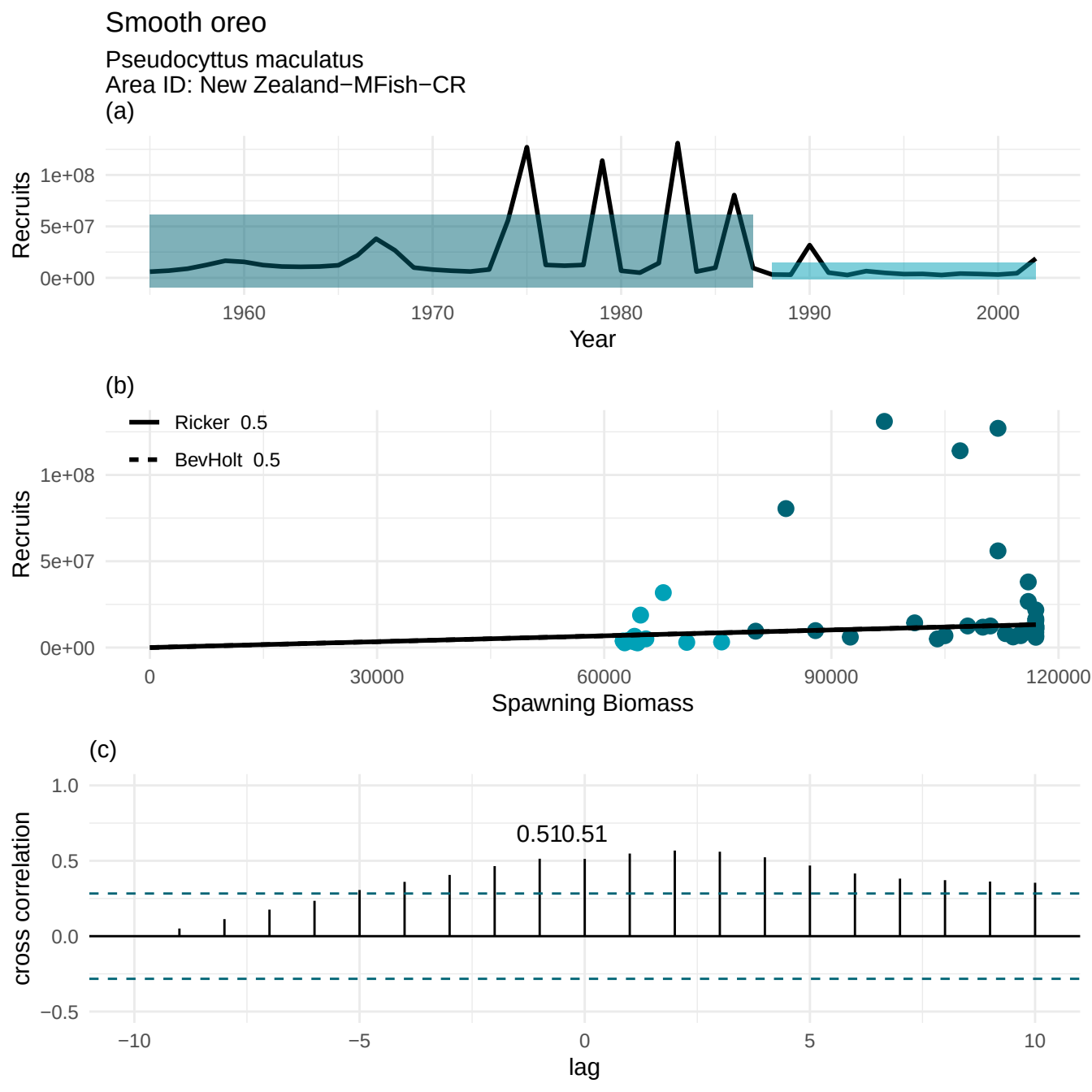

Sand eel
Ammodytes spp
Area ID: multinational−ICES−SA3
(a)
Recruits
8e+11
6e+11
4e+11
2e+11
0e+00
1990
2000
2010
2020
Year
(b)
Ricker 0.364
BevHolt 0.636
Recruits
8e+11
6e+11
4e+11
2e+11
0e+00
0e+00
1e+05
2e+05
3e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.59
−10
−5
0
5
10
lag

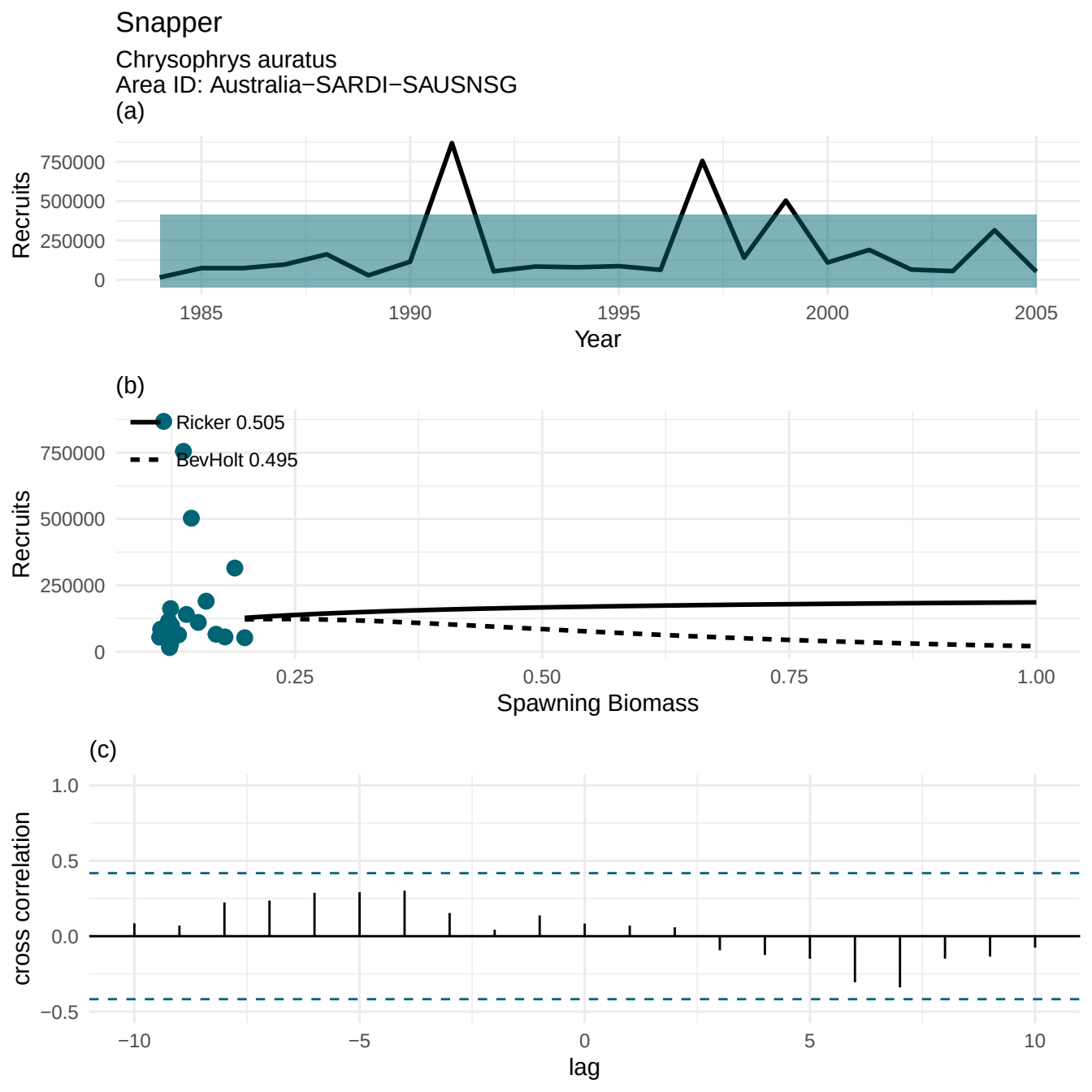

Sand eel
Ammodytes spp
Area ID: multinational−ICES−SA4
(a)
Recruits
4e+11
3e+11
2e+11
1e+11
0e+00
2000
2010
2020
Year
(b)
Ricker 0.311
BevHolt 0.689
Recruits
0e+00
1e+05
2e+05
3e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.69
−10
−5
0
5
10
lag

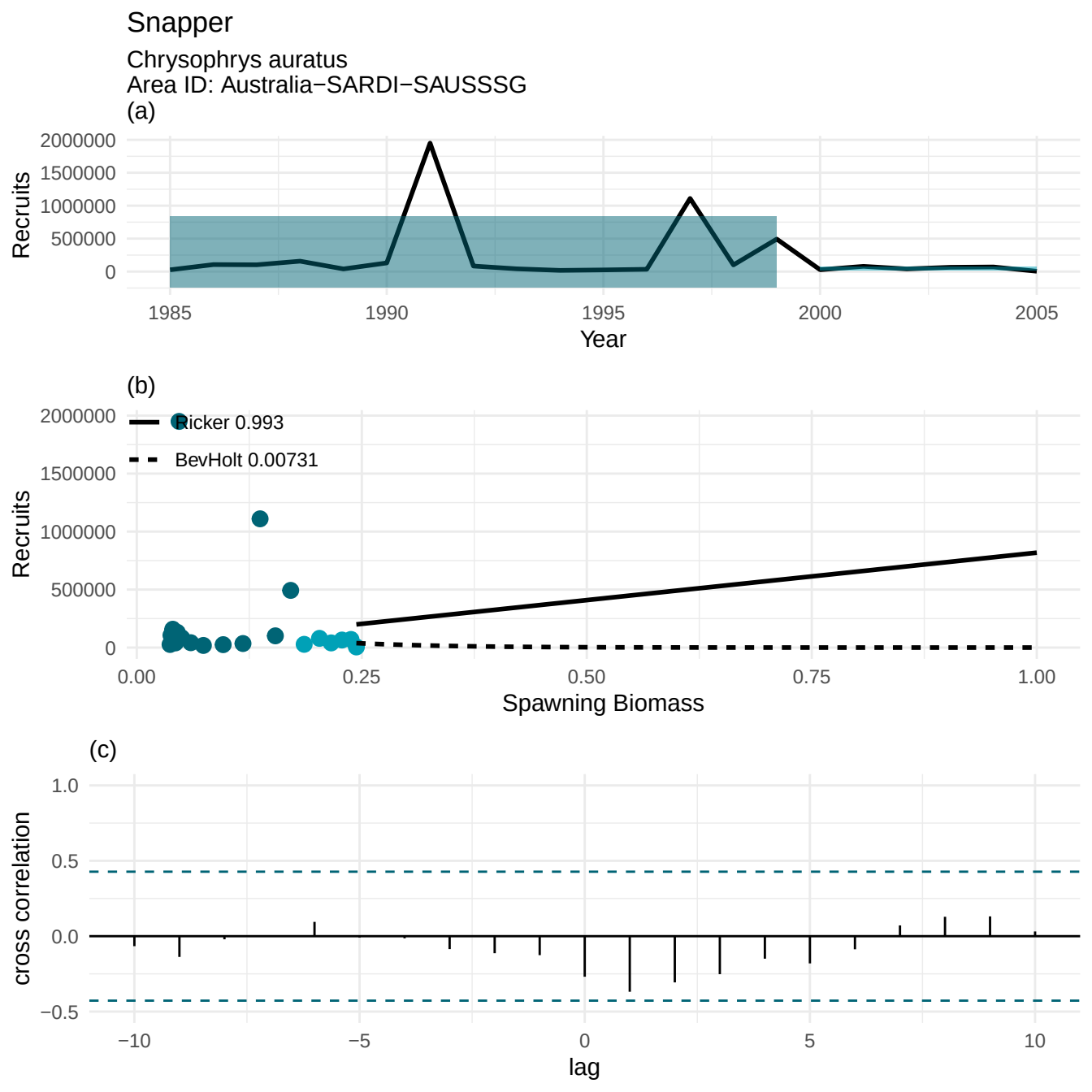

Summer flounder
Paralichthys dentatus
Area ID: USA−NMFS−MATLC
(a)
Recruits
6e+07
4e+07
2e+07
1990
2000
2010
Year
(b)
Ricker 0.869
BevHolt 0.131
Recruits
6e+07
4e+07
2e+07
0e+00
0
10000
20000
30000
40000
50000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

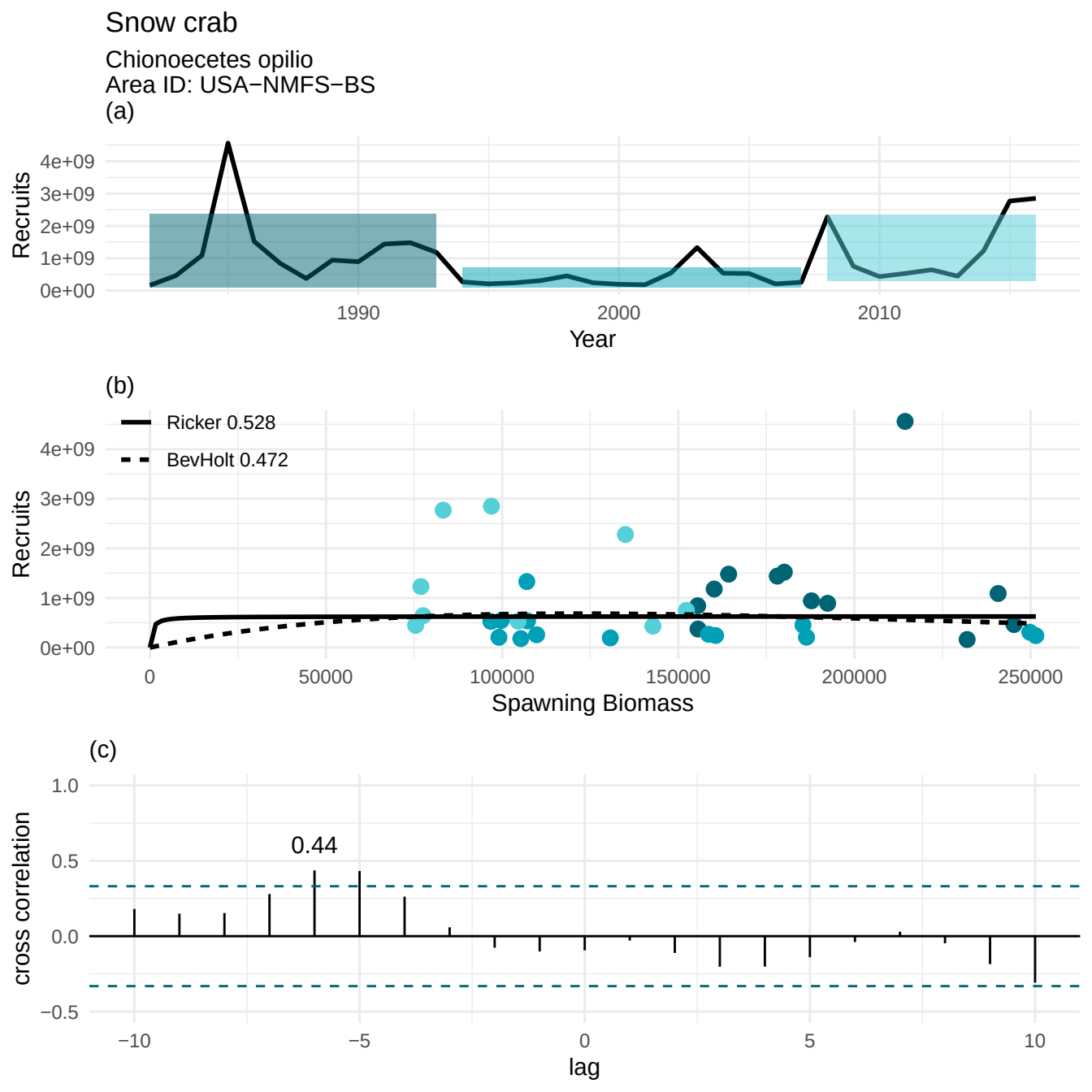

Silverfish
Seriolella punctata
Area ID: Australia−AFMA−SE
(a)
Recruits
4e+13
3e+13
2e+13
1e+13
1980
1990
2000
2010
Year
(b)
Ricker 0.442
BevHolt 0.558
Recruits
4e+13
3e+13
2e+13
1e+13
0e+00
0
5000
10000
15000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.52
0.52
−10
−5
0
5
10
lag

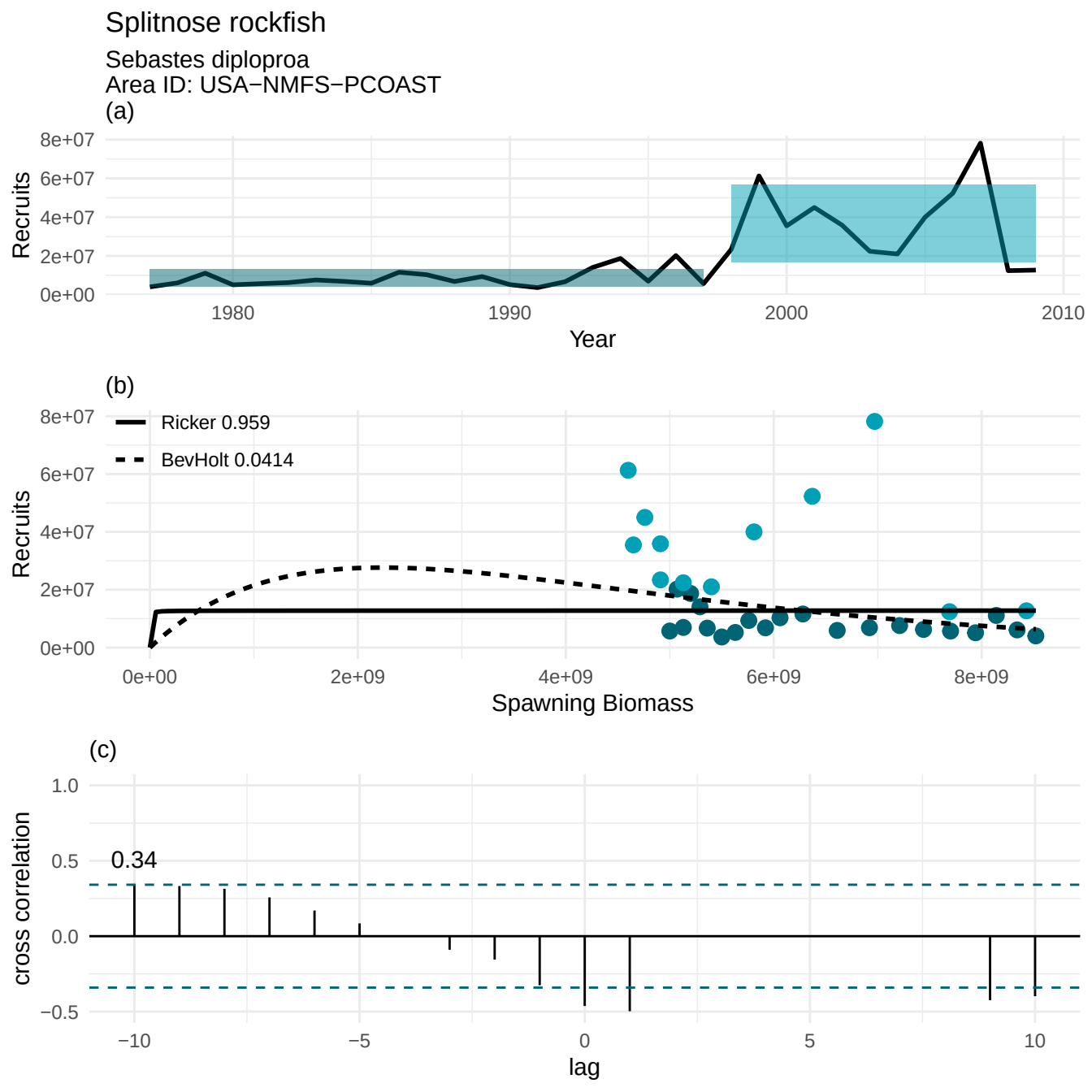

Skipjack tuna
Katsuwonus pelamis
Area ID: multinational−WCPFC−CWPAC
(a)
Recruits
8e+09
7e+09
6e+09
5e+09
4e+09
3e+09
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.527
BevHolt 0.473
Recruits
7.5e+09
5.0e+09
2.5e+09
0.0e+00
0e+00
1e+06
2e+06
3e+06
4e+06
5e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.54
−10
−5
0
5
10
lag

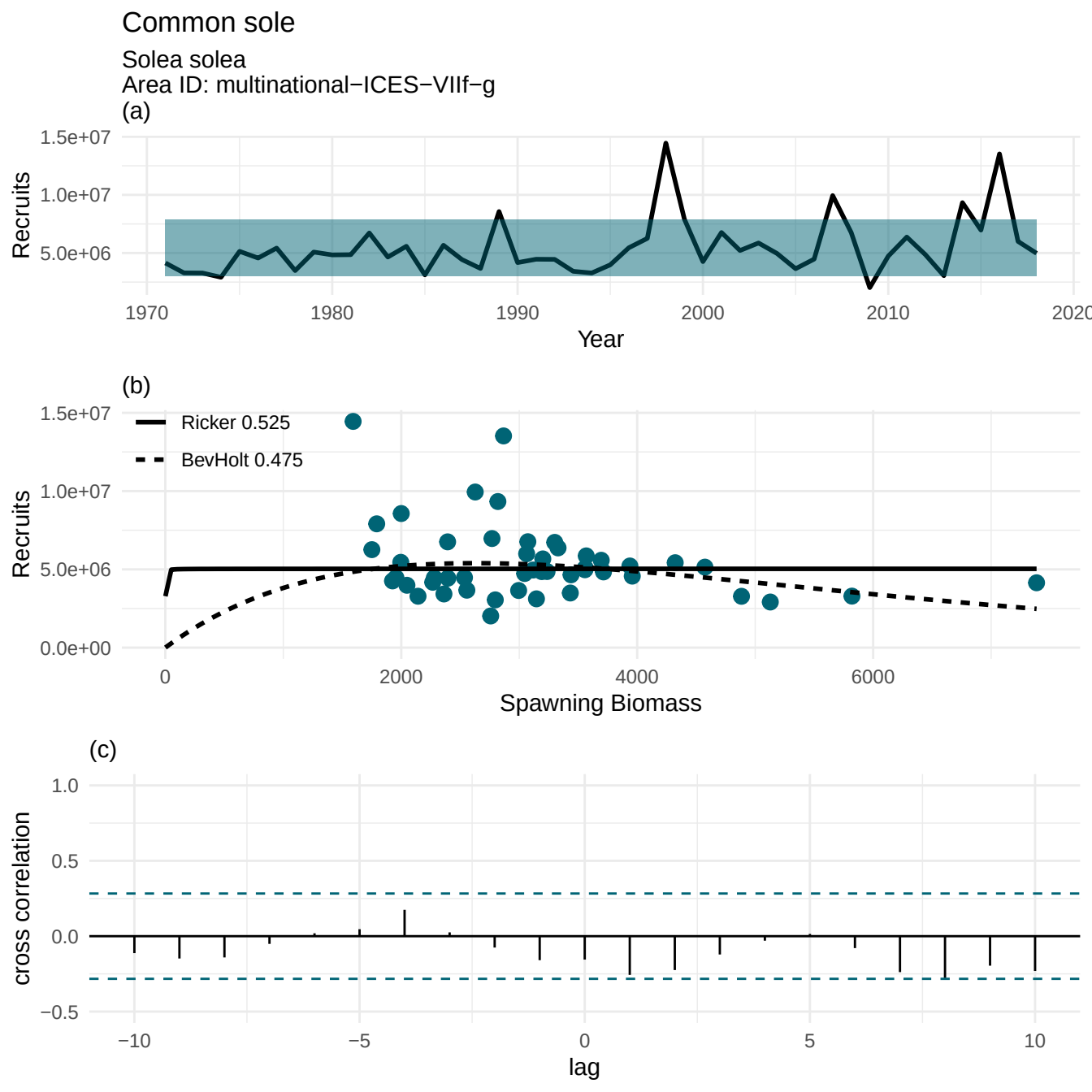

Smooth oreo
Pseudocyttus maculatus
Area ID: New Zealand−MFish−CR
(a)
Recruits
1e+08
5e+07
0e+00
1960
1970
1980
1990
2000
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
1e+08
5e+07
0e+00
0
30000
60000
90000
120000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.510.51
−10
−5
0
5
10
lag

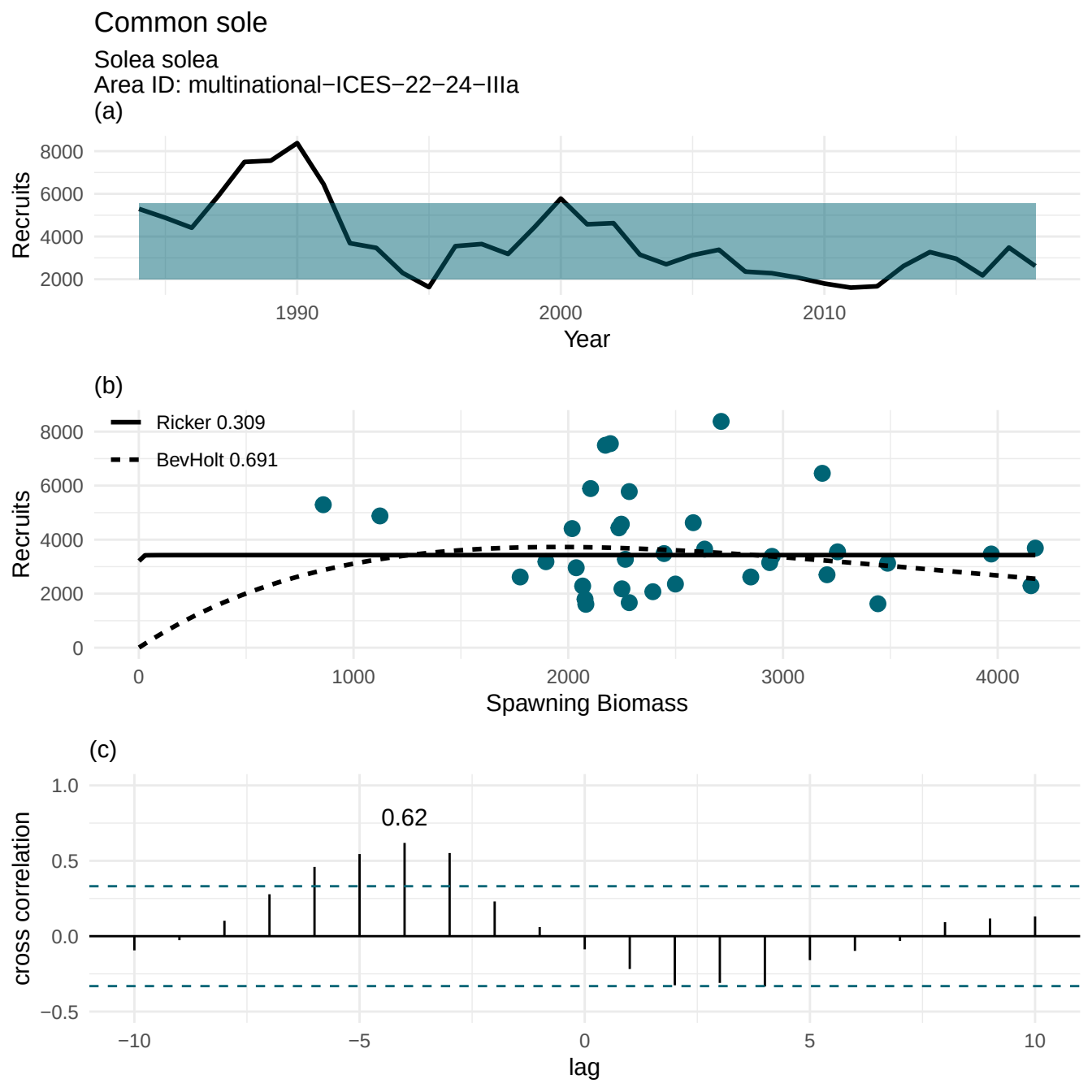

Snapper
Chrysophrys auratus
Area ID: Australia−SARDI−SAUSNSG
(a)
Recruits
750000
500000
250000
0
1985
1990
1995
2000
2005
Year
(b)
Ricker 0.505
BevHolt 0.495
Recruits
750000
500000
250000
0
0.25
0.50
0.75
1.00
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

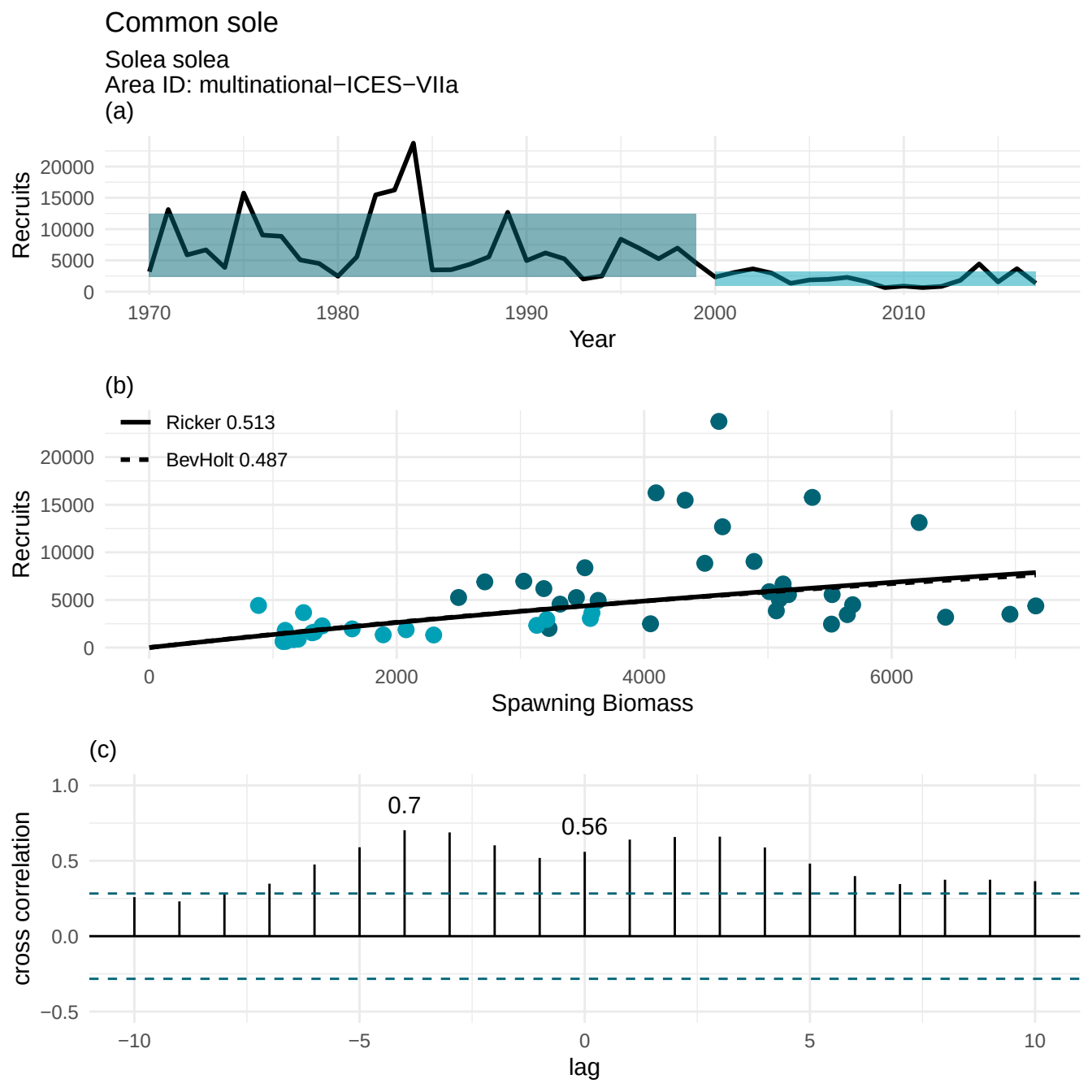

Snapper
Chrysophrys auratus
Area ID: Australia−SARDI−SAUSSSG
(a)
Recruits
2000000
1500000
1000000
500000
0
1985
1990
1995
2000
2005
Year
(b)
Ricker 0.993
BevHolt 0.00731
Recruits
2000000
1500000
1000000
500000
0
0.00
0.25
0.50
0.75
1.00
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

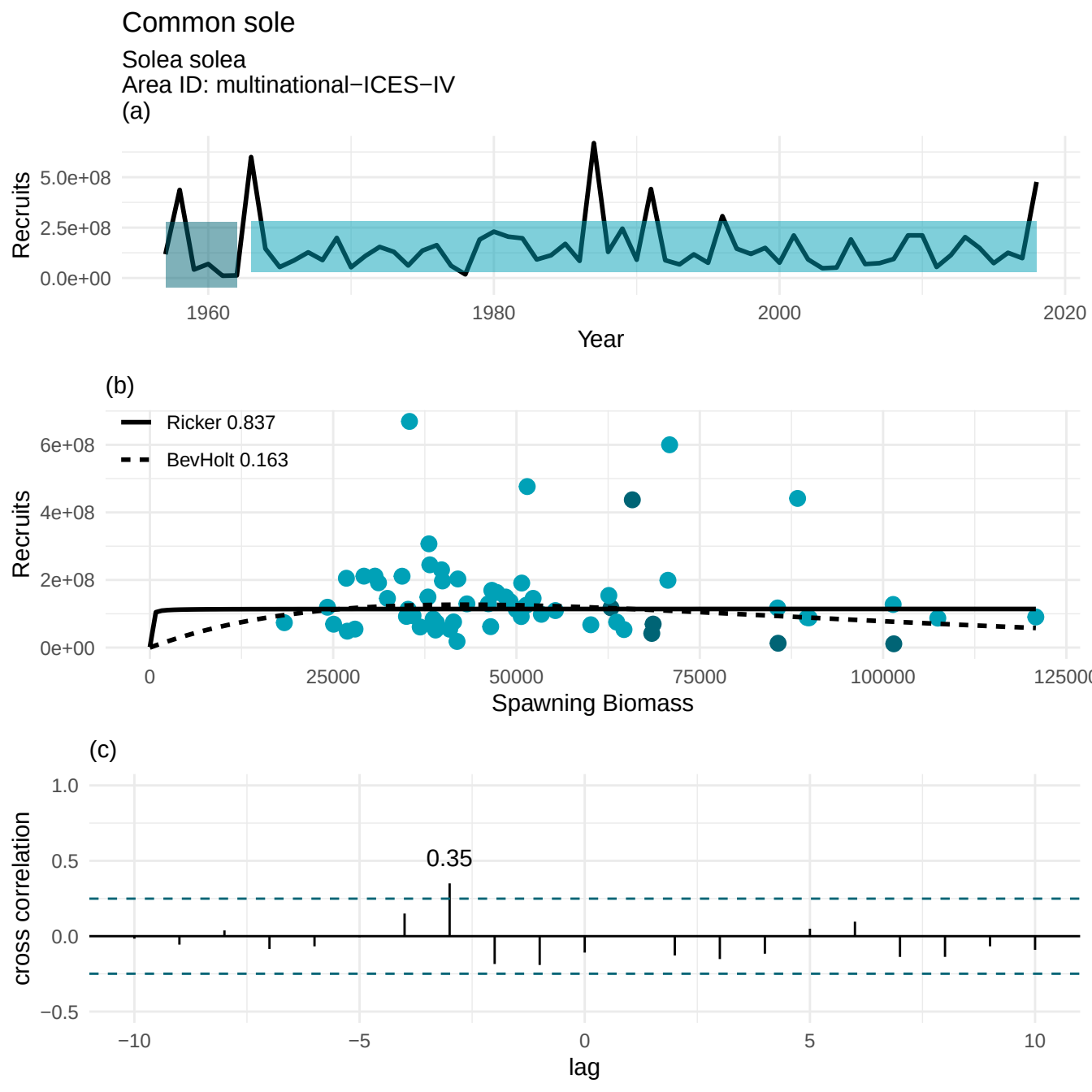

Snow crab
Chionoecetes opilio
Area ID: USA−NMFS−BS
(a)
Recruits
4e+09
3e+09
2e+09
1e+09
0e+00
1990
2000
2010
Year
(b)
Ricker 0.528
BevHolt 0.472
Recruits
4e+09
3e+09
2e+09
1e+09
0e+00
0
50000
100000
150000
200000
250000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.44
−10
−5
0
5
10
lag

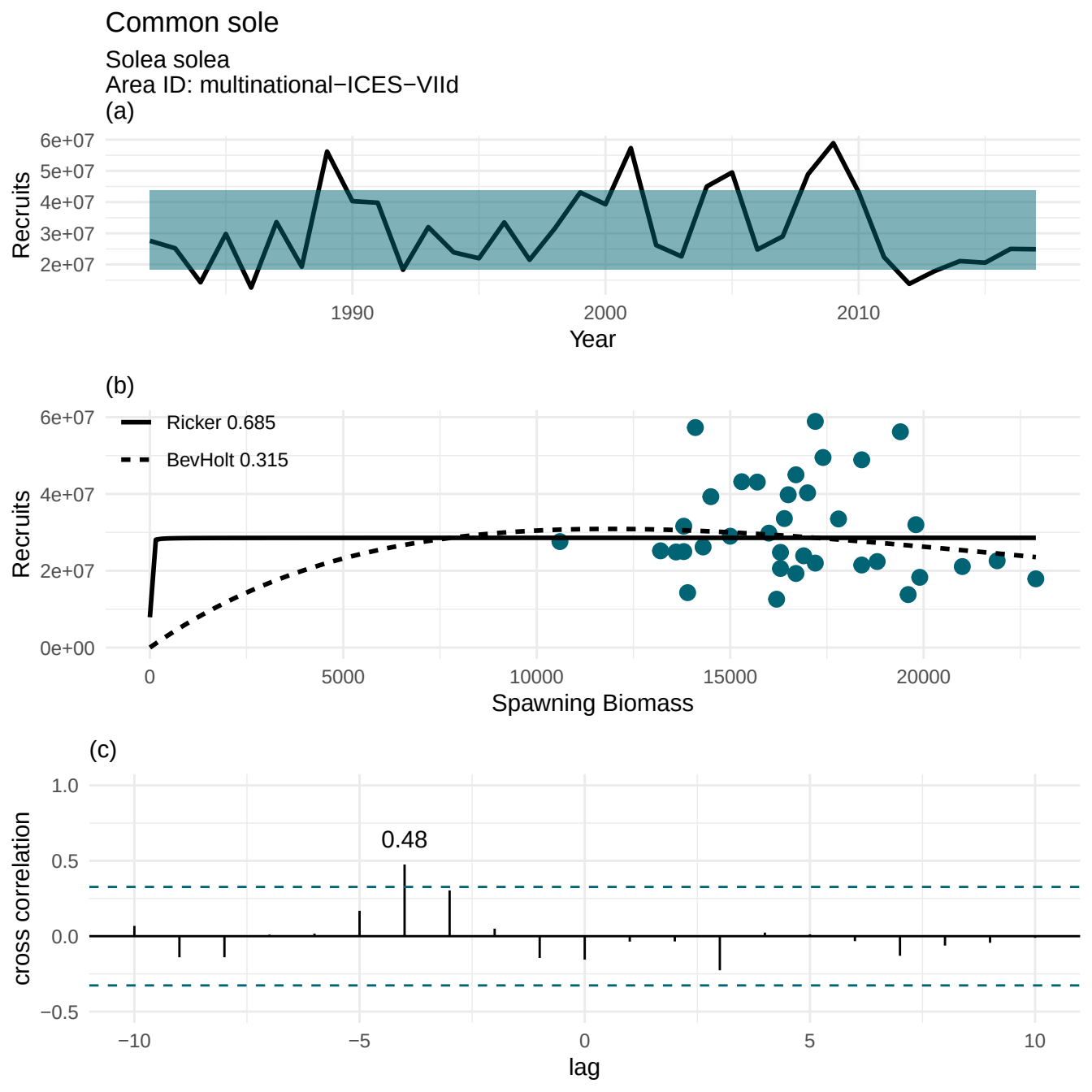

Splitnose rockfish
Sebastes diploproa
Area ID: USA−NMFS−PCOAST
(a)
Recruits
8e+07
6e+07
4e+07
2e+07
0e+00
1980
1990
2000
2010
Year
(b)
Ricker 0.959
BevHolt 0.0414
Recruits
0e+00
2e+09
4e+09
6e+09
8e+09
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.34
−10
−5
0
5
10
lag

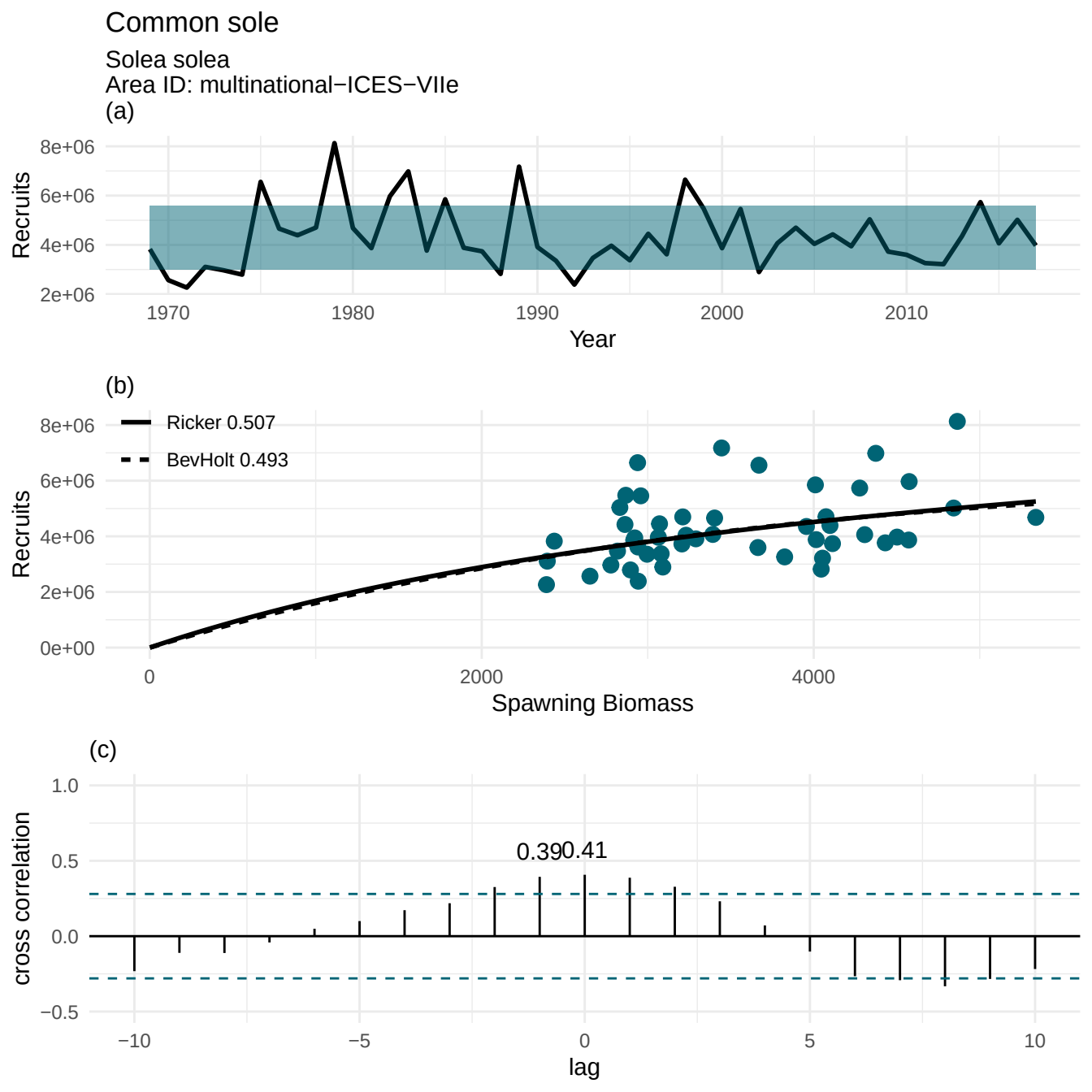

Common sole
Solea solea
Area ID: multinational−ICES−VIIf−g
(a)
Recruits
1.5e+07
1.0e+07
5.0e+06
1970
1980
1990
2000
2010
2020
Year
(b)
Ricker 0.525
BevHolt 0.475
Recruits
1.5e+07
1.0e+07
5.0e+06
0.0e+00
0
2000
4000
6000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

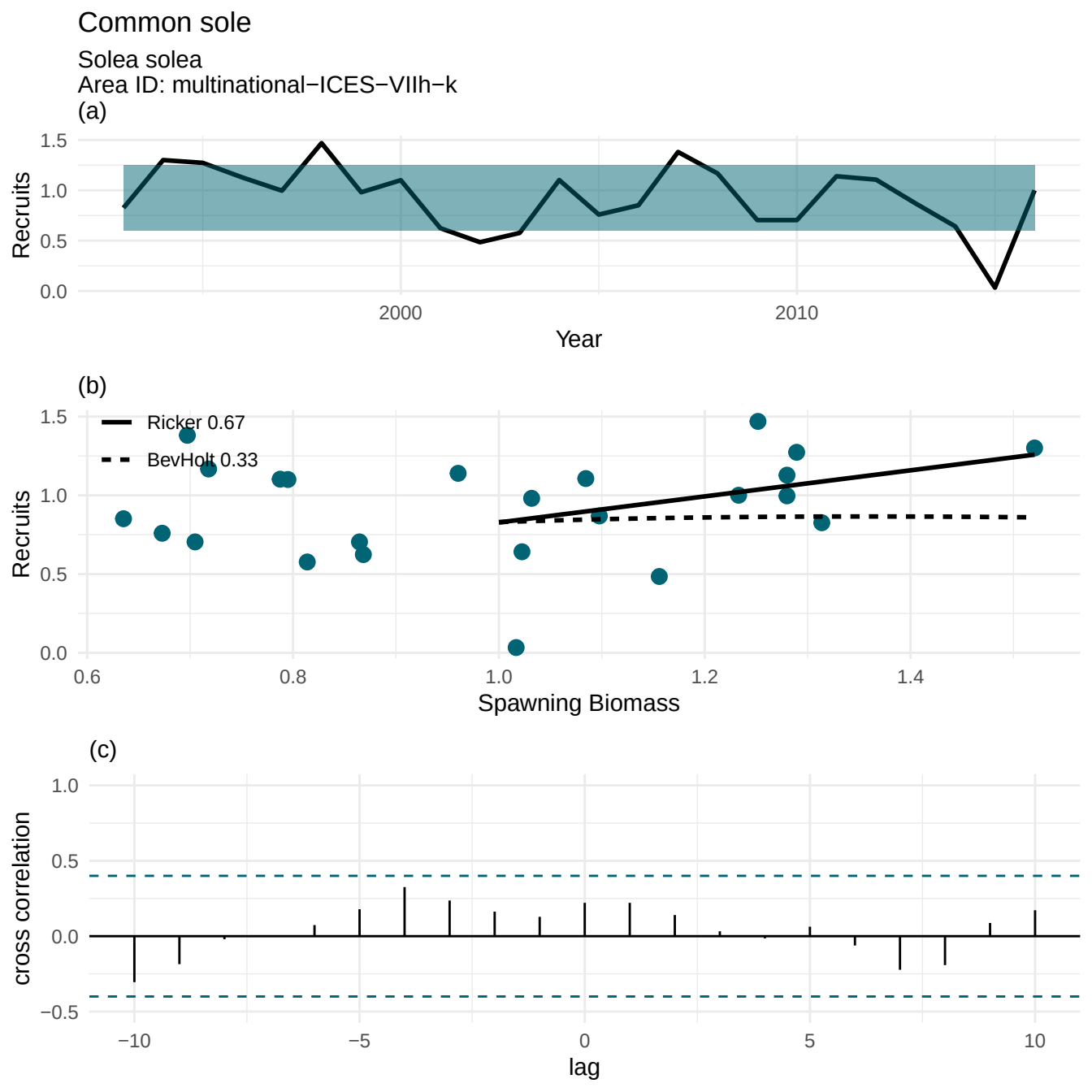

Common sole
Solea solea
Area ID: multinational−ICES−22−24−IIIa
(a)
Recruits
8000
6000
4000
2000
1990
2000
2010
Year
(b)
Ricker 0.309
BevHolt 0.691
Recruits
8000
6000
4000
2000
0
0
1000
2000
3000
4000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.62
−10
−5
0
5
10
lag

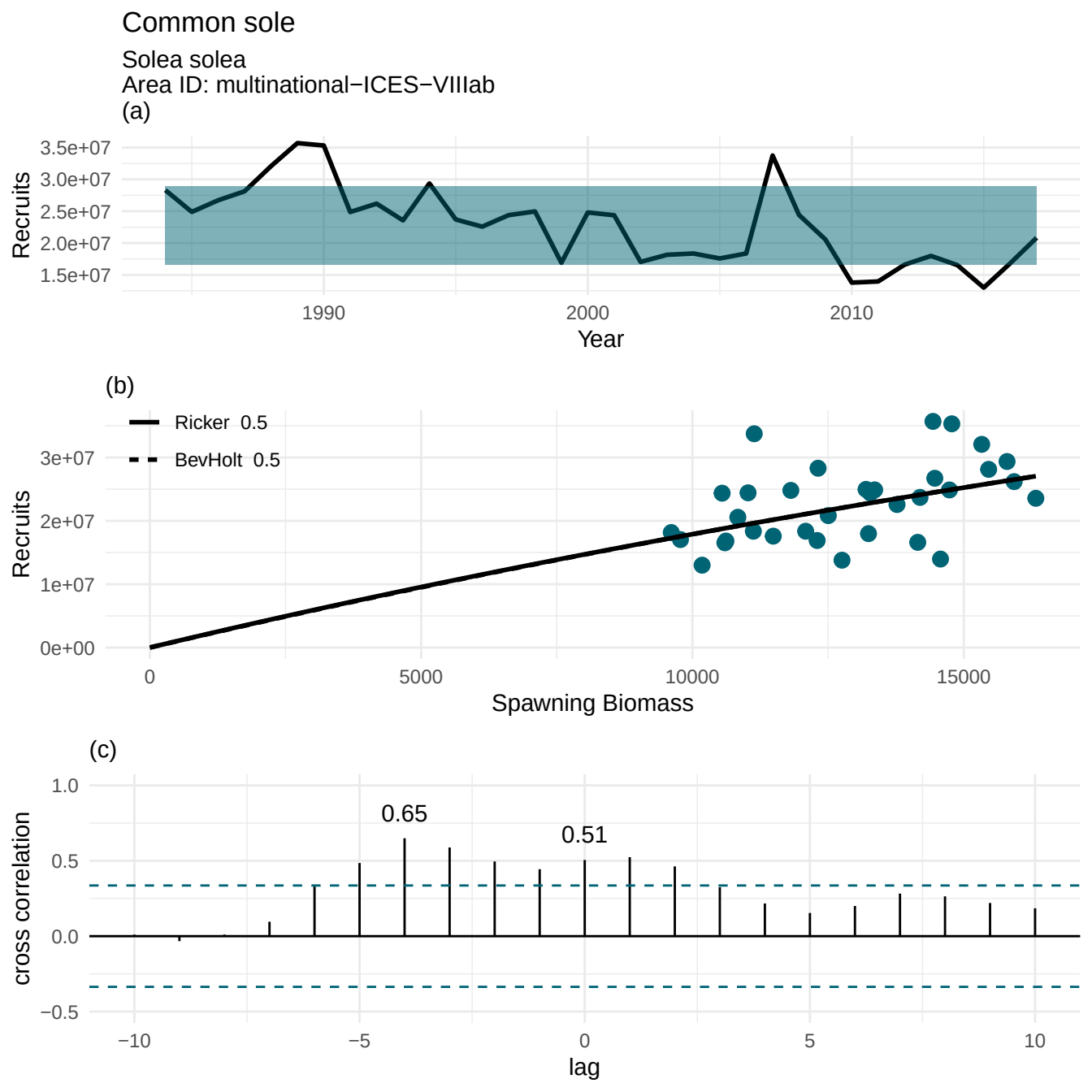

Common sole
Solea solea
Area ID: multinational−ICES−VIIa
(a)
Recruits
20000
15000
10000
5000
0
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.513
BevHolt 0.487
Recruits
20000
15000
10000
5000
0
0
2000
4000
6000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.7
0.56
−10
−5
0
5
10
lag

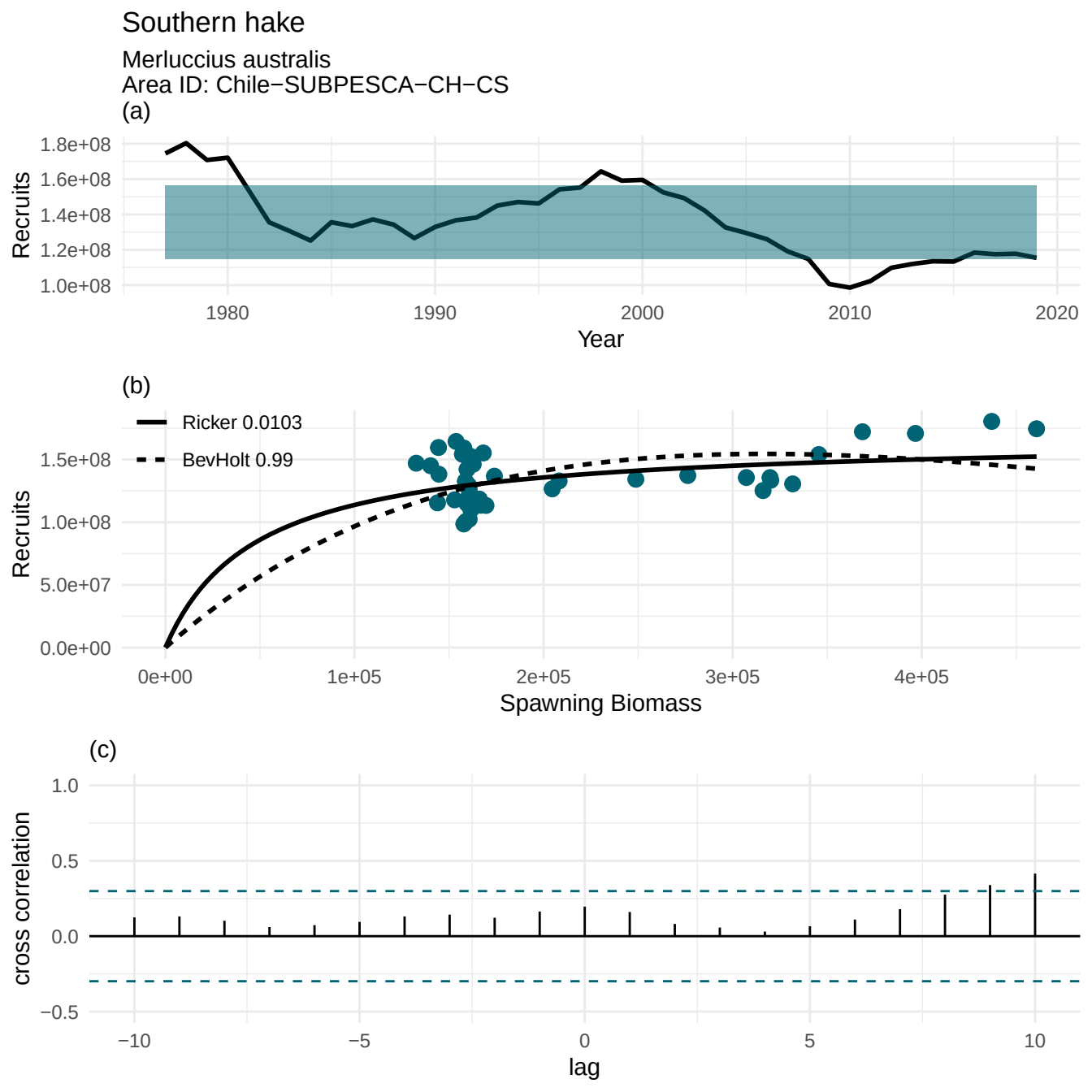

Common sole
Solea solea
Area ID: multinational−ICES−IV
(a)
Recruits
5.0e+08
2.5e+08
0.0e+00
1960
1980
2000
2020
Year
(b)
Ricker 0.837
BevHolt 0.163
Recruits
6e+08
4e+08
2e+08
0e+00
0
25000
50000
75000
100000
125000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.35
−10
−5
0
5
10
lag

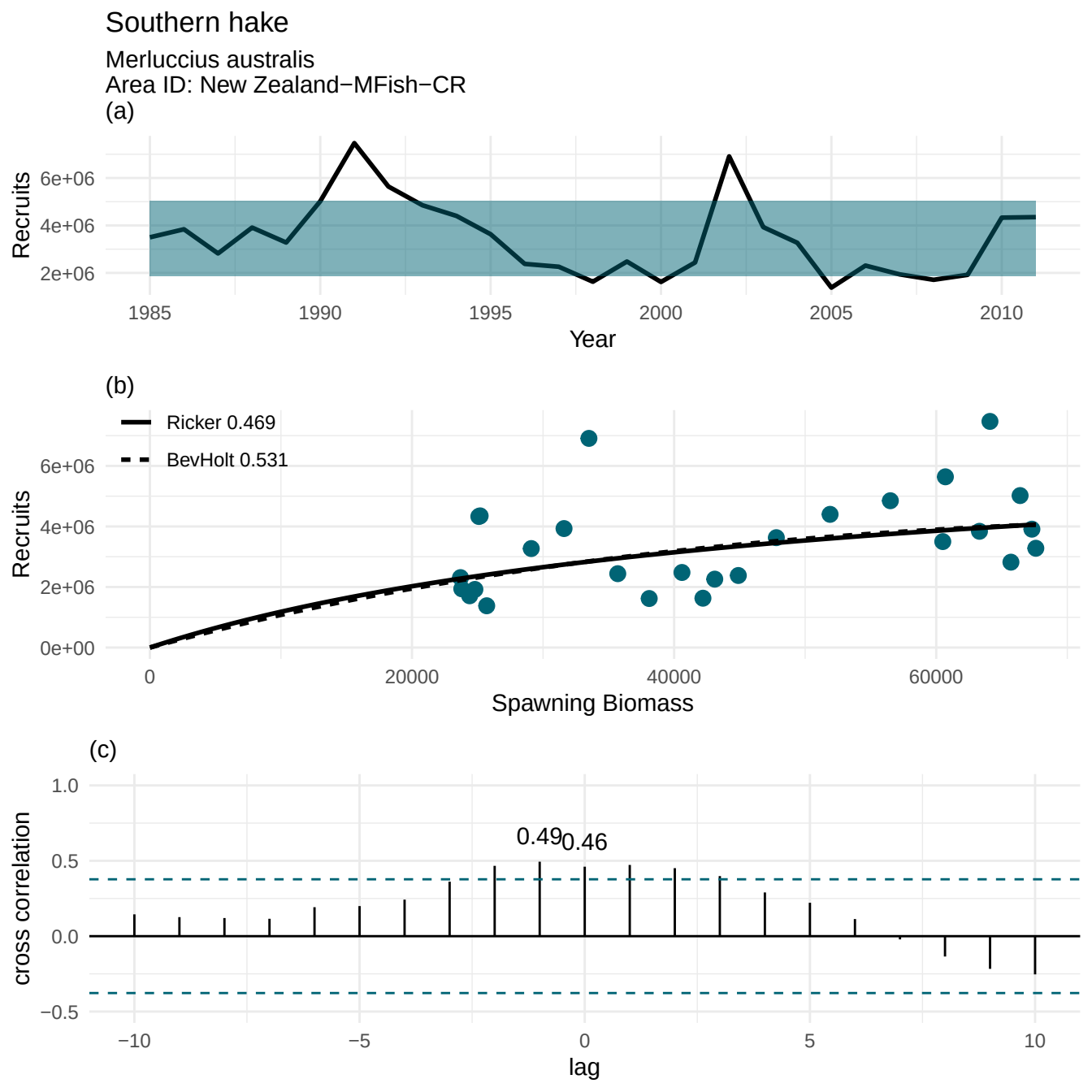

Common sole
Solea solea
Area ID: multinational−ICES−VIId
(a)
Recruits
6e+07
5e+07
4e+07
3e+07
2e+07
1990
2000
2010
Year
(b)
Ricker 0.685
BevHolt 0.315
Recruits
6e+07
4e+07
2e+07
0e+00
0
5000
10000
15000
20000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.48
−10
−5
0
5
10
lag

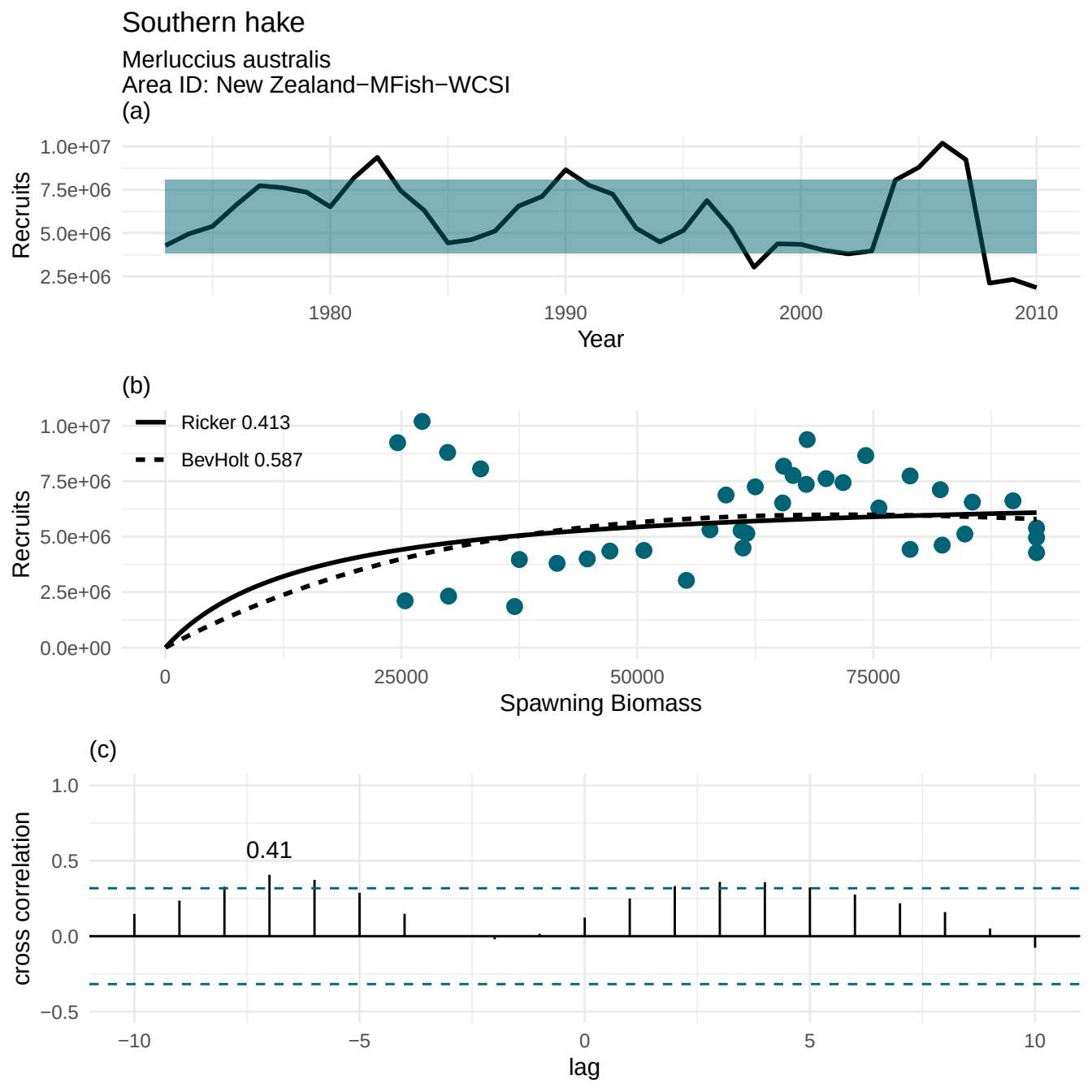

Common sole
Solea solea
Area ID: multinational−ICES−VIIe
(a)
Recruits
8e+06
6e+06
4e+06
2e+06
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.507
BevHolt 0.493
Recruits
8e+06
6e+06
4e+06
2e+06
0e+00
0
2000
4000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.390.41
−10
−5
0
5
10
lag

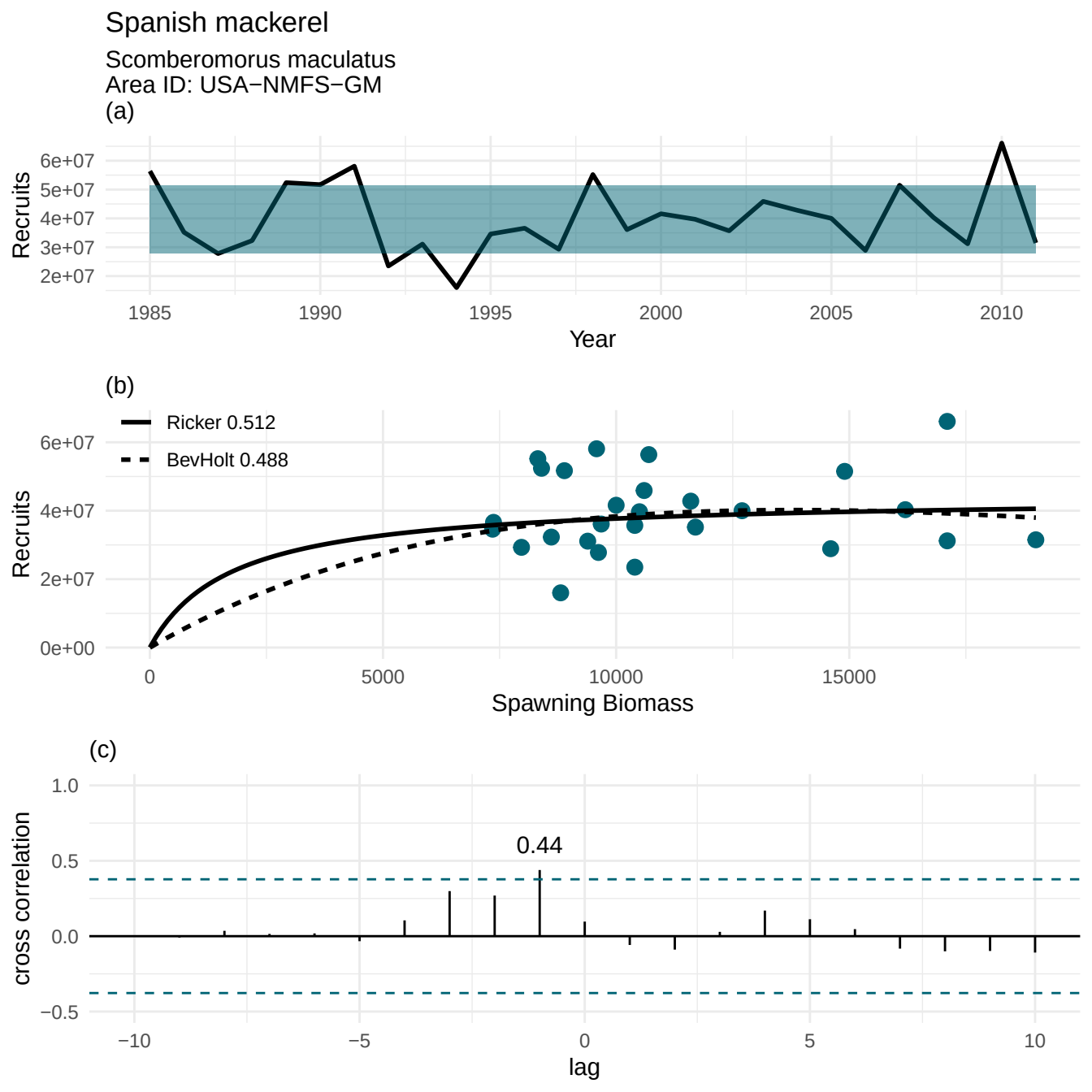

Common sole
Solea solea
Area ID: multinational−ICES−VIIh−k
(a)
Recruits
1.5
1.0
0.5
0.0
2000
2010
Year
(b)
Ricker 0.67
BevHolt 0.33
Recruits
1.5
1.0
0.5
0.0
0.6
0.8
1.0
1.2
1.4
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

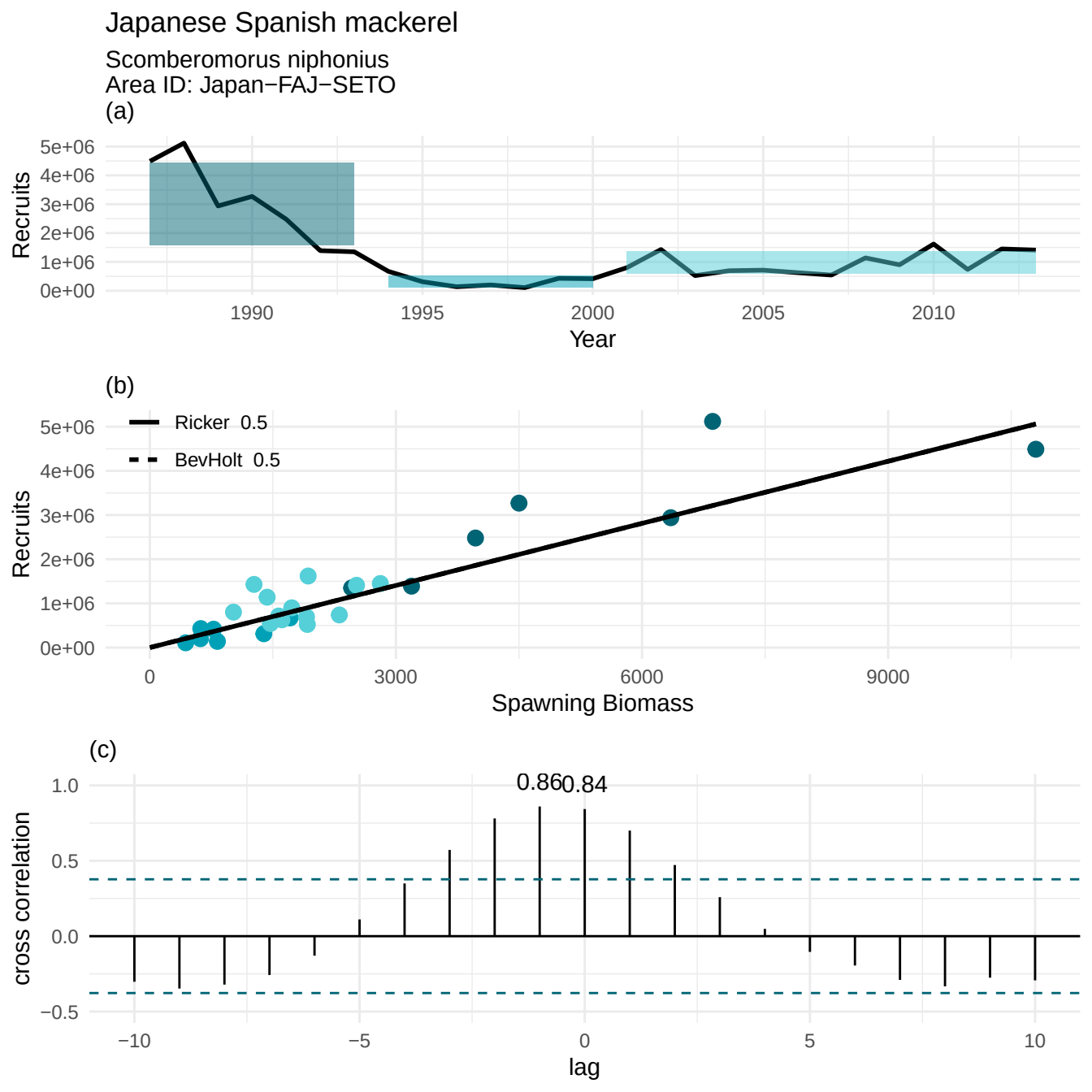

Common sole
Solea solea
Area ID: multinational−ICES−VIIIab
(a)
Recruits
3.5e+07
3.0e+07
2.5e+07
2.0e+07
1.5e+07
1990
2000
2010
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
3e+07
2e+07
1e+07
0e+00
0
5000
10000
15000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.65
0.51
−10
−5
0
5
10
lag

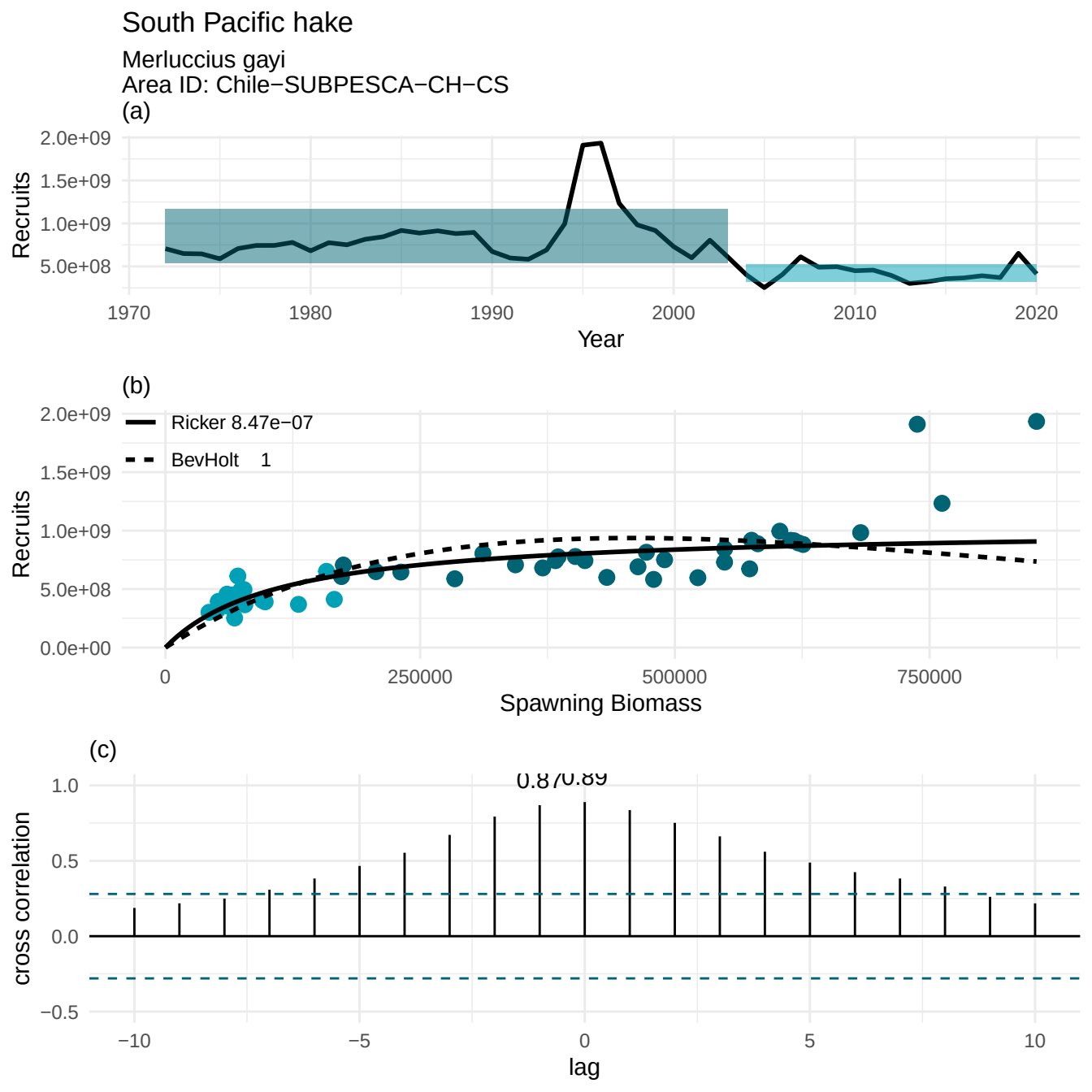

Southern hake
Merluccius australis
Area ID: Chile−SUBPESCA−CH−CS
(a)
Recruits
1.8e+08
1.6e+08
1.4e+08
1.2e+08
1.0e+08
1980
1990
2000
2010
2020
Year
(b)
Ricker 0.0103
BevHolt 0.99
Recruits
1.5e+08
1.0e+08
5.0e+07
0.0e+00
0e+00
1e+05
2e+05
3e+05
4e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

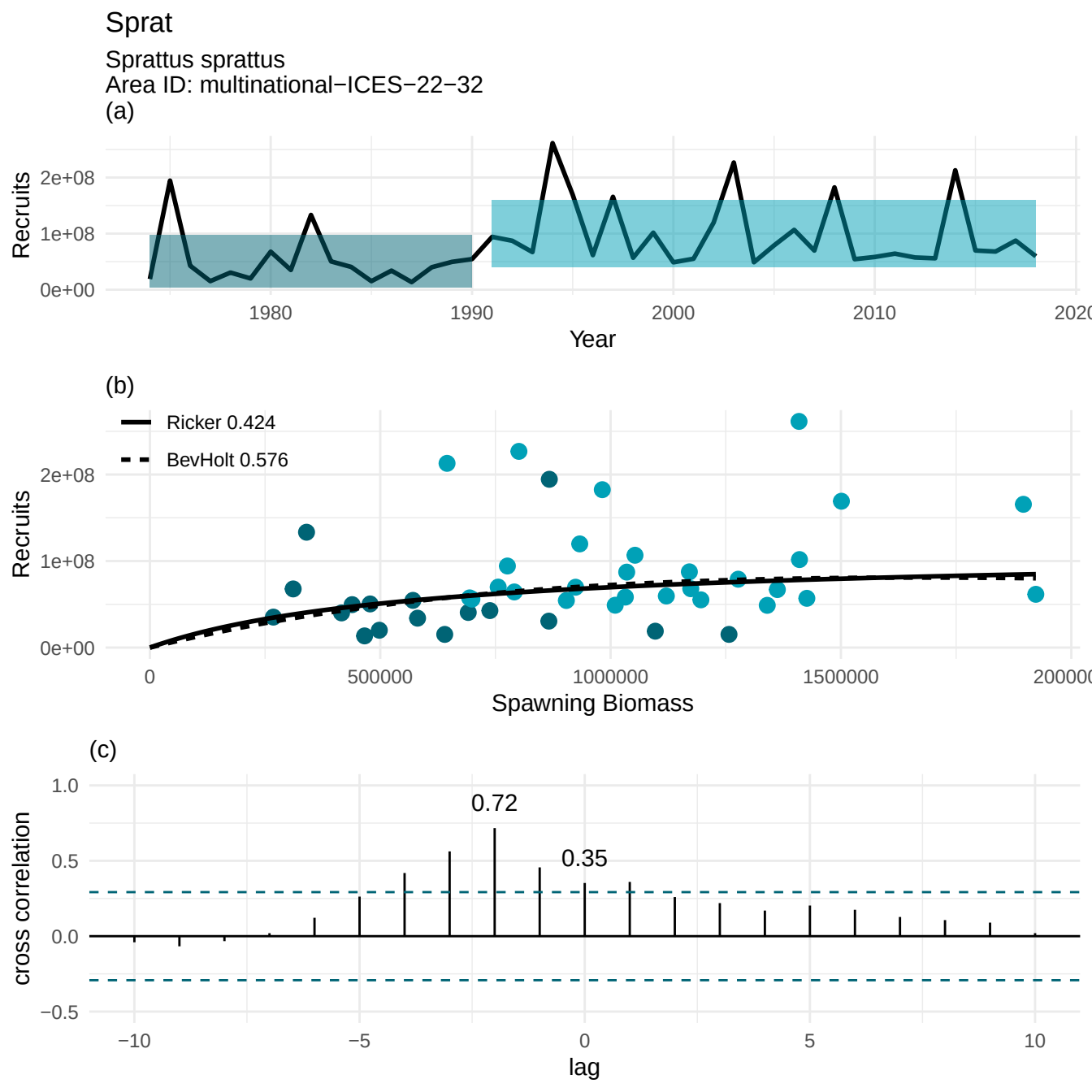

Southern hake
Merluccius australis
Area ID: New Zealand−MFish−CR
(a)
Recruits
6e+06
4e+06
2e+06
1985
1990
1995
2000
2005
2010
Year
(b)
Ricker 0.469
BevHolt 0.531
Recruits
6e+06
4e+06
2e+06
0e+00
0
20000
40000
60000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.49
0.46
−10
−5
0
5
10
lag

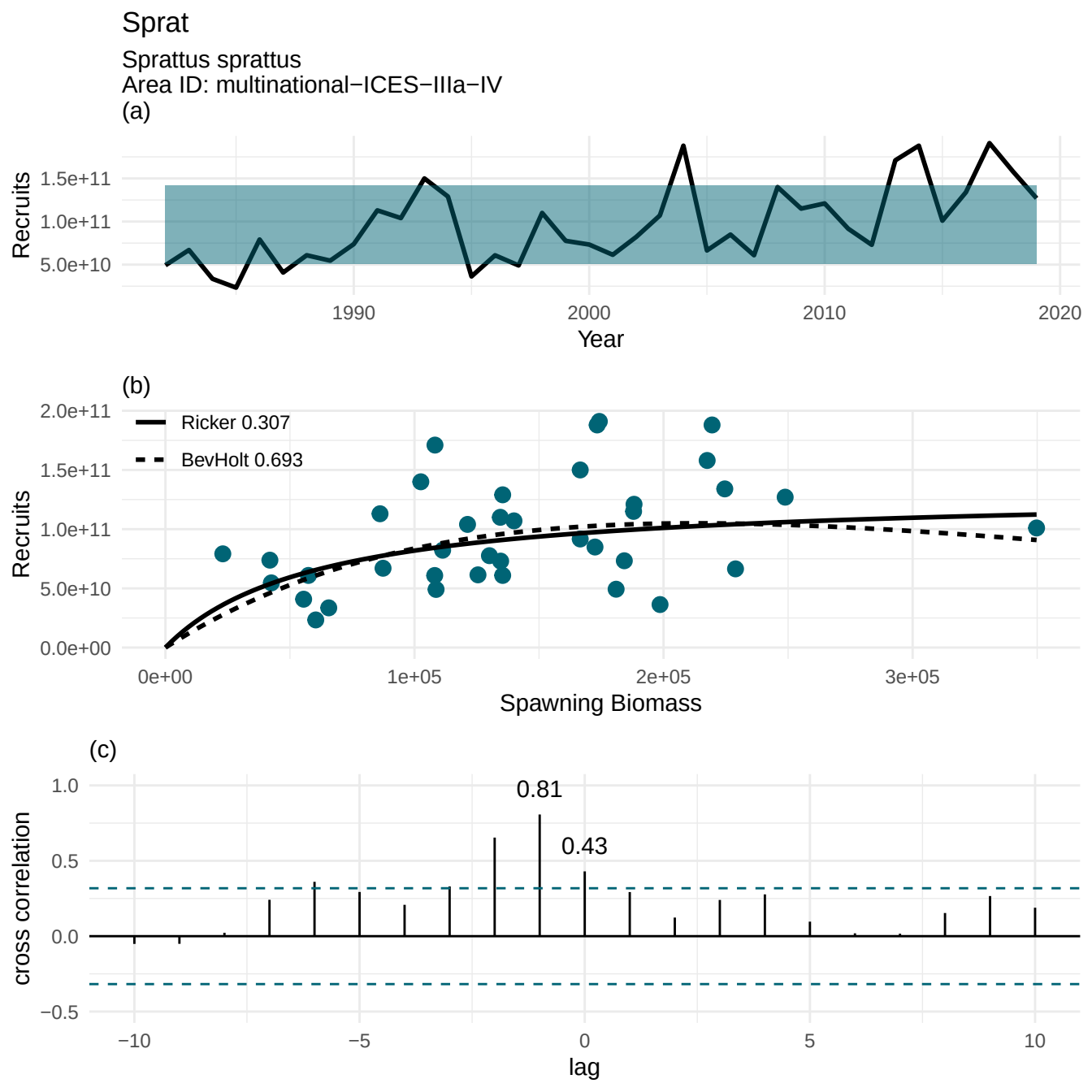

Southern hake
Merluccius australis
Area ID: New Zealand−MFish−WCSI
(a)
Recruits
1.0e+07
7.5e+06
5.0e+06
2.5e+06
1980
1990
2000
2010
Year
(b)
Ricker 0.413
BevHolt 0.587
Recruits
1.0e+07
7.5e+06
5.0e+06
2.5e+06
0.0e+00
0
25000
50000
75000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.41
−10
−5
0
5
10
lag

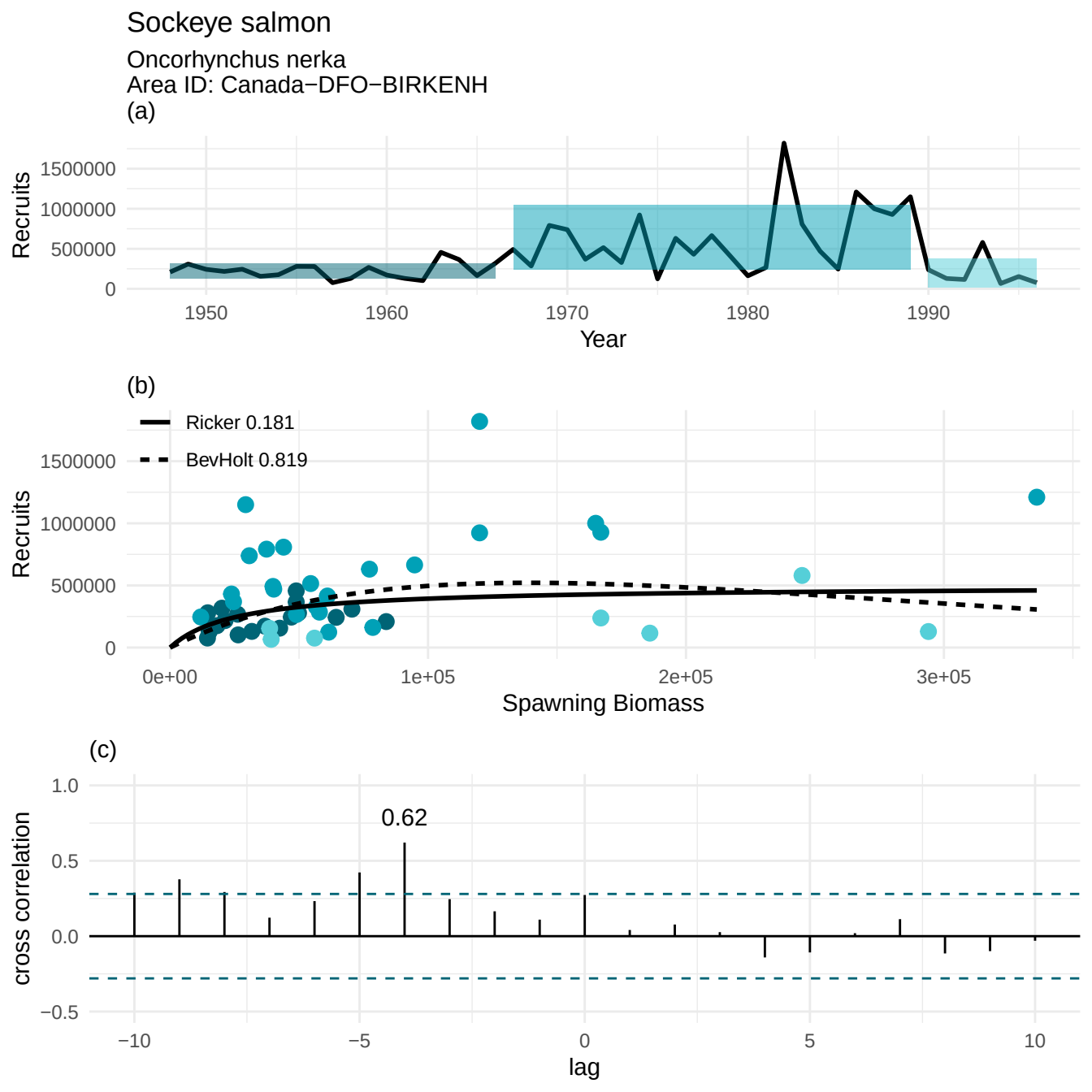

Spanish mackerel
Scomberomorus maculatus
Area ID: USA−NMFS−GM
(a)
Recruits
6e+07
5e+07
4e+07
3e+07
2e+07
1985
1990
1995
2000
2005
2010
Year
(b)
Ricker 0.512
BevHolt 0.488
Recruits
6e+07
4e+07
2e+07
0e+00
0
5000
10000
15000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.44
−10
−5
0
5
10
lag

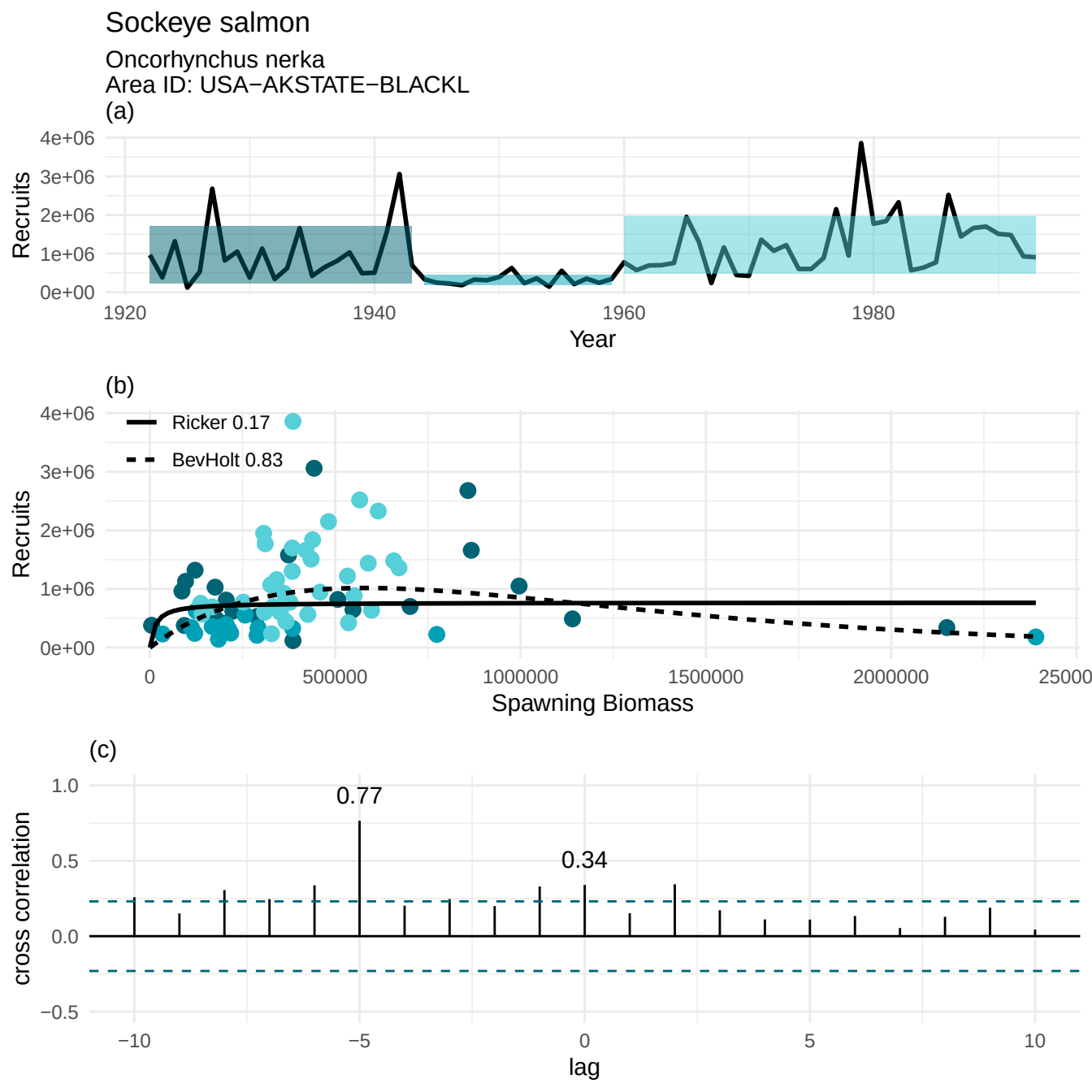

Japanese Spanish mackerel
Scomberomorus niphonius
Area ID: Japan−FAJ−SETO
(a)
Recruits
5e+06
4e+06
3e+06
2e+06
1e+06
0e+00
1990
1995
2000
2005
2010
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
5e+06
4e+06
3e+06
2e+06
1e+06
0e+00
0
3000
6000
9000
Spawning Biomass
(c)
0.86
0.84
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

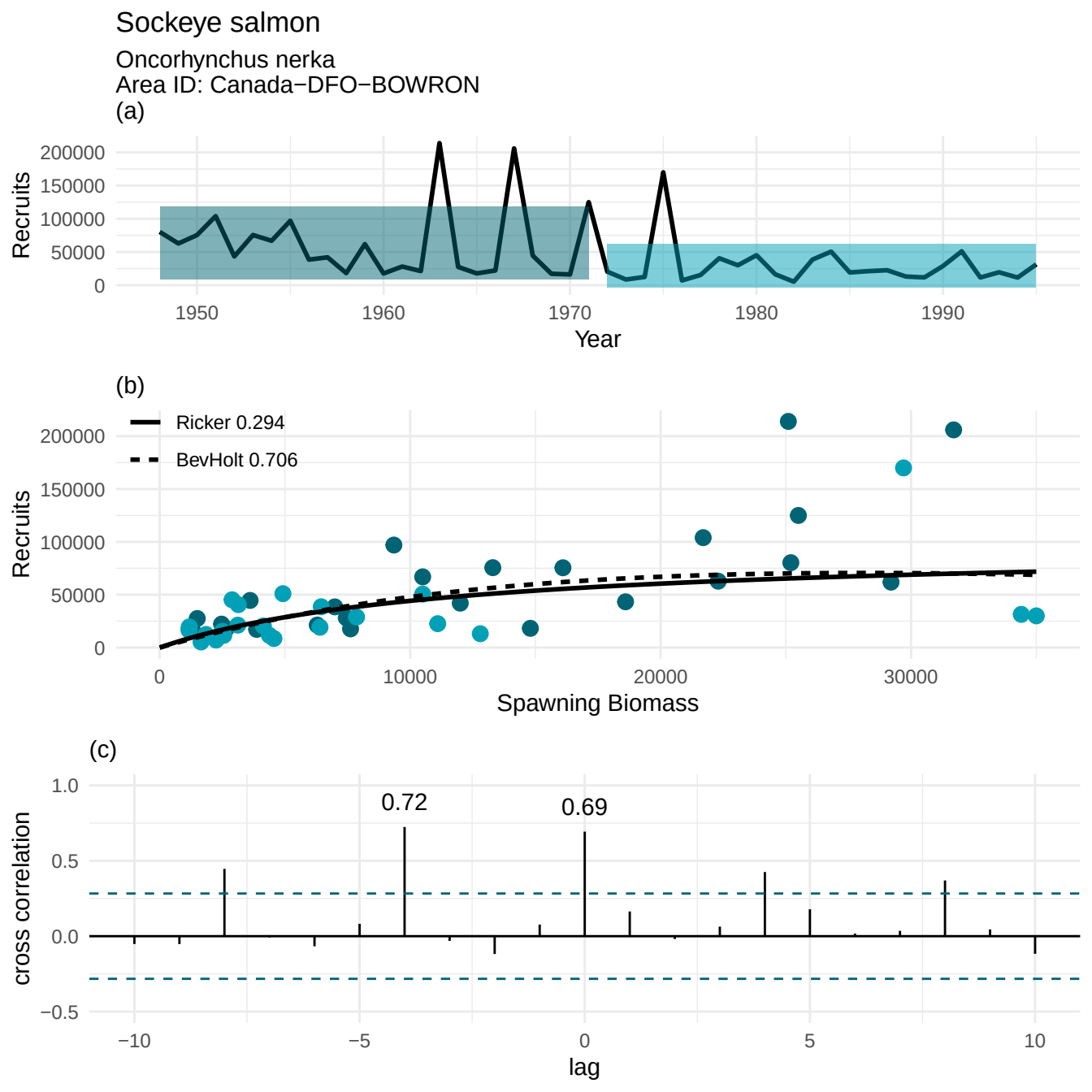

South Pacific hake
Merluccius gayi
Area ID: Chile−SUBPESCA−CH−CS
(a)
Recruits
2.0e+09
1.5e+09
1.0e+09
5.0e+08
1970
1980
1990
2000
2010
2020
Year
(b)
Ricker 8.47e−07
BevHolt 1
Recruits
2.0e+09
1.5e+09
1.0e+09
5.0e+08
0.0e+00
0
250000
500000
750000
Spawning Biomass
(c)
0.87
0.89
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

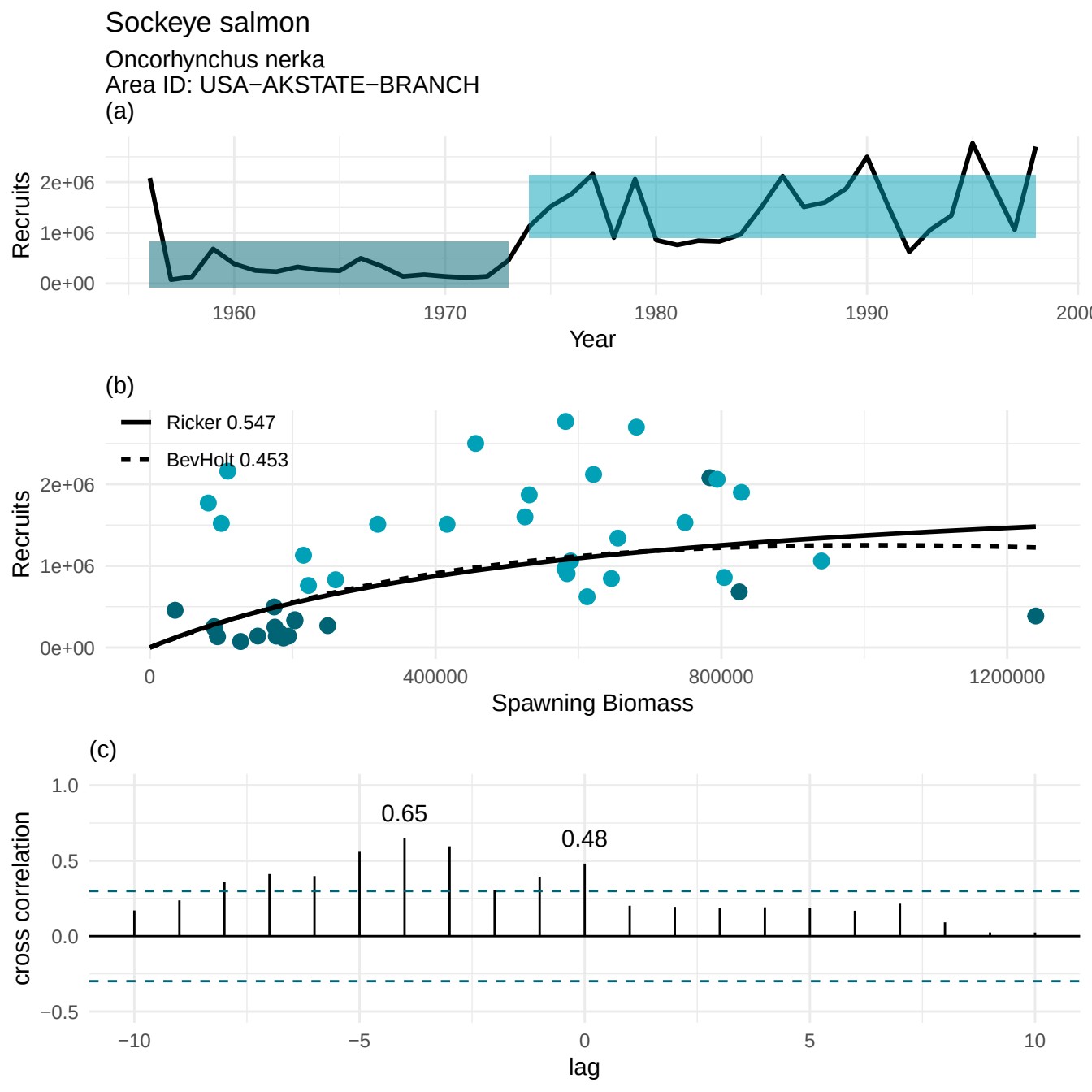

Sprat
Sprattus sprattus
Area ID: multinational−ICES−22−32
(a)
Recruits
2e+08
1e+08
0e+00
1980
1990
2000
2010
2020
Year
(b)
Ricker 0.424
BevHolt 0.576
Recruits
2e+08
1e+08
0e+00
0
500000
1000000
1500000
2000000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.72
0.35
−10
−5
0
5
10
lag

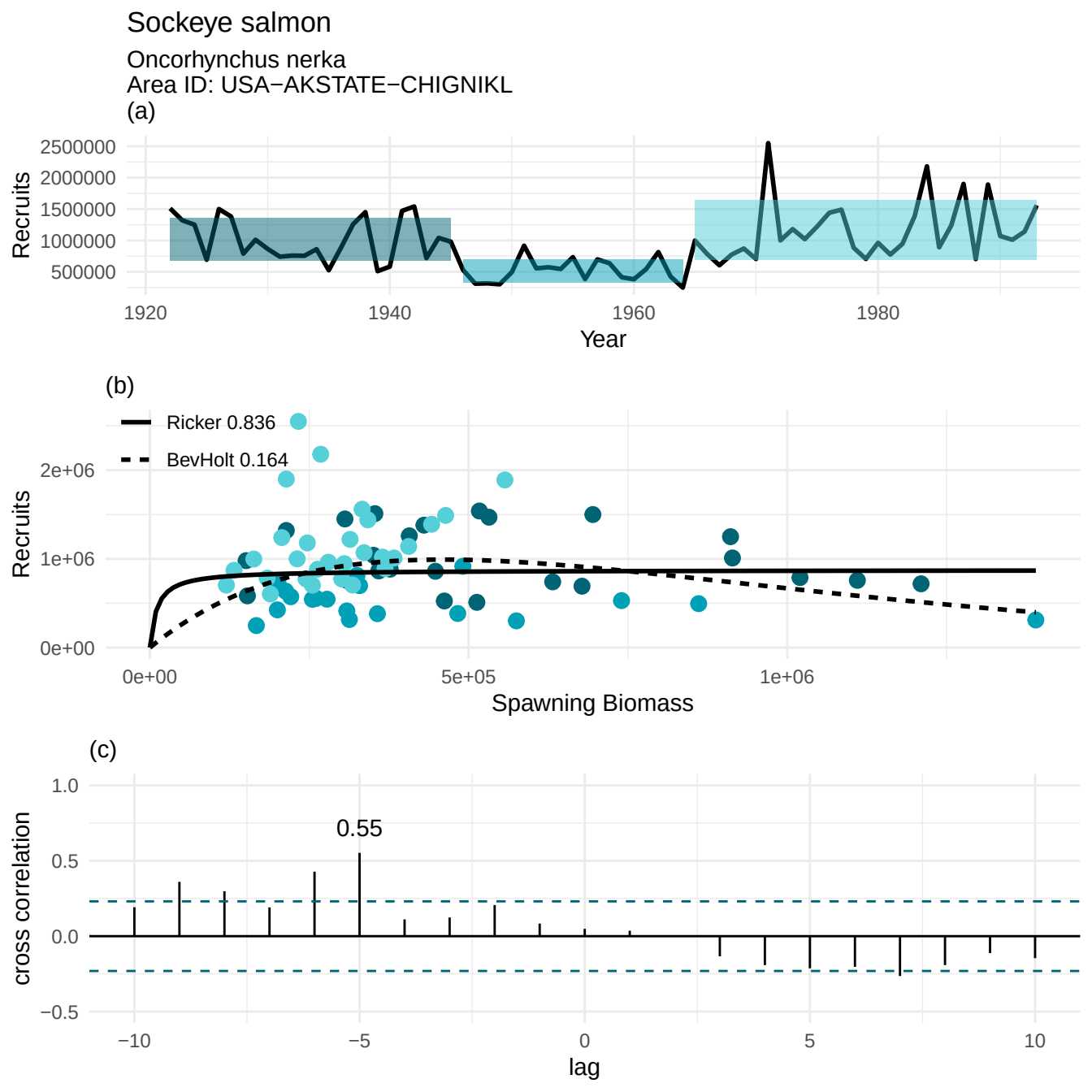

Sprat
Sprattus sprattus
Area ID: multinational−ICES−IIIa−IV
(a)
Recruits
1.5e+11
1.0e+11
5.0e+10
1990
2000
2010
2020
Year
(b)
Ricker 0.307
BevHolt 0.693
Recruits
2.0e+11
1.5e+11
1.0e+11
5.0e+10
0.0e+00
0e+00
1e+05
2e+05
3e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.81
0.43
−10
−5
0
5
10
lag

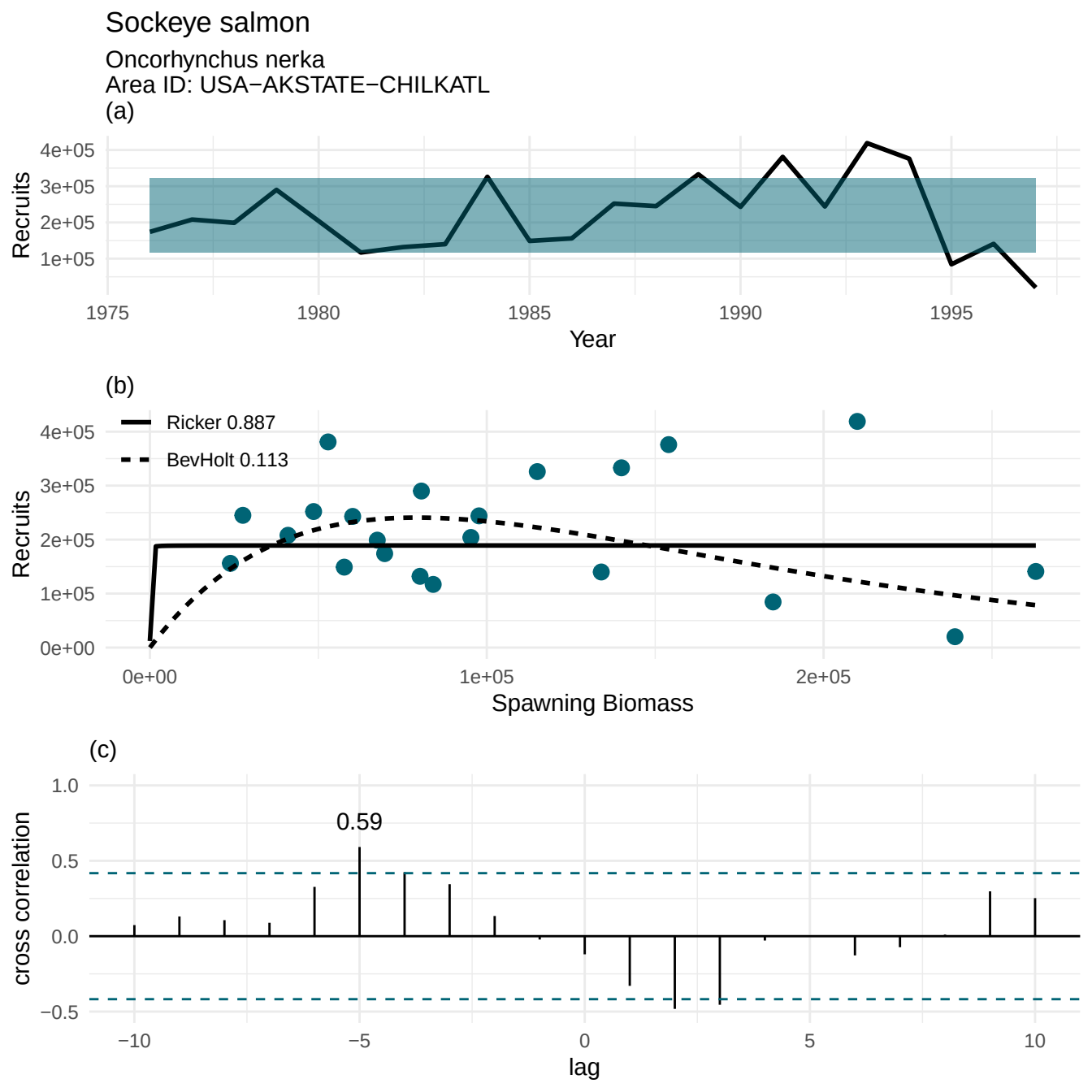

Sockeye salmon
Oncorhynchus nerka
Area ID: Canada−DFO−BIRKENH
(a)
Recruits
1500000
1000000
500000
0
1950
1960
1970
1980
1990
Year
(b)
Ricker 0.181
BevHolt 0.819
Recruits
1500000
1000000
500000
0
0e+00
1e+05
2e+05
3e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.62
−10
−5
0
5
10
lag

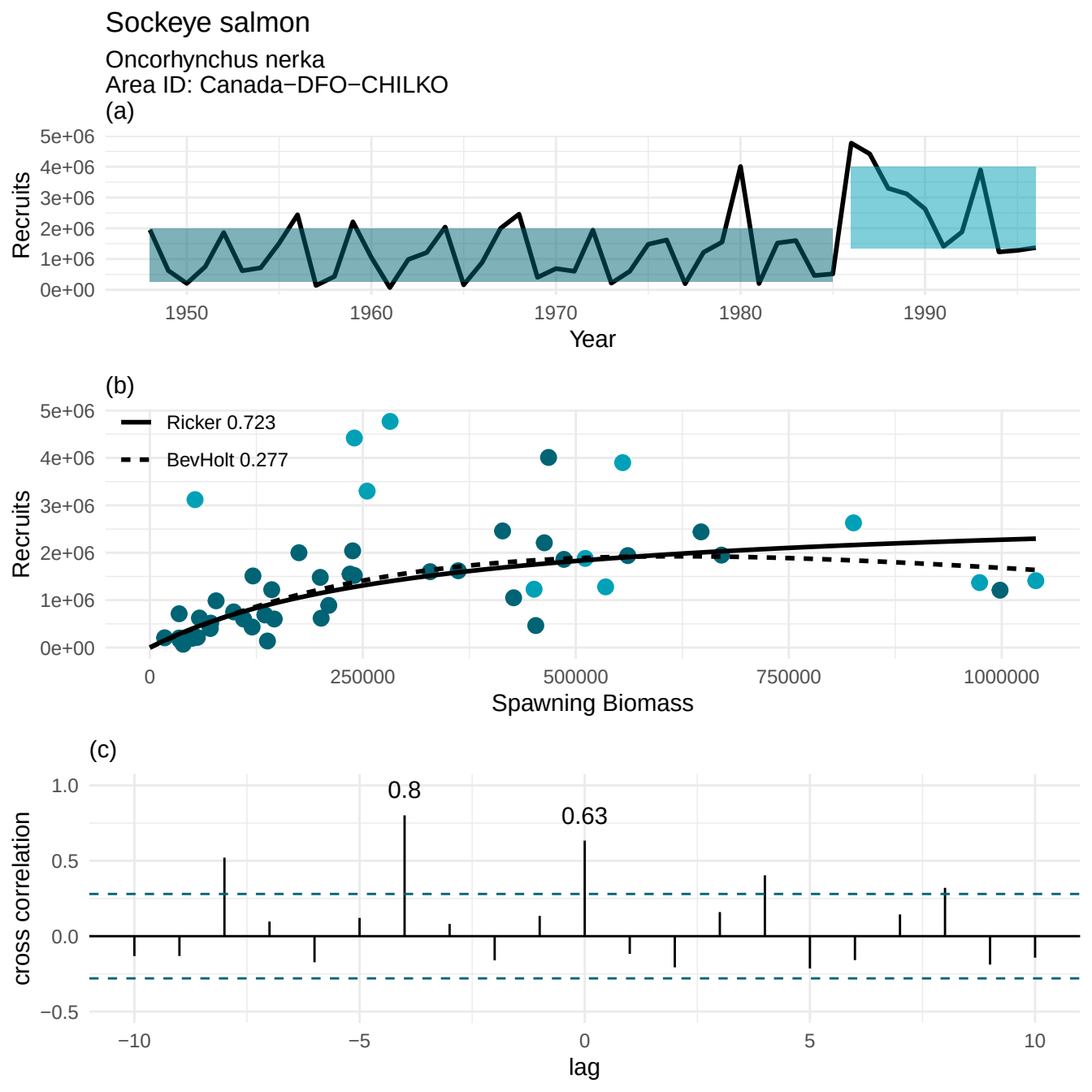

Sockeye salmon
Oncorhynchus nerka
Area ID: USA−AKSTATE−BLACKL
(a)
Recruits
4e+06
3e+06
2e+06
1e+06
0e+00
1920
1940
1960
1980
Year
(b)
Ricker 0.17
BevHolt 0.83
Recruits
Spawning Biomass
0
500000
1000000
1500000
2000000
(c)
cross correlation
0.77
0.34
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

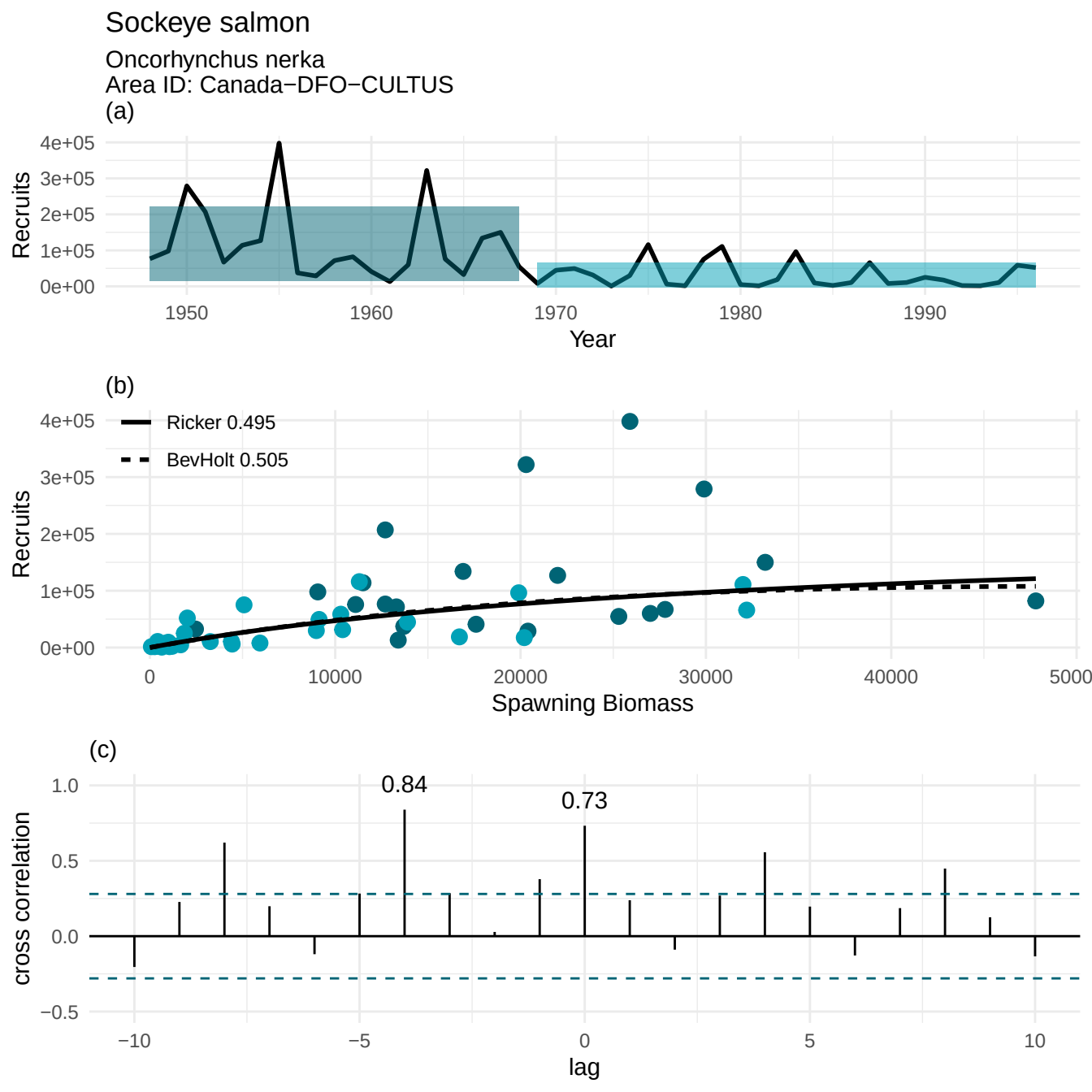

Sockeye salmon
Oncorhynchus nerka
Area ID: Canada−DFO−BOWRON
(a)
Recruits
200000
150000
100000
50000
0
1950
1960
1970
1980
1990
Year
(b)
Ricker 0.294
BevHolt 0.706
Recruits
200000
150000
100000
50000
0
0
10000
20000
30000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.72
0.69
−10
−5
0
5
10
lag

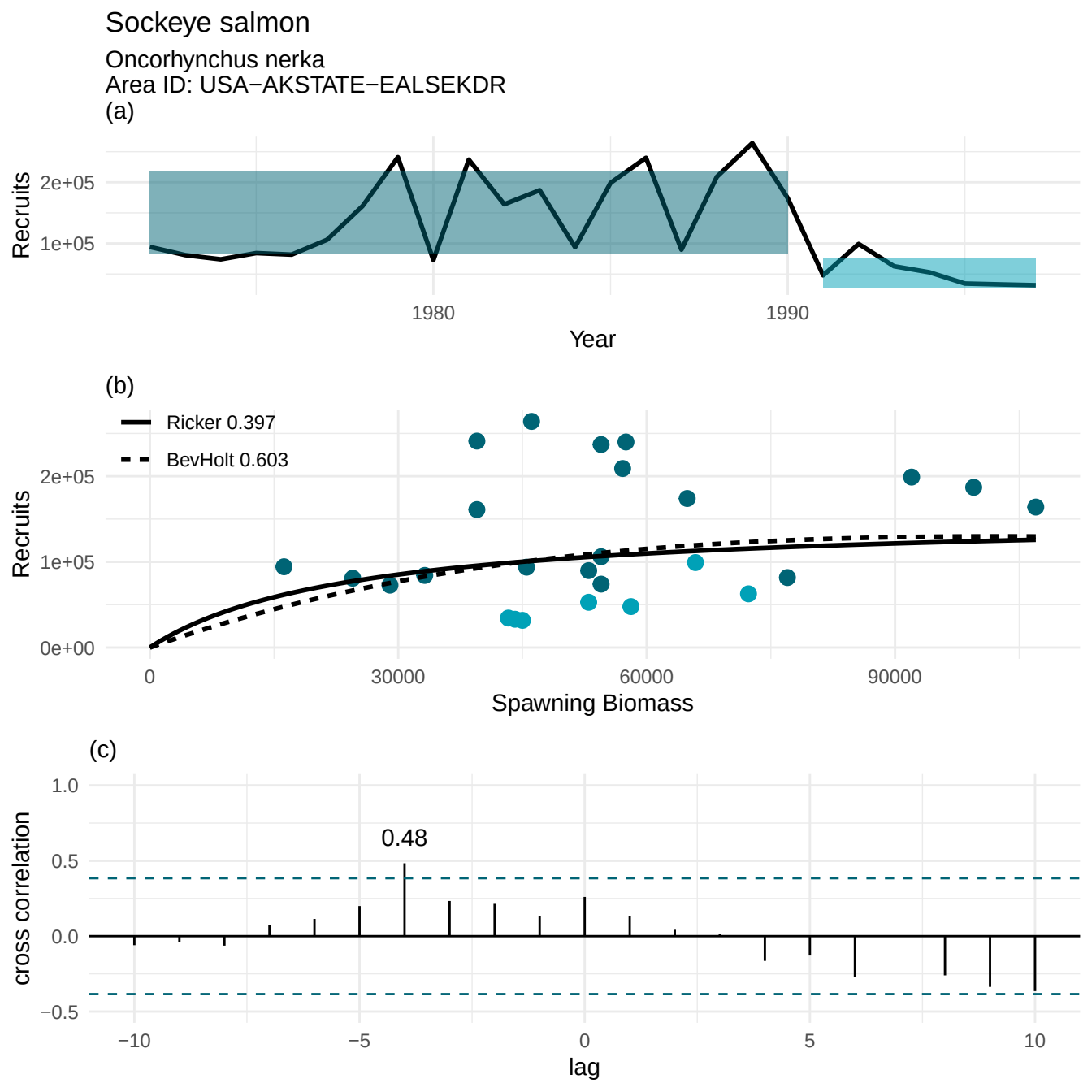

Sockeye salmon
Oncorhynchus nerka
Area ID: USA−AKSTATE−BRANCH
(a)
Recruits
2e+06
1e+06
0e+00
1960
1970
1980
1990
Year
(b)
Ricker 0.547
BevHolt 0.453
Recruits
2e+06
1e+06
0e+00
0
400000
800000
1200000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.65
0.48
−10
−5
0
5
10
lag

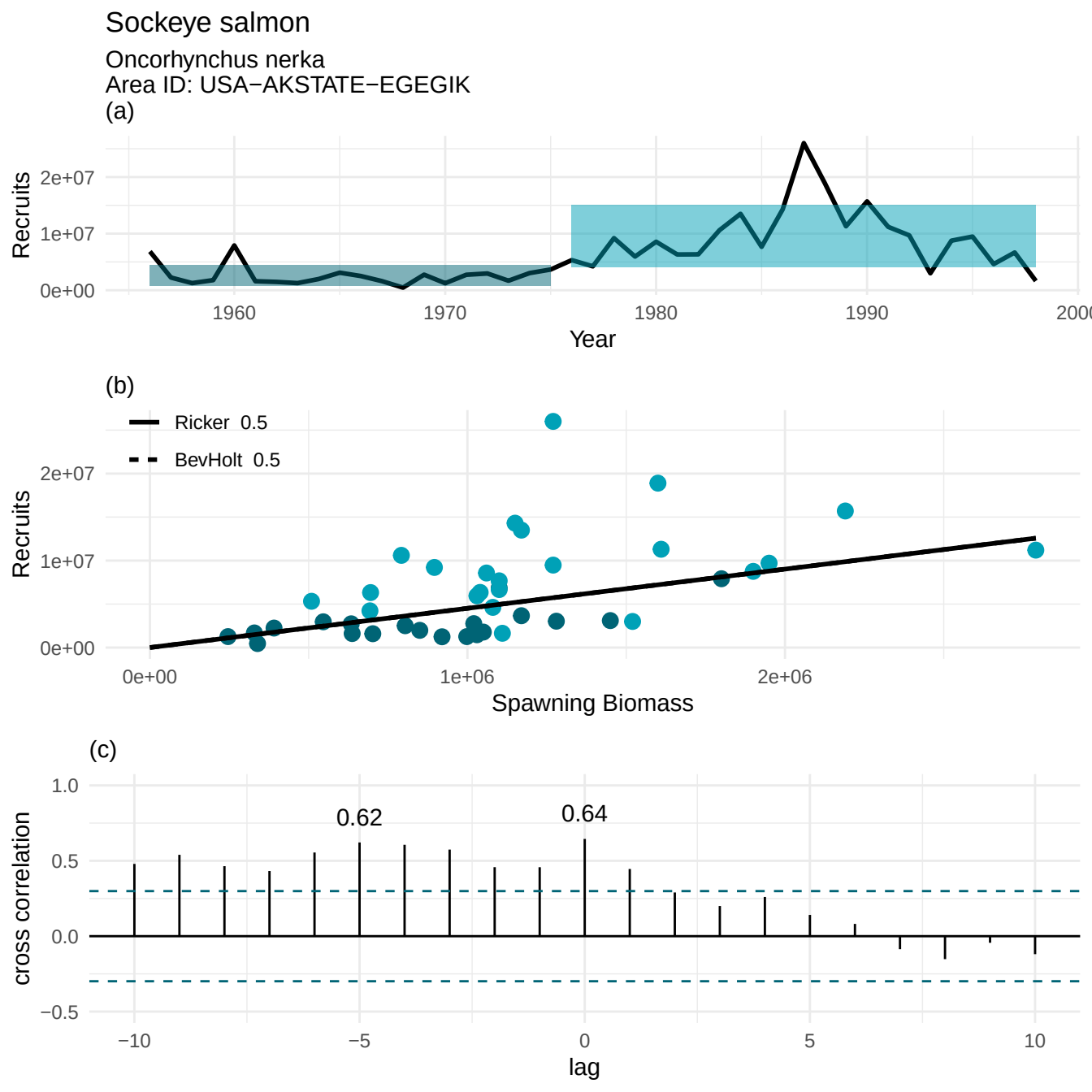

Sockeye salmon
Oncorhynchus nerka
Area ID: USA−AKSTATE−CHIGNIKL
(a)
Recruits
2500000
2000000
1500000
1000000
500000
1920
1940
1960
1980
Year
(b)
Ricker 0.836
BevHolt 0.164
Recruits
2e+06
1e+06
0e+00
0e+00
5e+05
1e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.55
−10
−5
0
5
10
lag

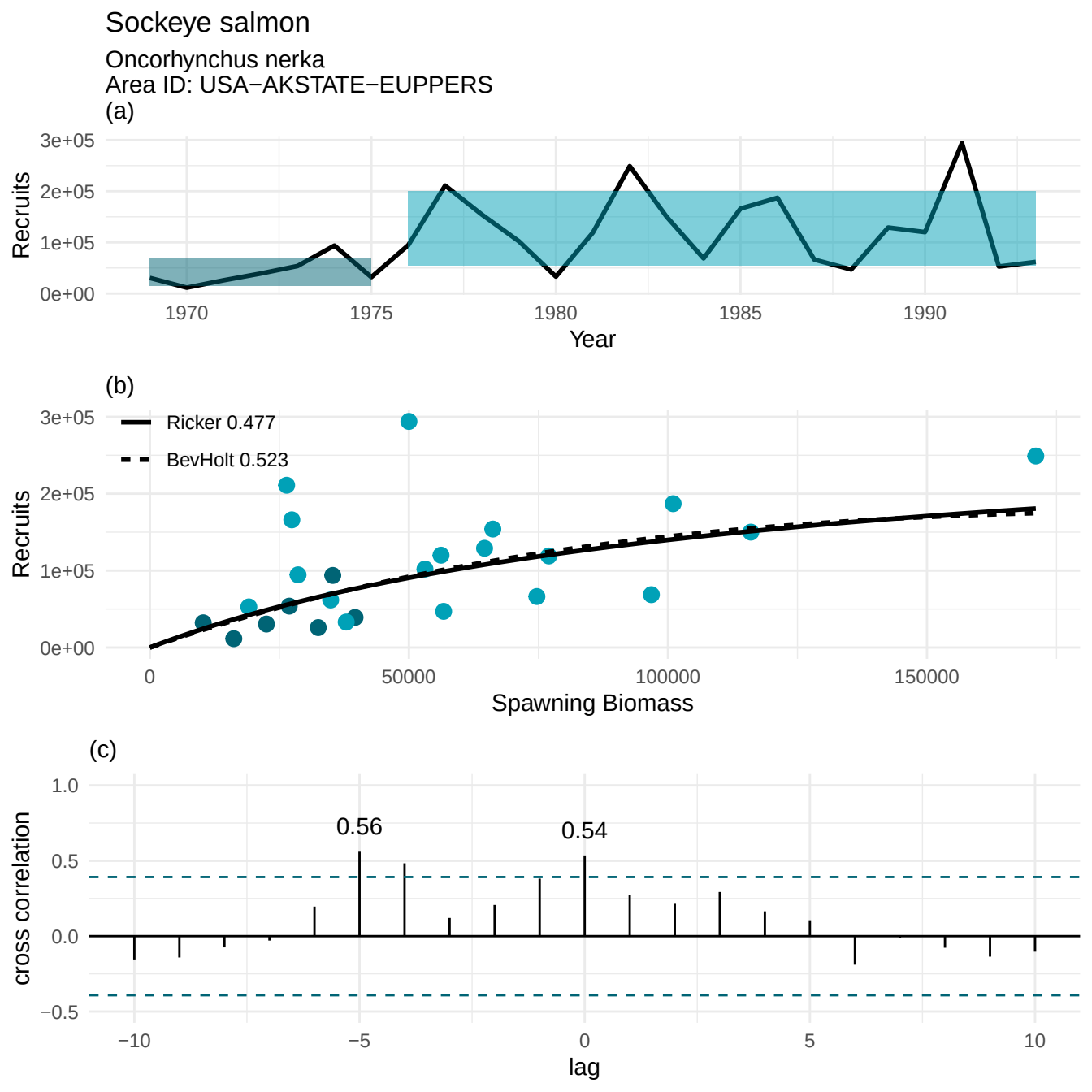

Sockeye salmon
Oncorhynchus nerka
Area ID: USA−AKSTATE−CHILKATL
(a)
Recruits
4e+05
3e+05
2e+05
1e+05
1975
1980
1985
1990
1995
Year
(b)
Ricker 0.887
BevHolt 0.113
Recruits
4e+05
3e+05
2e+05
1e+05
0e+00
0e+00
1e+05
2e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.59
−10
−5
0
5
10
lag

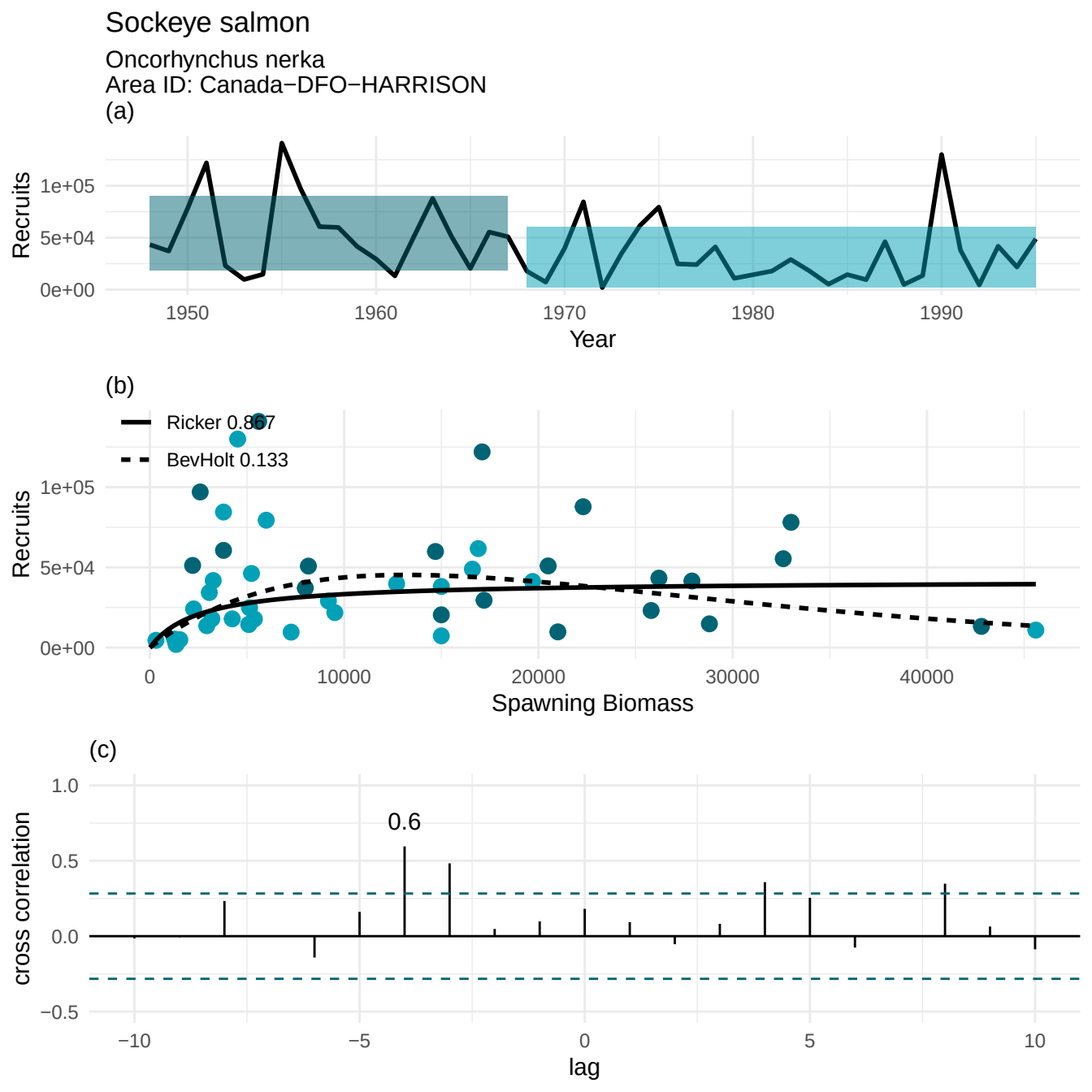

Sockeye salmon
Oncorhynchus nerka
Area ID: Canada−DFO−CHILKO
(a)
Recruits
5e+06
4e+06
3e+06
2e+06
1e+06
0e+00
1950
1960
1970
1980
1990
Year
(b)
Ricker 0.723
BevHolt 0.277
Recruits
0
250000
500000
750000
1000000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.8
0.63
−10
−5
0
5
10
lag

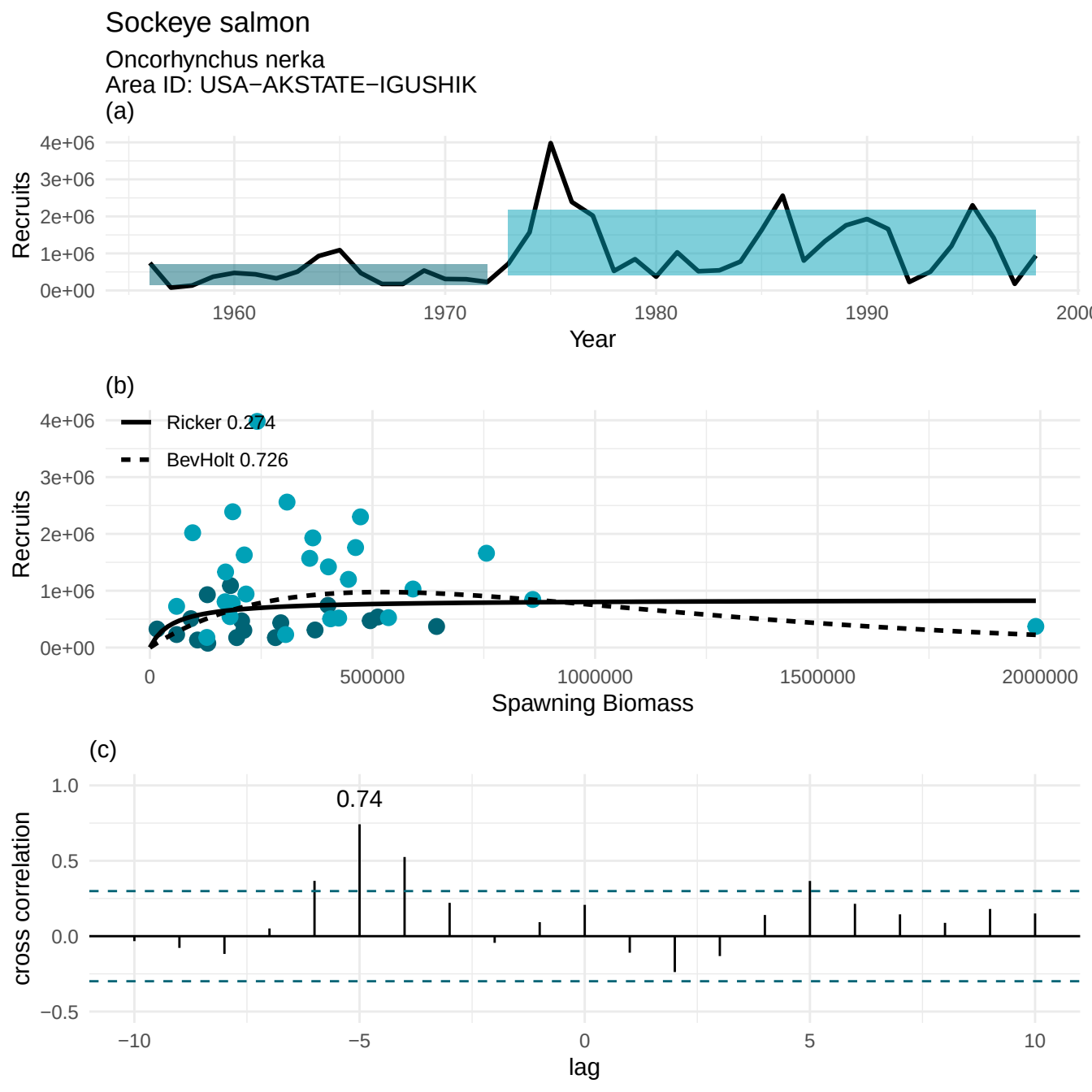

Sockeye salmon
Oncorhynchus nerka
Area ID: Canada−DFO−CULTUS
(a)
Recruits
4e+05
3e+05
2e+05
1e+05
0e+00
1950
1960
1970
1980
1990
Year
(b)
Ricker 0.495
BevHolt 0.505
Recruits
Spawning Biomass
0
10000
20000
30000
40000
5000
(c)
cross correlation
0.84
0.73
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

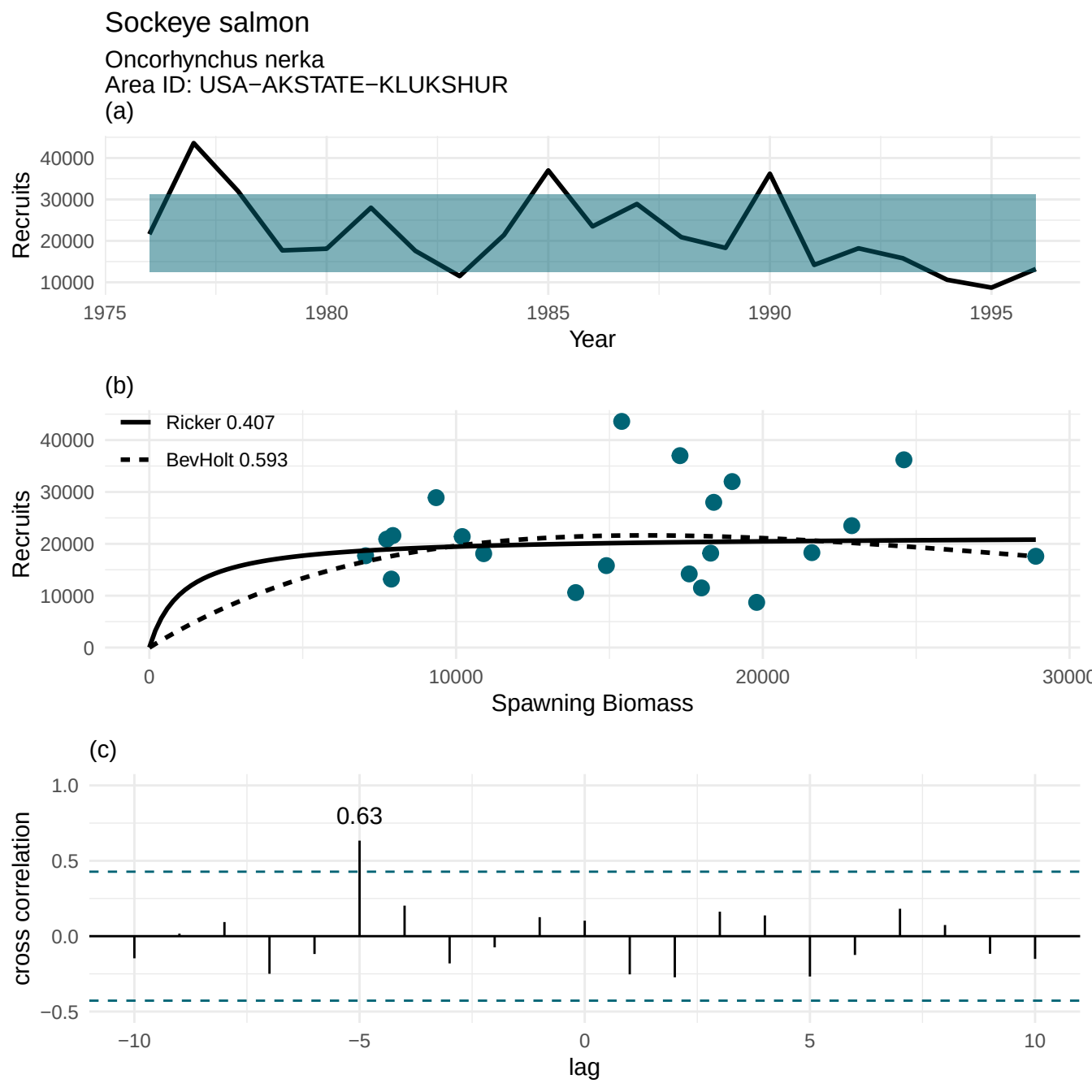

Sockeye salmon
Oncorhynchus nerka
Area ID: USA−AKSTATE−EALSEKDR
(a)
Recruits
2e+05
1e+05
1980
1990
Year
(b)
Ricker 0.397
BevHolt 0.603
Recruits
2e+05
1e+05
0e+00
0
30000
60000
90000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.48
−10
−5
0
5
10
lag

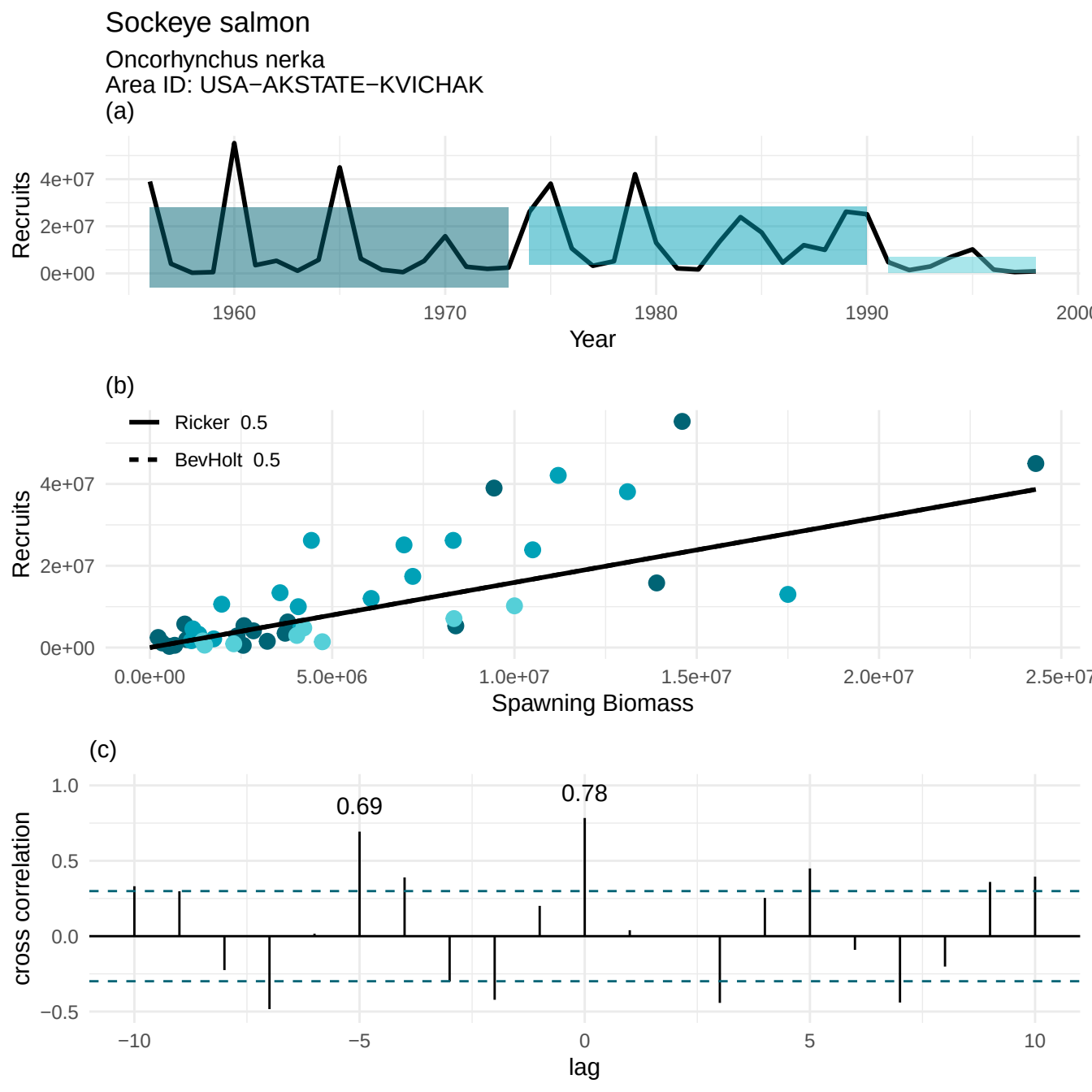

Sockeye salmon
Oncorhynchus nerka
Area ID: USA−AKSTATE−EGEGIK
(a)
Recruits
2e+07
1e+07
0e+00
1960
1970
1980
1990
2000
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
2e+07
1e+07
0e+00
0e+00
1e+06
2e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.62
0.64
−10
−5
0
5
10
lag

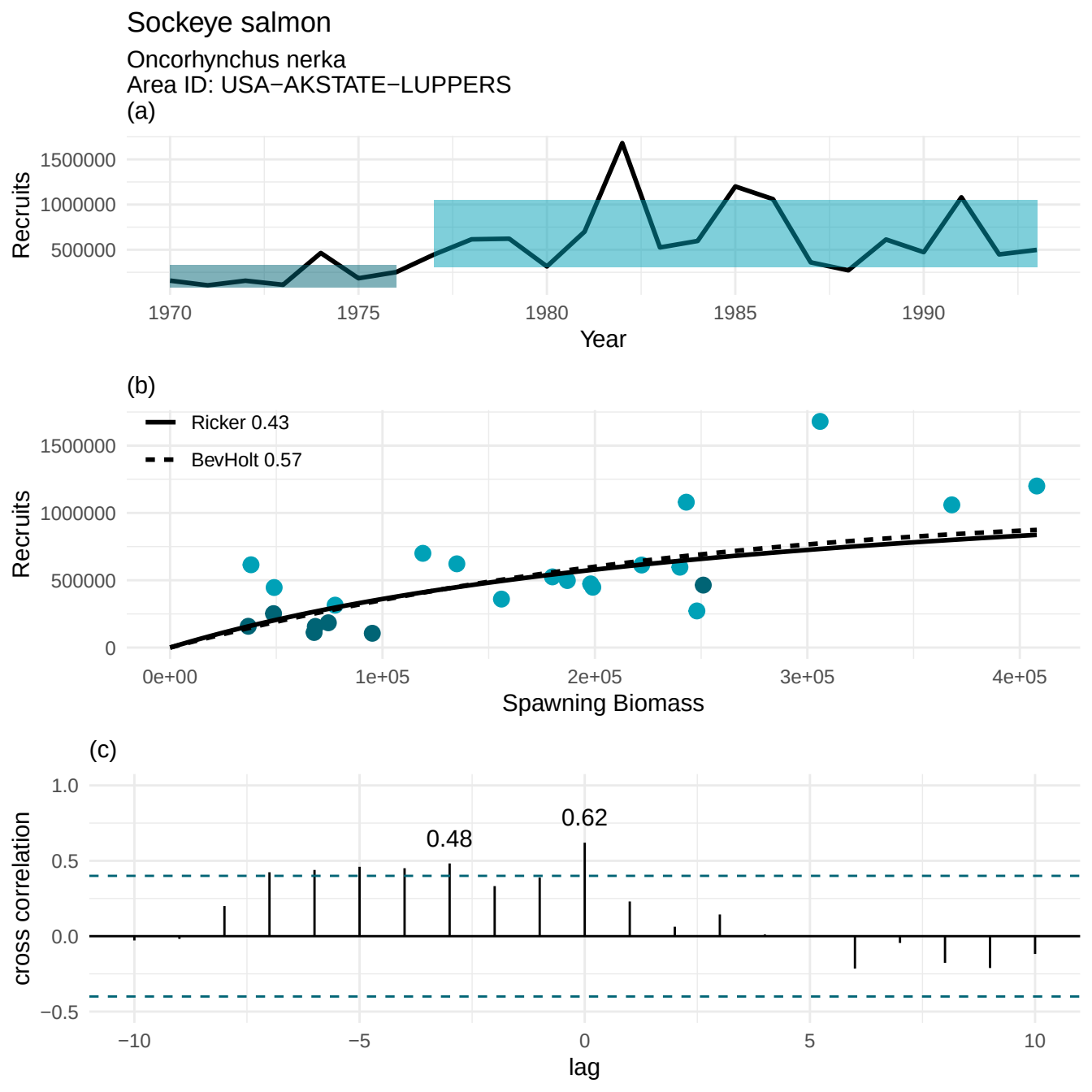

Sockeye salmon
Oncorhynchus nerka
Area ID: USA−AKSTATE−EUPPERS
(a)
Recruits
3e+05
2e+05
1e+05
0e+00
1970
1975
1980
1985
1990
Year
(b)
Ricker 0.477
BevHolt 0.523
Recruits
3e+05
2e+05
1e+05
0e+00
0
50000
100000
150000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.56
0.54
−10
−5
0
5
10
lag

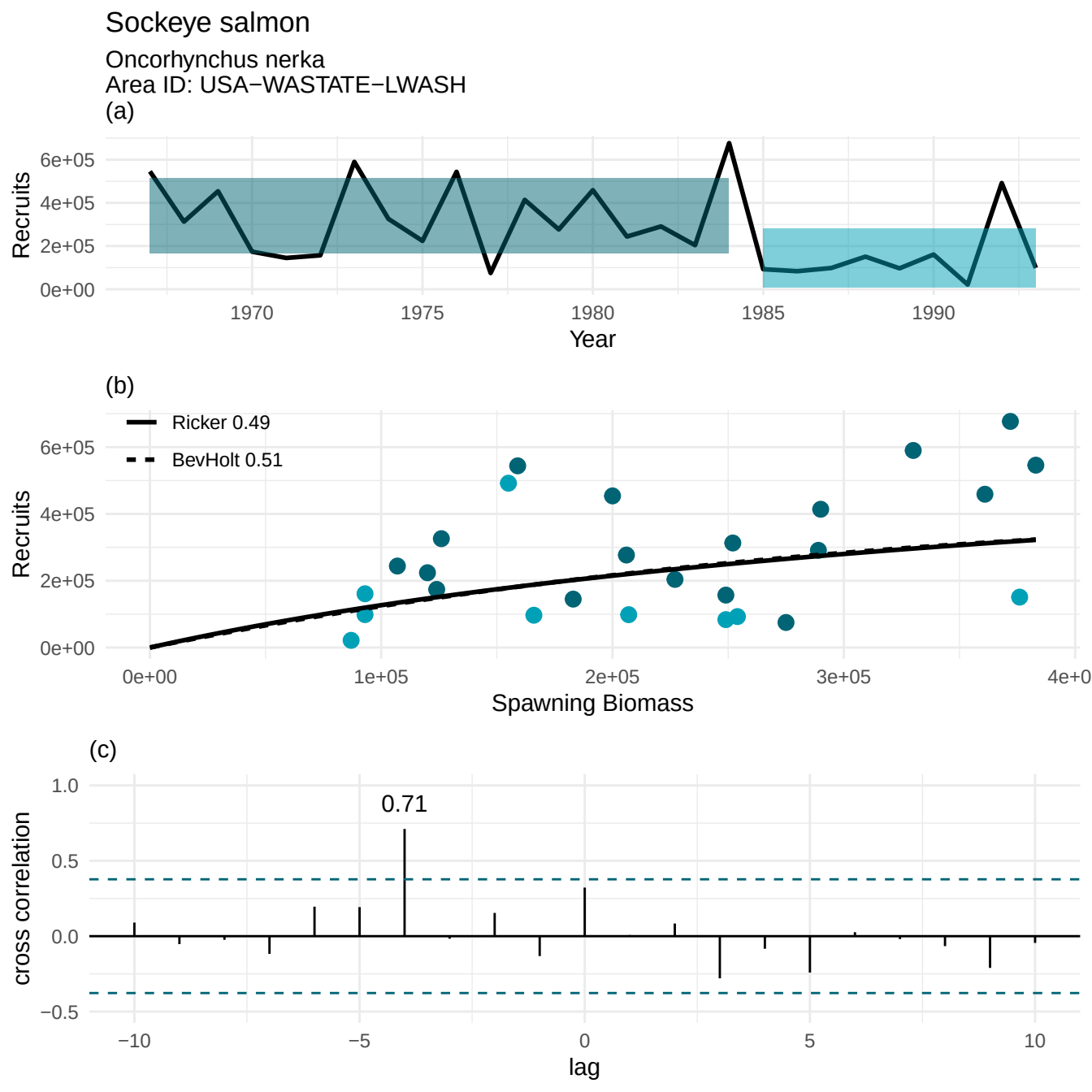

Sockeye salmon
Oncorhynchus nerka
Area ID: Canada−DFO−HARRISON
(a)
Recruits
1e+05
5e+04
0e+00
1950
1960
1970
1980
1990
Year
(b)
Ricker 0.867
BevHolt 0.133
Recruits
1e+05
5e+04
0e+00
0
10000
20000
30000
40000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.6
−10
−5
0
5
10
lag

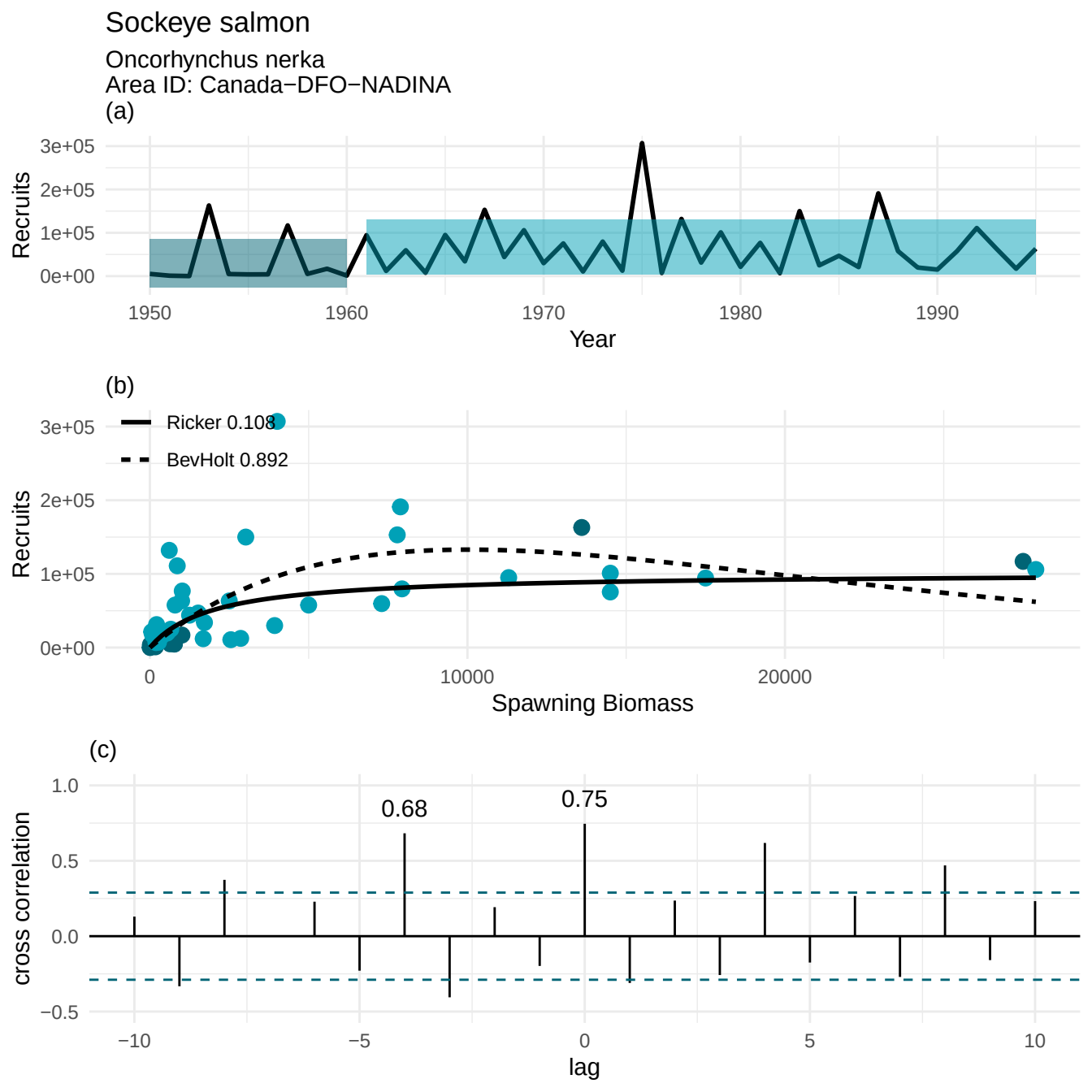

Sockeye salmon
Oncorhynchus nerka
Area ID: USA−AKSTATE−IGUSHIK
(a)
Recruits
4e+06
3e+06
2e+06
1e+06
0e+00
1960
1970
1980
1990
2000
Year
(b)
Ricker 0.274
BevHolt 0.726
Recruits
0
500000
1000000
1500000
2000000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.74
−10
−5
0
5
10
lag

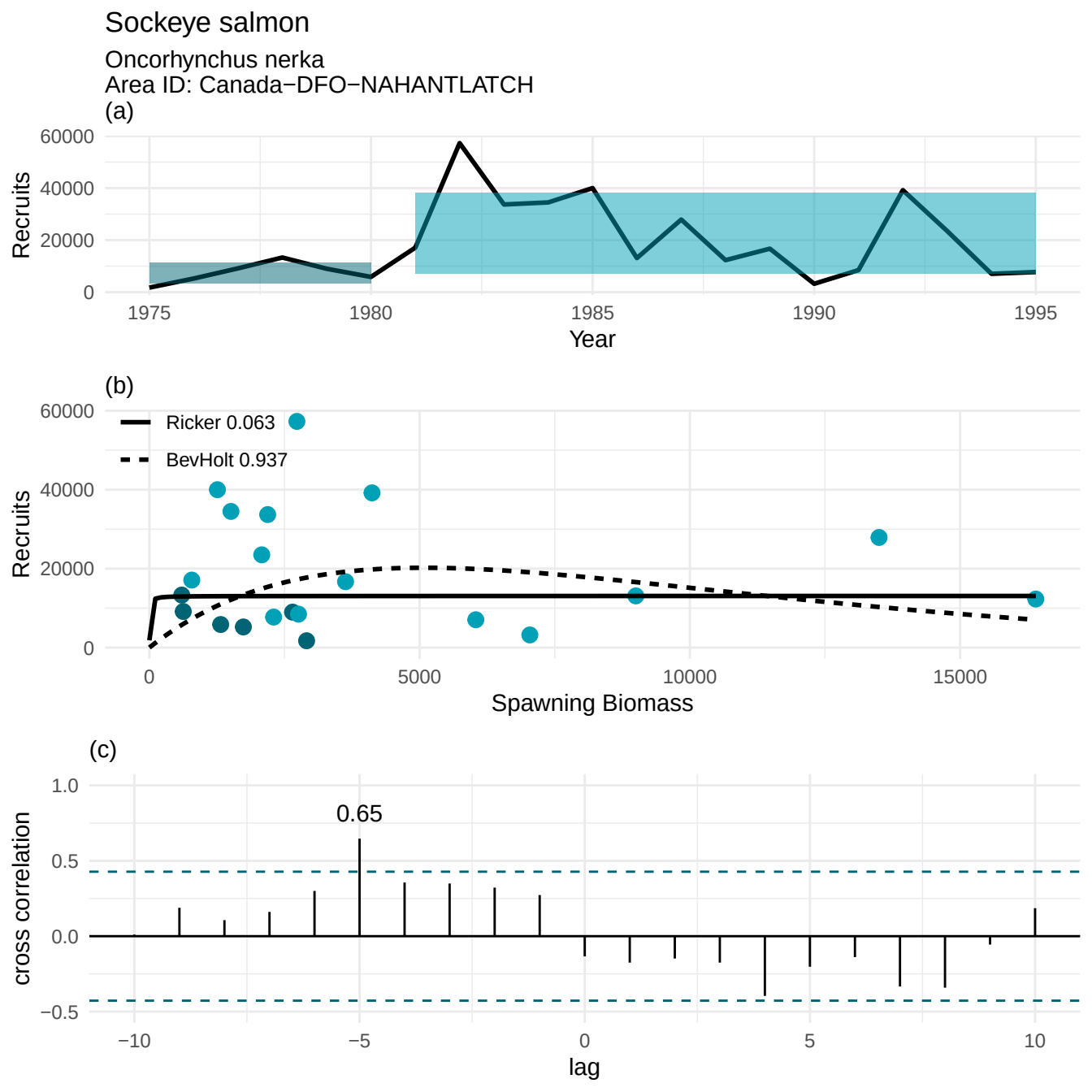

Sockeye salmon
Oncorhynchus nerka
Area ID: USA−AKSTATE−KLUKSHUR
(a)
Recruits
40000
30000
20000
10000
1975
1980
1985
1990
1995
Year
(b)
Ricker 0.407
BevHolt 0.593
Recruits
40000
30000
20000
10000
0
0
10000
20000
30000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.63
−10
−5
0
5
10
lag

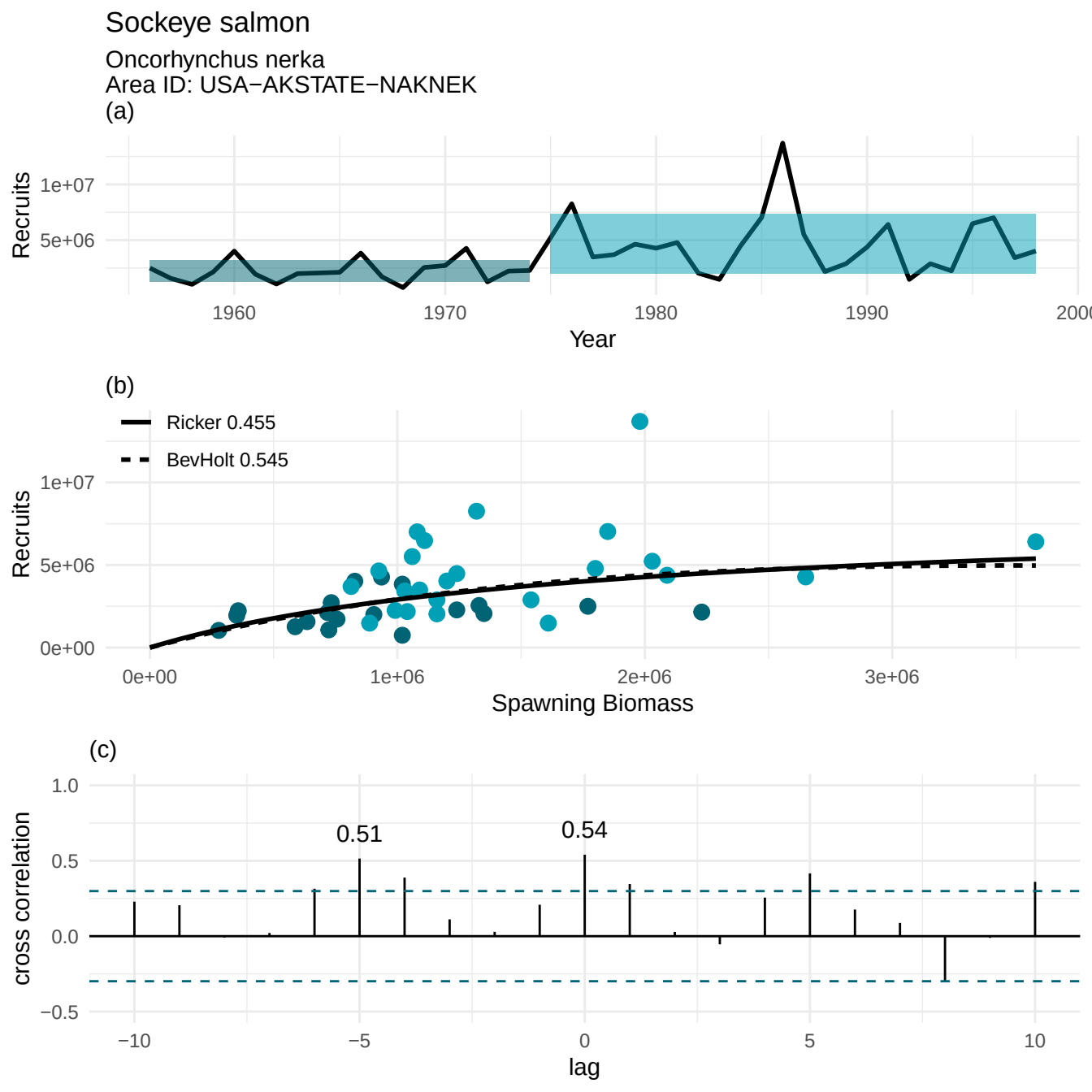

Sockeye salmon
Oncorhynchus nerka
Area ID: USA−AKSTATE−KVICHAK
(a)
Recruits
4e+07
2e+07
0e+00
1960
1970
1980
1990
2000
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
4e+07
2e+07
0e+00
0.0e+00
5.0e+06
1.0e+07
1.5e+07
2.0e+07
2.5e+07
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.69
0.78
−10
−5
0
5
10
lag

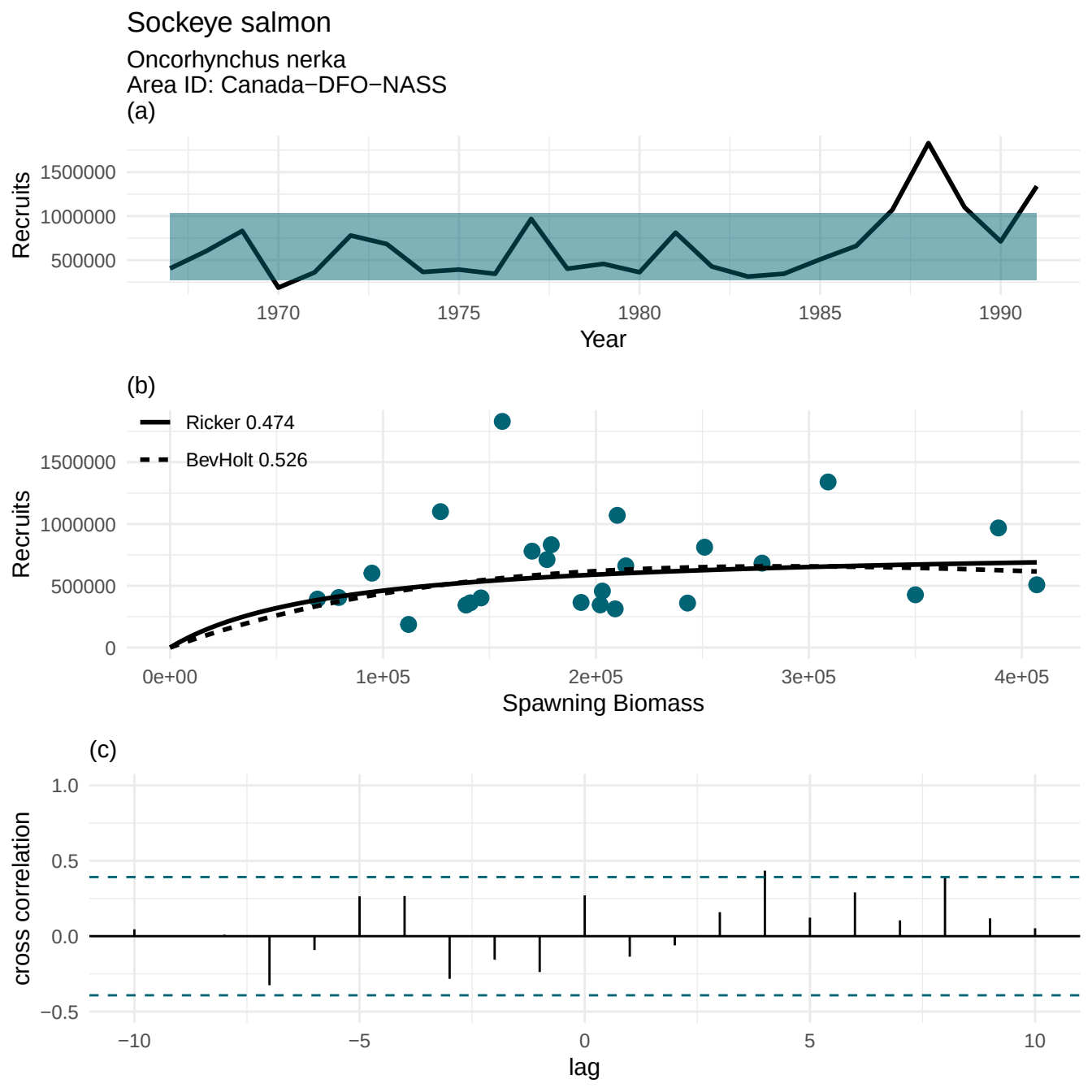

Sockeye salmon
Oncorhynchus nerka
Area ID: USA−AKSTATE−LUPPERS
(a)
Recruits
1500000
1000000
500000
1970
1975
1980
1985
1990
Year
(b)
Ricker 0.43
BevHolt 0.57
Recruits
1500000
1000000
500000
0
0e+00
1e+05
2e+05
3e+05
4e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.48
0.62
−10
−5
0
5
10
lag

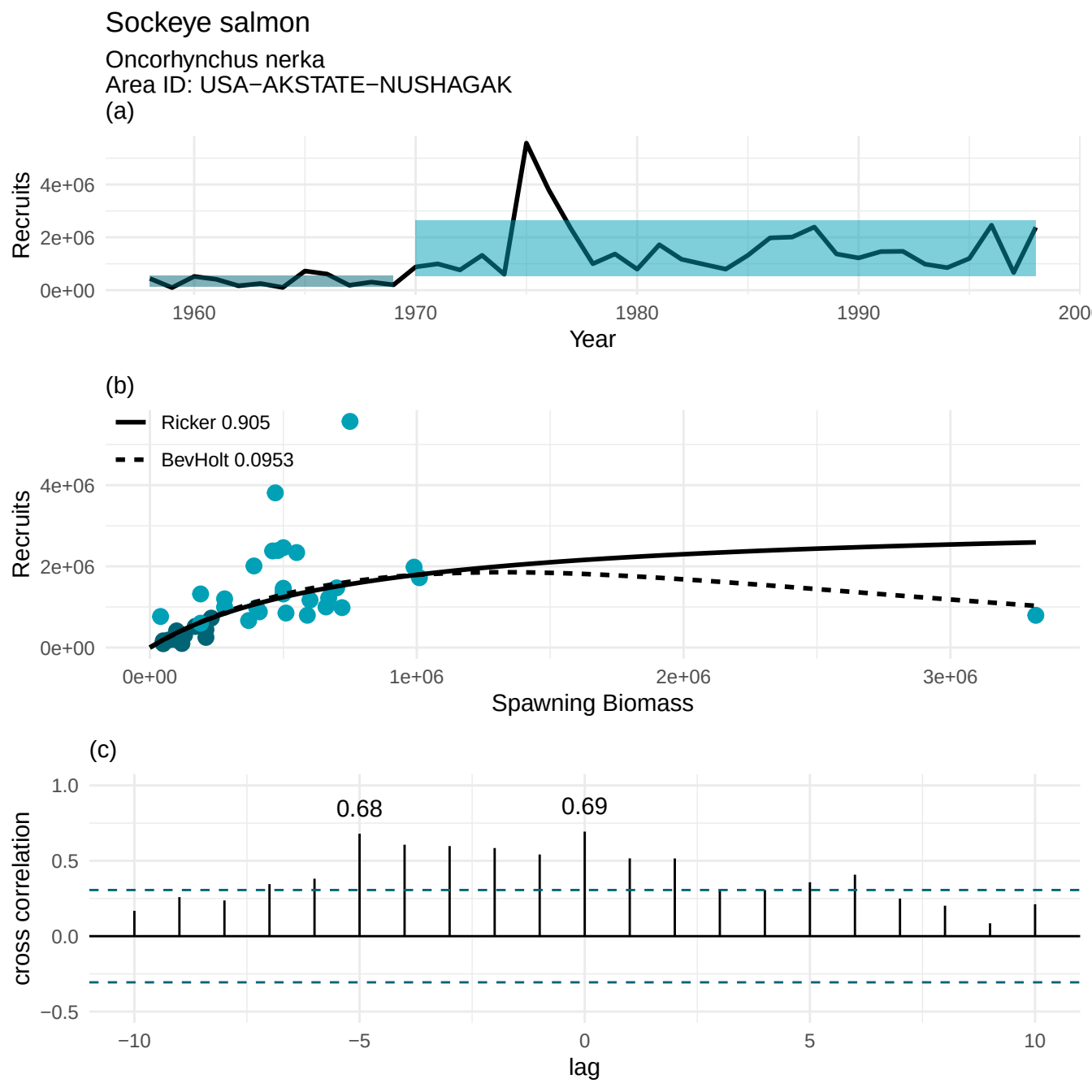

Sockeye salmon
Oncorhynchus nerka
Area ID: USA−WASTATE−LWASH
(a)
Recruits
6e+05
4e+05
2e+05
0e+00
1970
1975
1980
1985
1990
Year
(b)
Ricker 0.49
BevHolt 0.51
Recruits
6e+05
4e+05
2e+05
0e+00
0e+00
1e+05
2e+05
3e+05
4e+0
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.71
−10
−5
0
5
10
lag

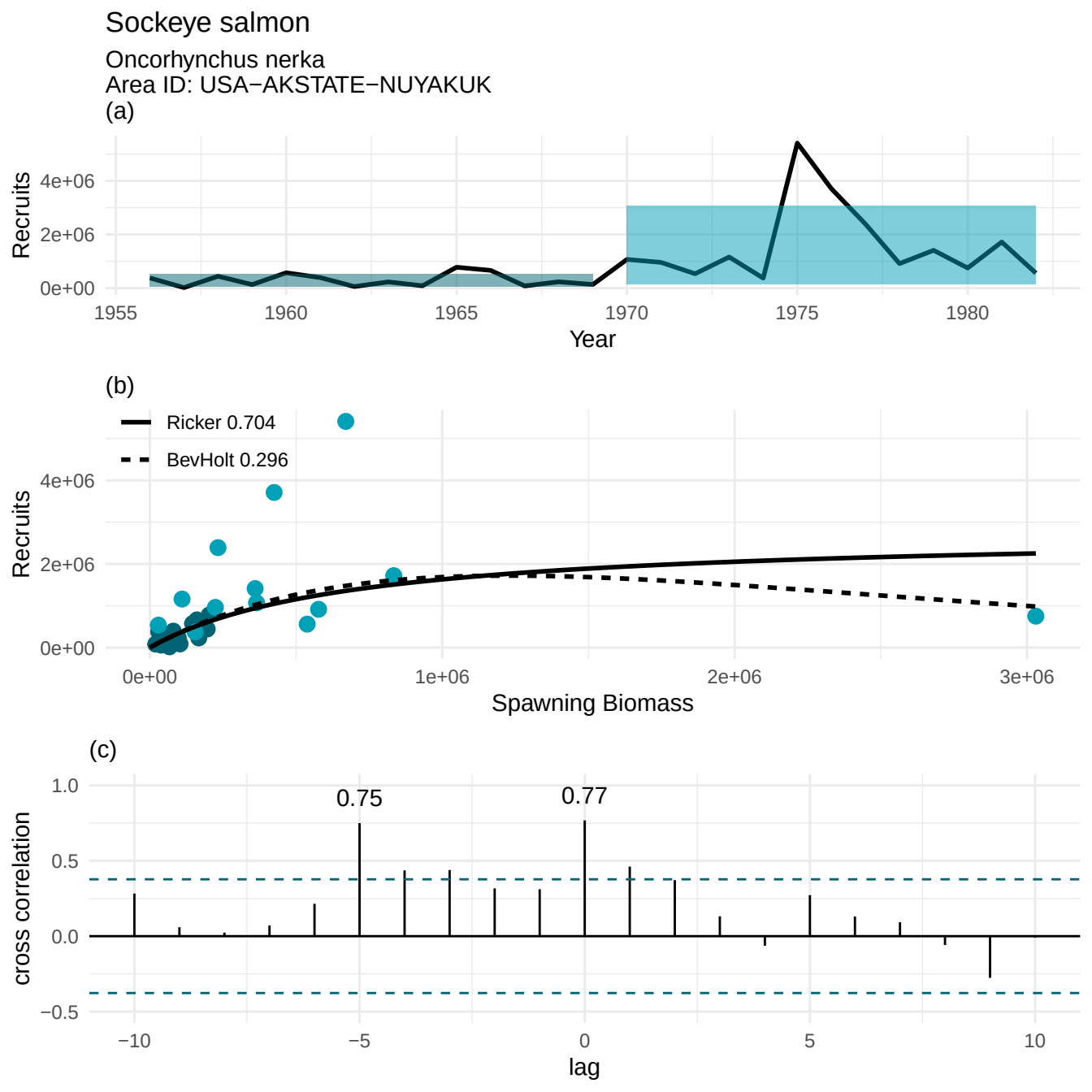

Sockeye salmon
Oncorhynchus nerka
Area ID: Canada−DFO−NADINA
(a)
Recruits
3e+05
2e+05
1e+05
0e+00
1950
1960
1970
1980
1990
Year
(b)
Ricker 0.108
BevHolt 0.892
Recruits
3e+05
2e+05
1e+05
0e+00
0
10000
20000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.68
0.75
−10
−5
0
5
10
lag

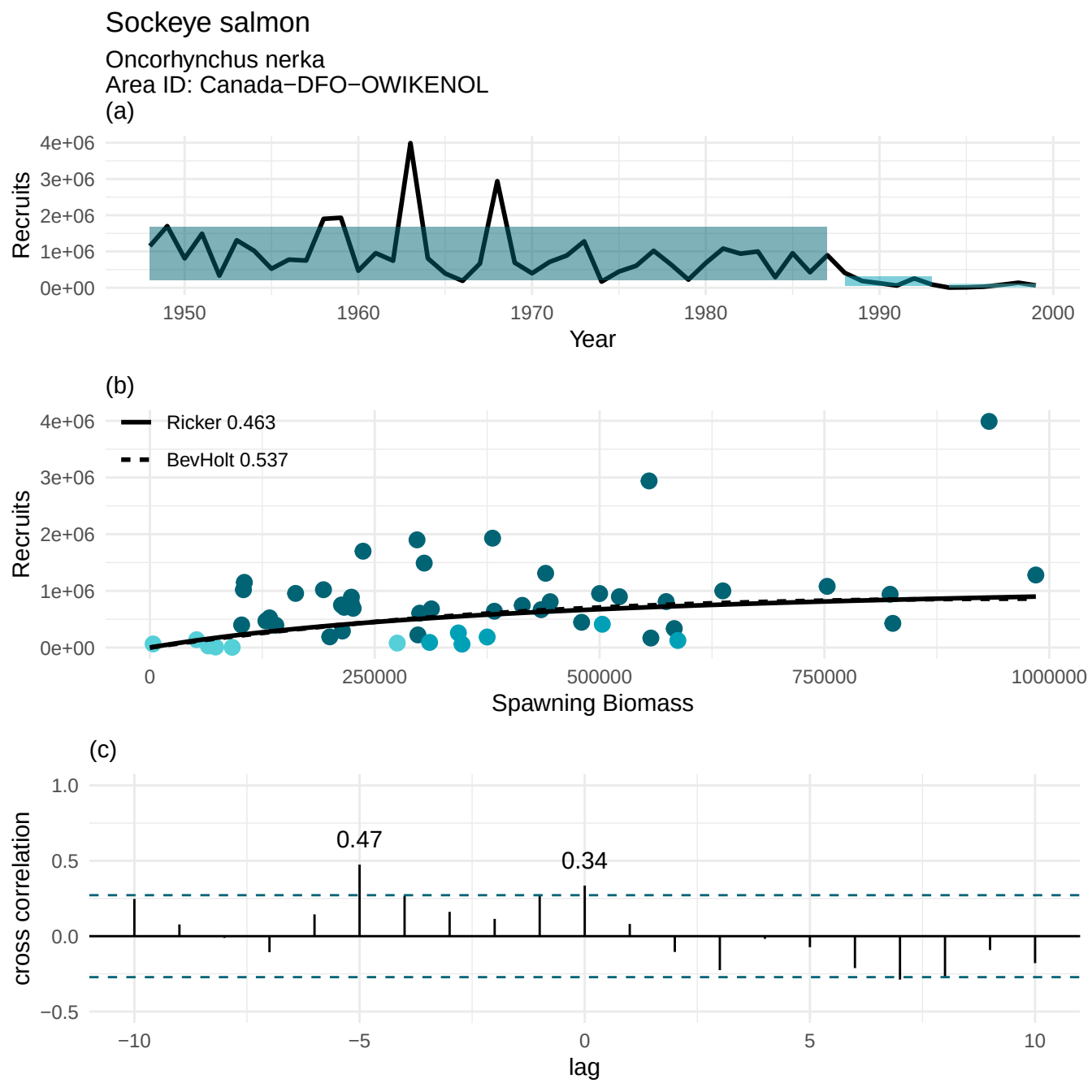

Sockeye salmon
Oncorhynchus nerka
Area ID: Canada−DFO−NAHANTLATCH
(a)
Recruits
60000
40000
20000
0
1975
1980
1985
1990
1995
Year
(b)
Ricker 0.063
BevHolt 0.937
Recruits
60000
40000
20000
0
0
5000
10000
15000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.65
−10
−5
0
5
10
lag

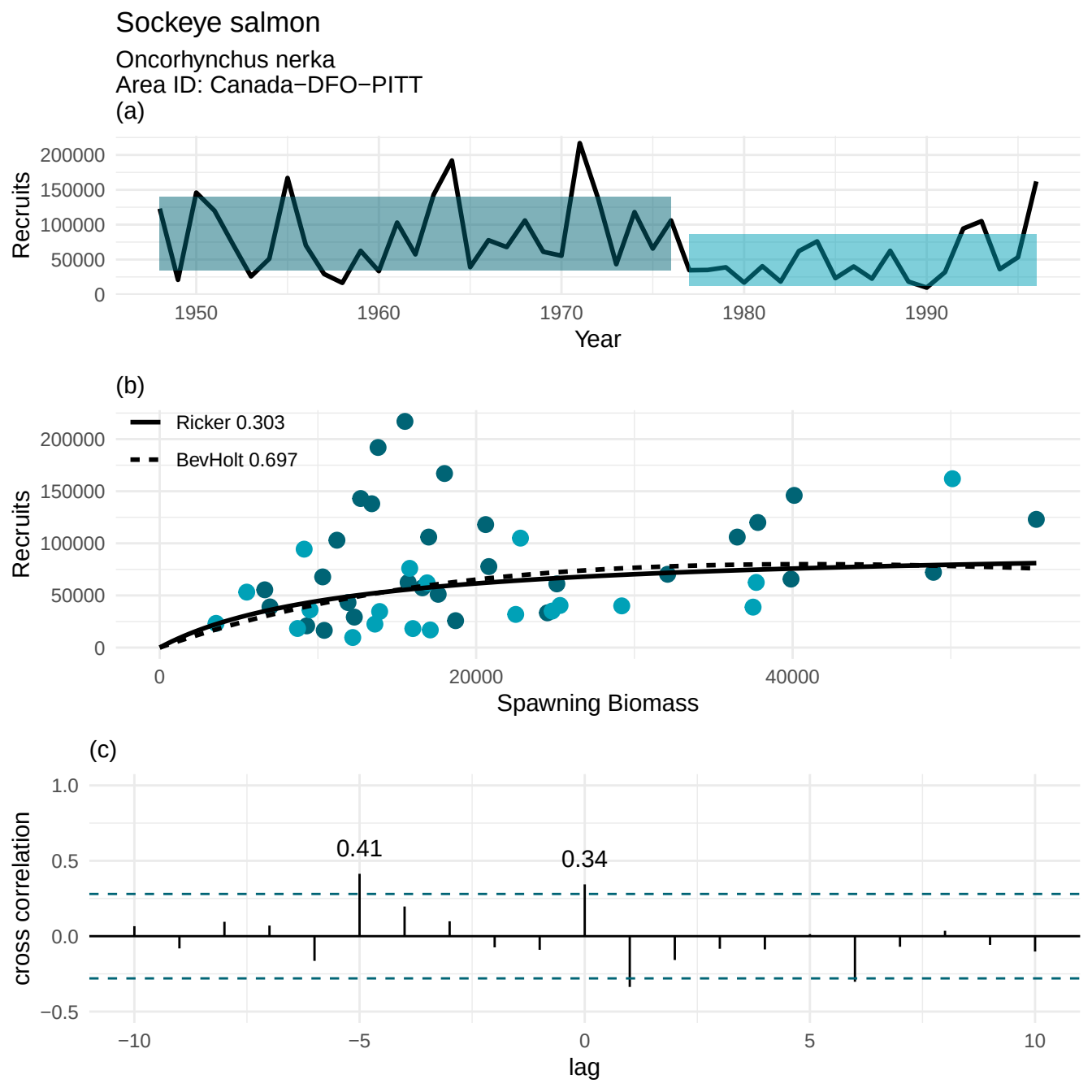

Sockeye salmon
Oncorhynchus nerka
Area ID: USA−AKSTATE−NAKNEK
(a)
Recruits
1e+07
5e+06
1960
1970
1980
1990
Year
(b)
Ricker 0.455
BevHolt 0.545
Recruits
1e+07
5e+06
0e+00
0e+00
1e+06
2e+06
3e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.51
0.54
−10
−5
0
5
10
lag

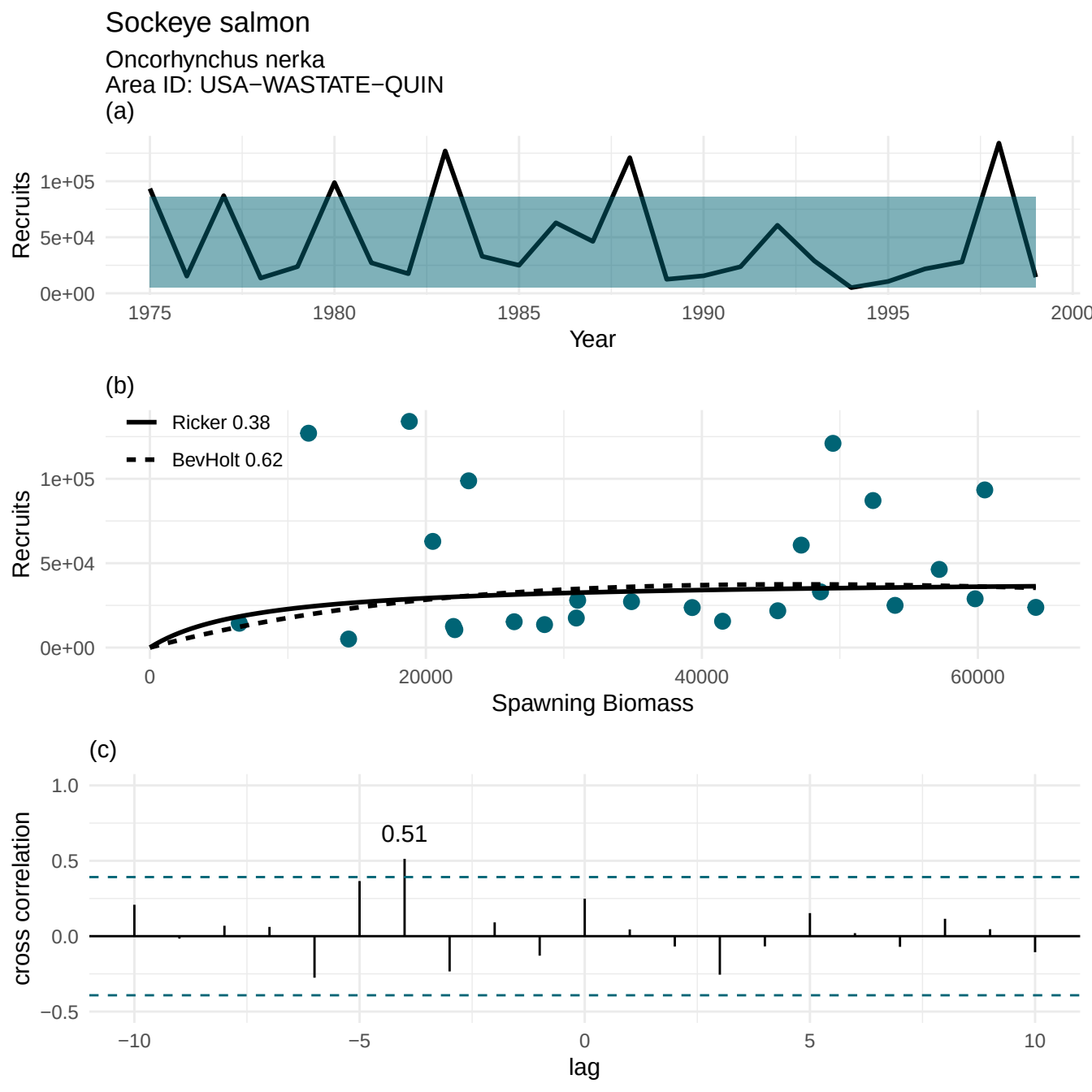

Sockeye salmon
Oncorhynchus nerka
Area ID: Canada−DFO−NASS
(a)
Recruits
1500000
1000000
500000
1970
1975
1980
1985
1990
Year
(b)
Ricker 0.474
BevHolt 0.526
Recruits
1500000
1000000
500000
0
0e+00
1e+05
2e+05
3e+05
4e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

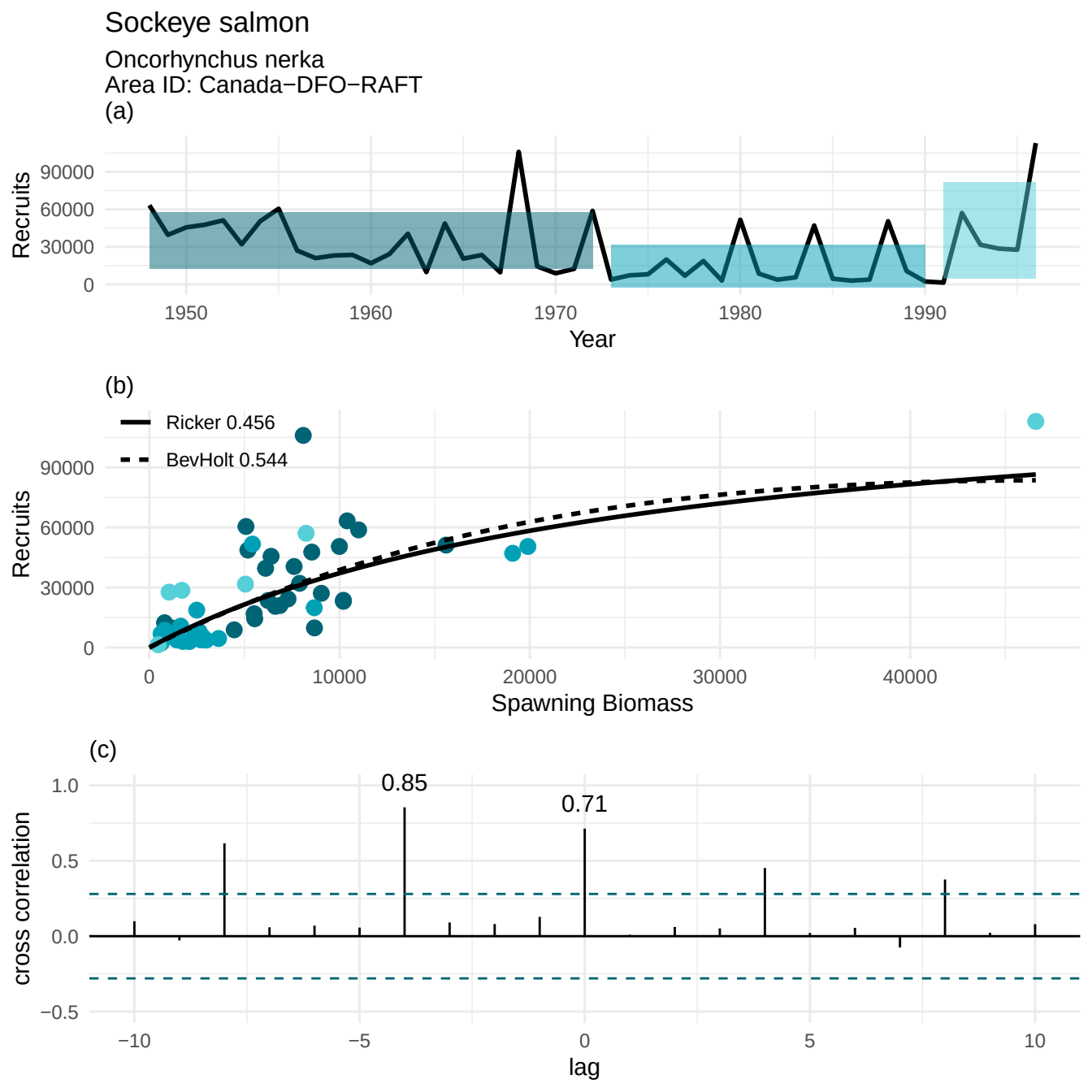

Sockeye salmon
Oncorhynchus nerka
Area ID: USA−AKSTATE−NUSHAGAK
(a)
Recruits
4e+06
2e+06
0e+00
1960
1970
1980
1990
200
Year
(b)
Ricker 0.905
BevHolt 0.0953
Recruits
4e+06
2e+06
0e+00
0e+00
1e+06
2e+06
3e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.68
0.69
−10
−5
0
5
10
lag

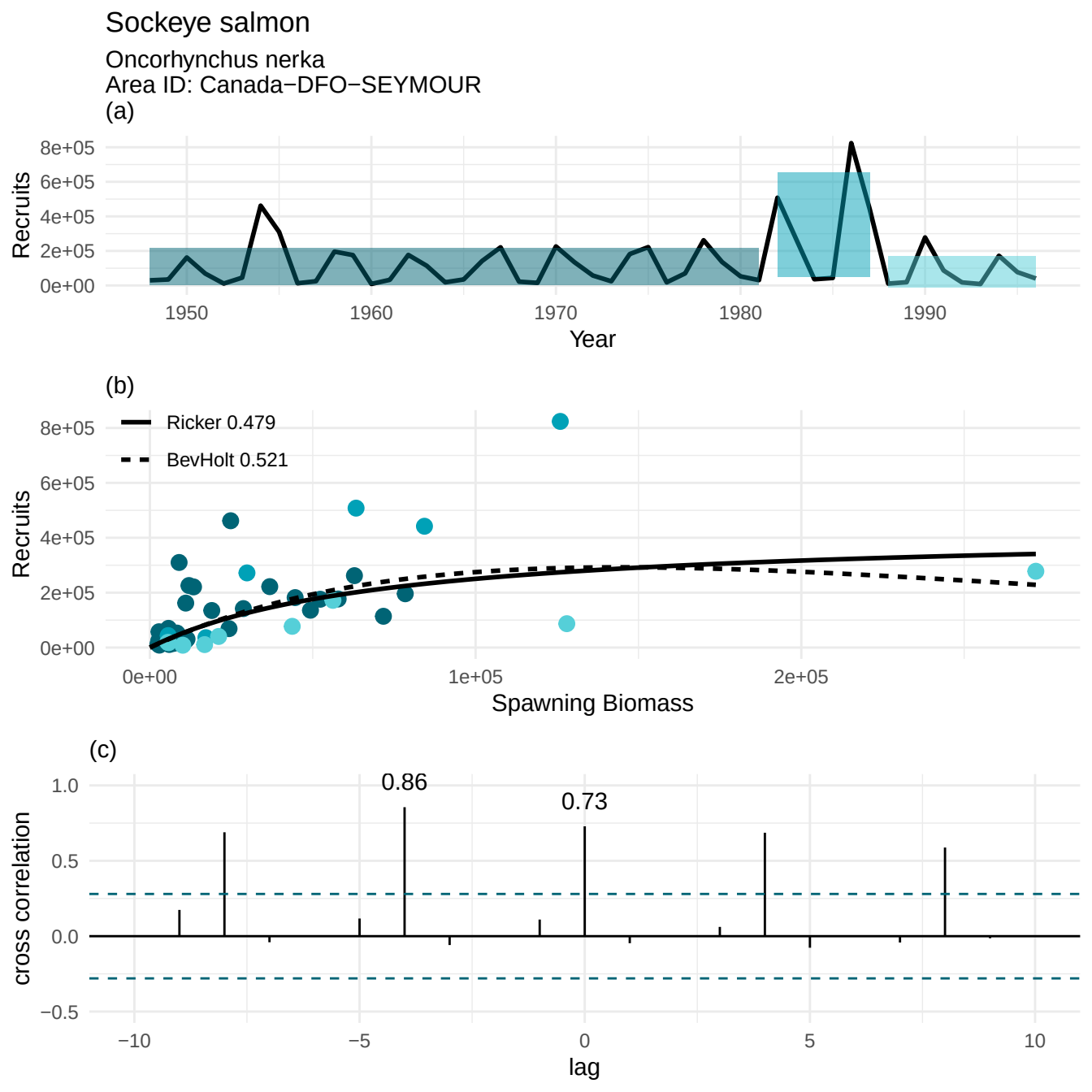

Sockeye salmon
Oncorhynchus nerka
Area ID: USA−AKSTATE−NUYAKUK
(a)
Recruits
4e+06
2e+06
0e+00
1955
1960
1965
1970
1975
1980
Year
(b)
Ricker 0.704
BevHolt 0.296
Recruits
4e+06
2e+06
0e+00
0e+00
1e+06
2e+06
3e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.75
0.77
−10
−5
0
5
10
lag

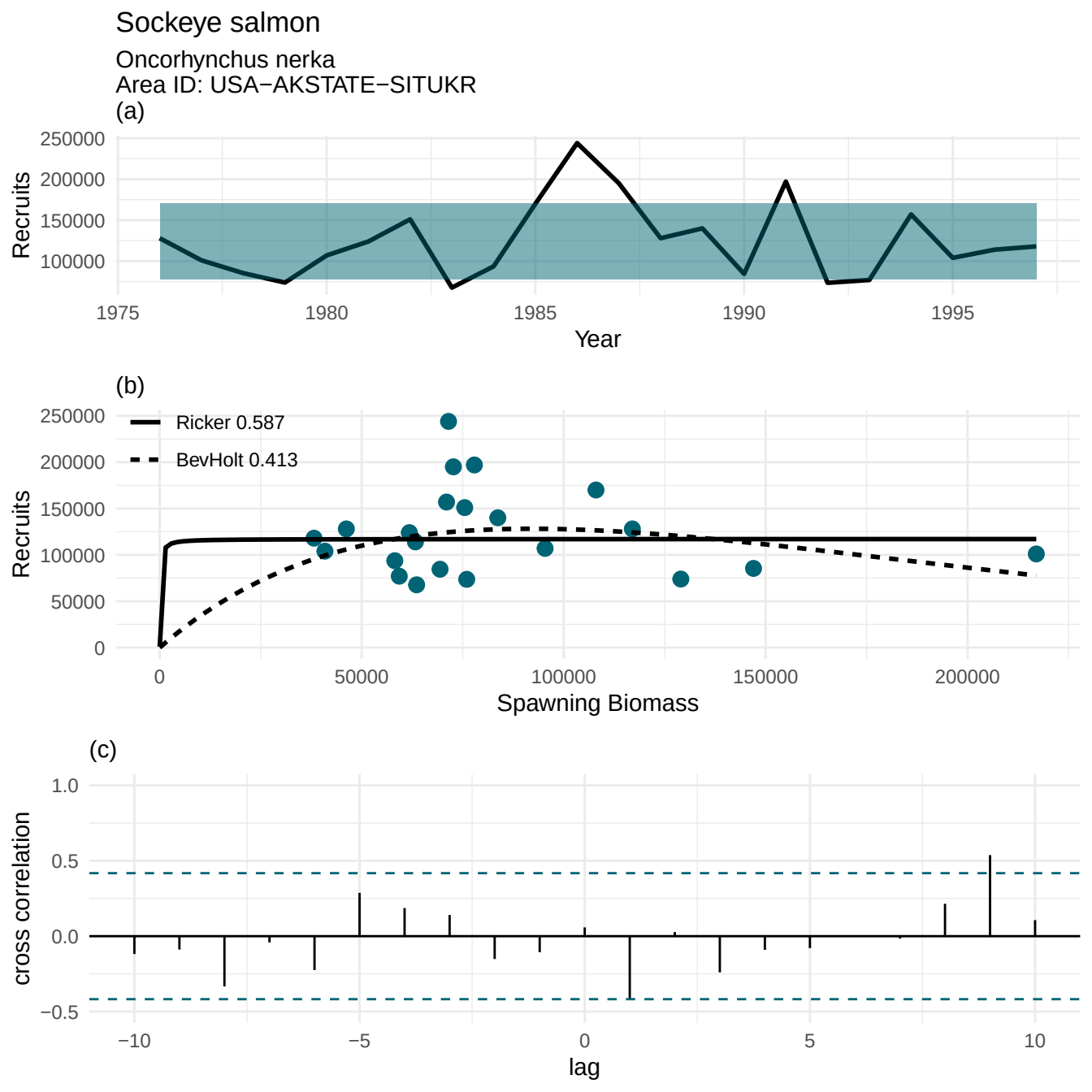

Sockeye salmon
Oncorhynchus nerka
Area ID: Canada−DFO−OWIKENOL
(a)
Recruits
4e+06
3e+06
2e+06
1e+06
0e+00
1950
1960
1970
1980
1990
2000
Year
(b)
Ricker 0.463
BevHolt 0.537
Recruits
0
250000
500000
750000
1000000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.47
0.34
−10
−5
0
5
10
lag

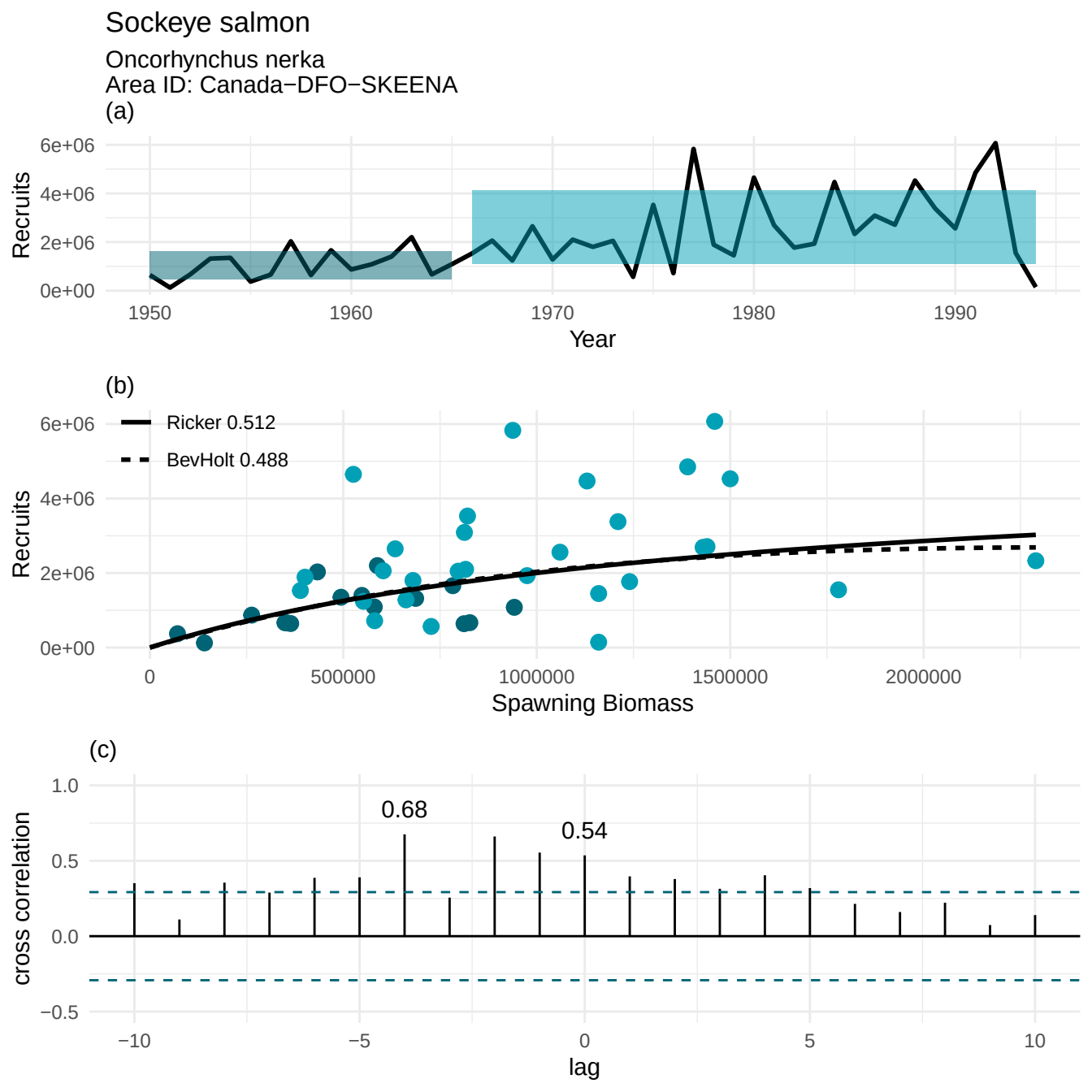

Sockeye salmon
Oncorhynchus nerka
Area ID: Canada−DFO−PITT
(a)
Recruits
200000
150000
100000
50000
0
1950
1960
1970
1980
1990
Year
(b)
Ricker 0.303
BevHolt 0.697
Recruits
200000
150000
100000
50000
0
0
20000
40000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.41
0.34
−10
−5
0
5
10
lag

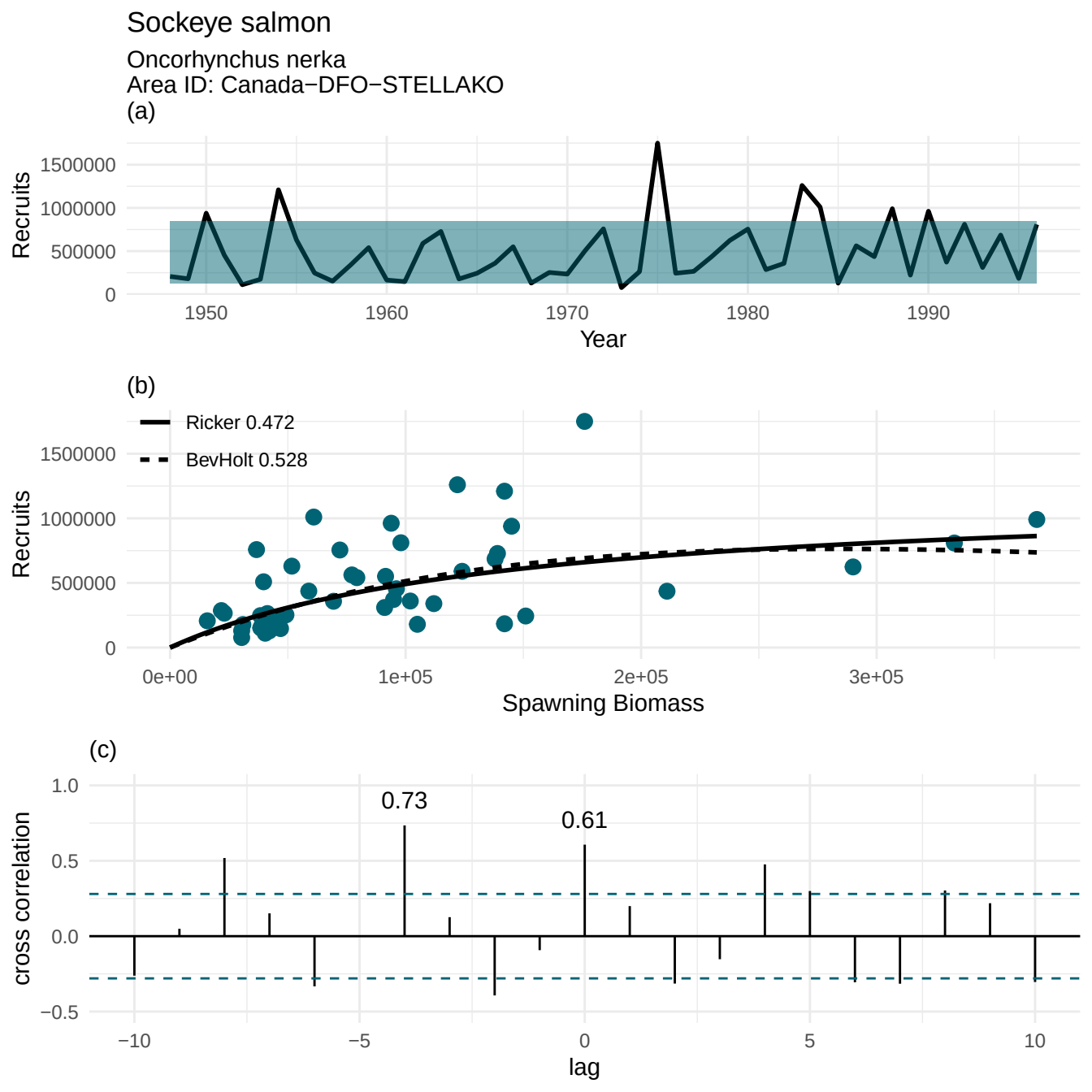

Sockeye salmon
Oncorhynchus nerka
Area ID: USA−WASTATE−QUIN
(a)
Recruits
1e+05
5e+04
0e+00
1975
1980
1985
1990
1995
2000
Year
(b)
Ricker 0.38
BevHolt 0.62
Recruits
1e+05
5e+04
0e+00
0
20000
40000
60000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.51
−10
−5
0
5
10
lag

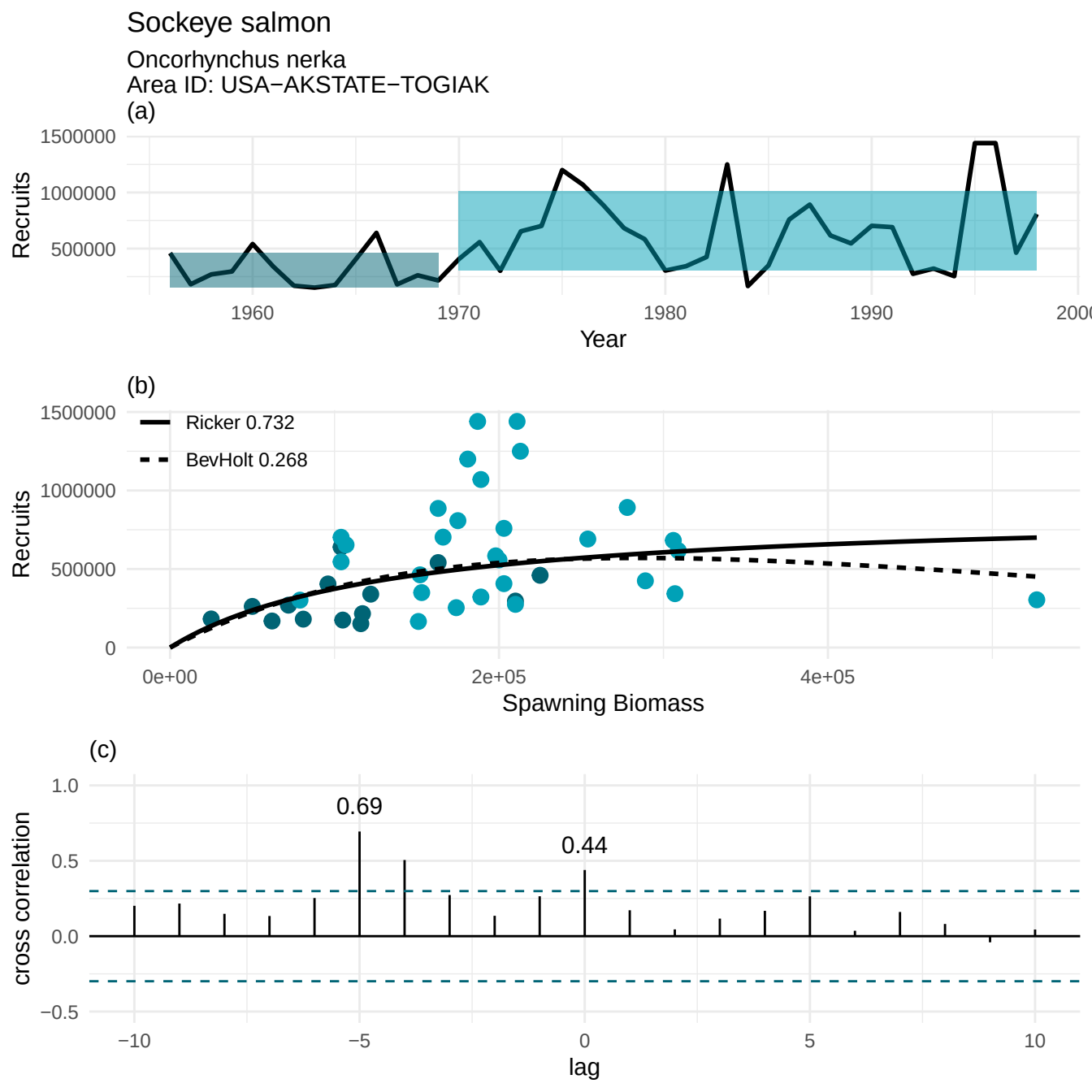

Sockeye salmon
Oncorhynchus nerka
Area ID: Canada−DFO−RAFT
(a)
Recruits
90000
60000
30000
0
1950
1960
1970
1980
1990
Year
(b)
Ricker 0.456
BevHolt 0.544
Recruits
90000
60000
30000
0
0
10000
20000
30000
40000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.85
0.71
−10
−5
0
5
10
lag

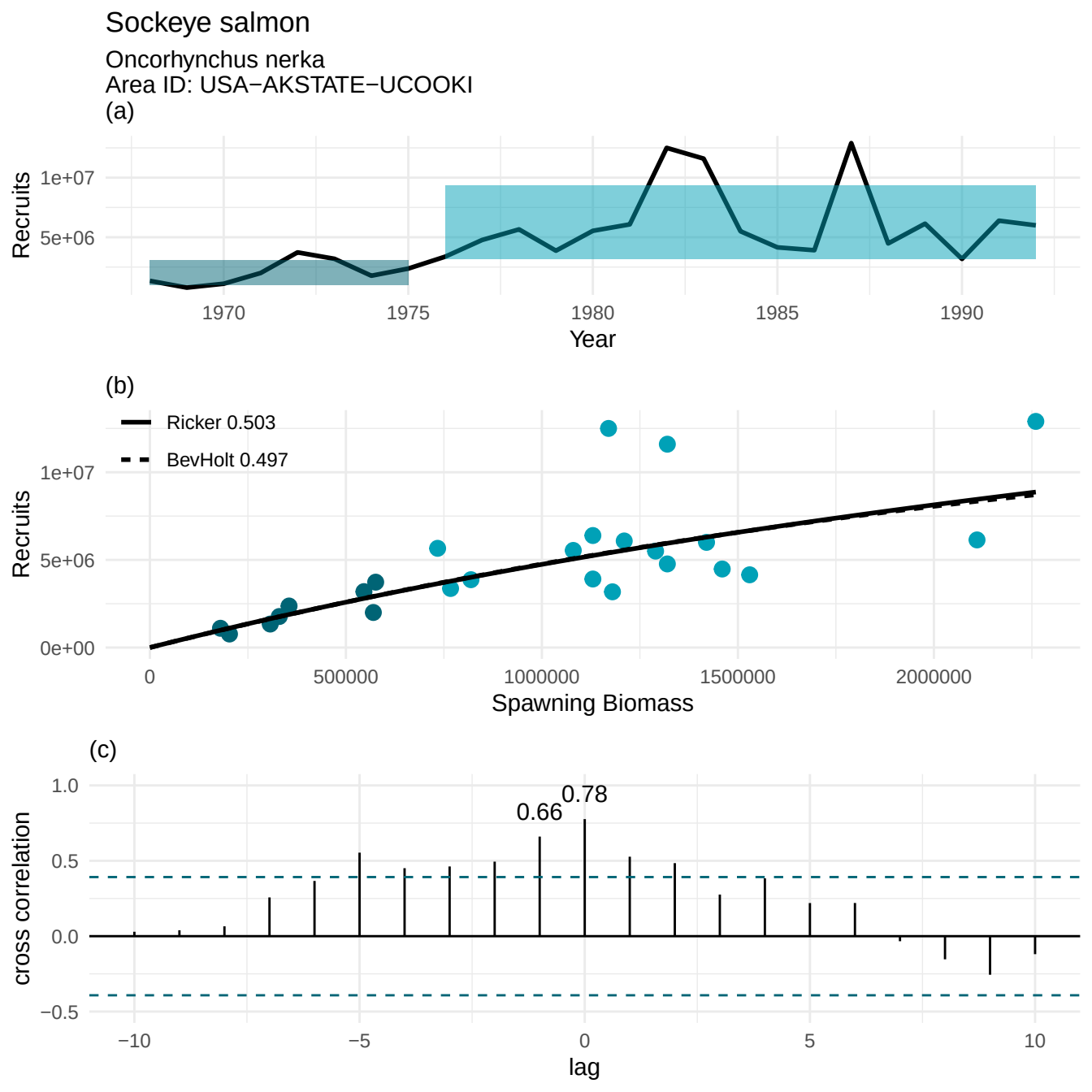

Sockeye salmon
Oncorhynchus nerka
Area ID: Canada−DFO−SEYMOUR
(a)
Recruits
8e+05
6e+05
4e+05
2e+05
0e+00
1950
1960
1970
1980
1990
Year
(b)
Ricker 0.479
BevHolt 0.521
Recruits
0e+00
1e+05
2e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.86
0.73
−10
−5
0
5
10
lag

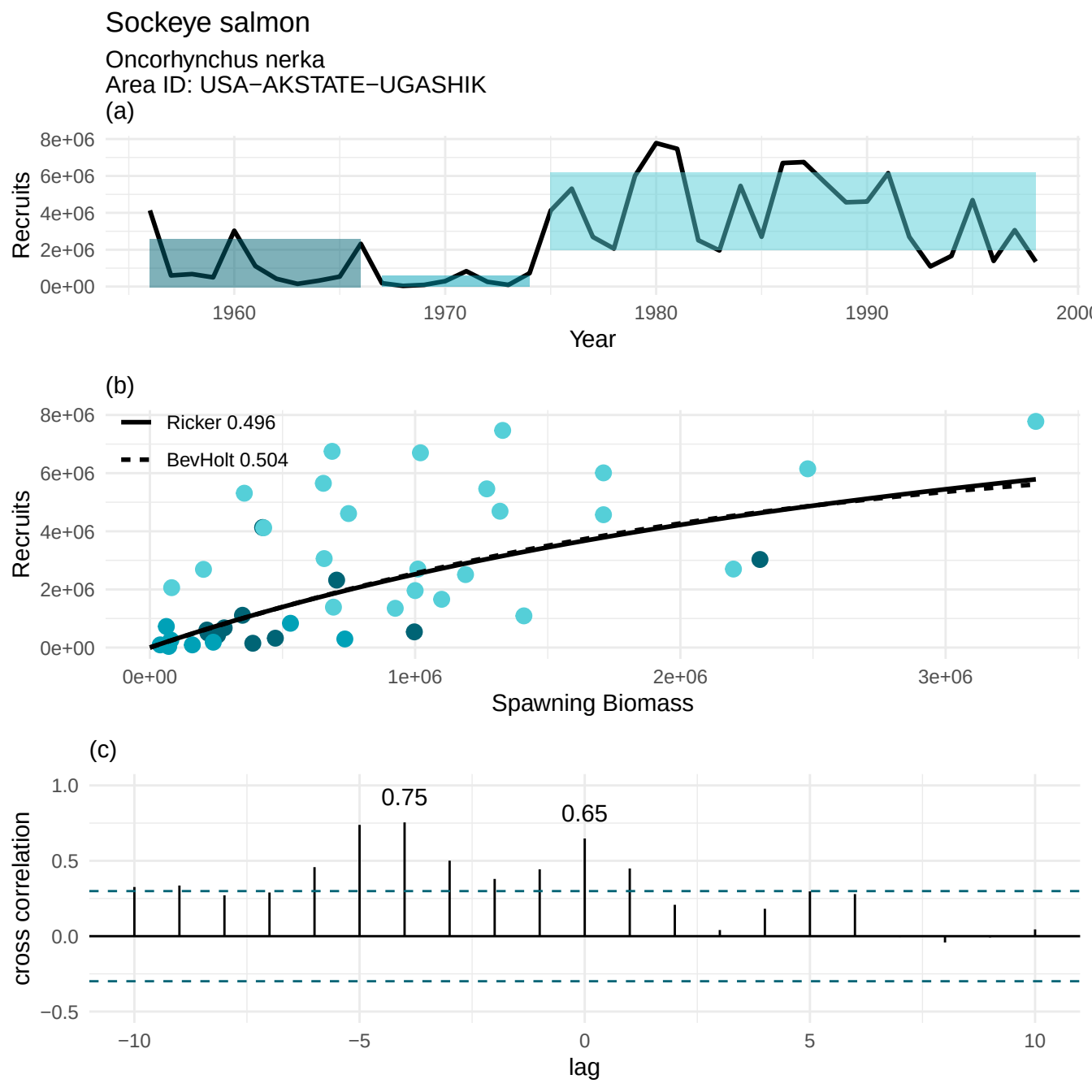

Sockeye salmon
Oncorhynchus nerka
Area ID: USA−AKSTATE−SITUKR
(a)
Recruits
250000
200000
150000
100000
1975
1980
1985
1990
1995
Year
(b)
Ricker 0.587
BevHolt 0.413
Recruits
250000
200000
150000
100000
50000
0
0
50000
100000
150000
200000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

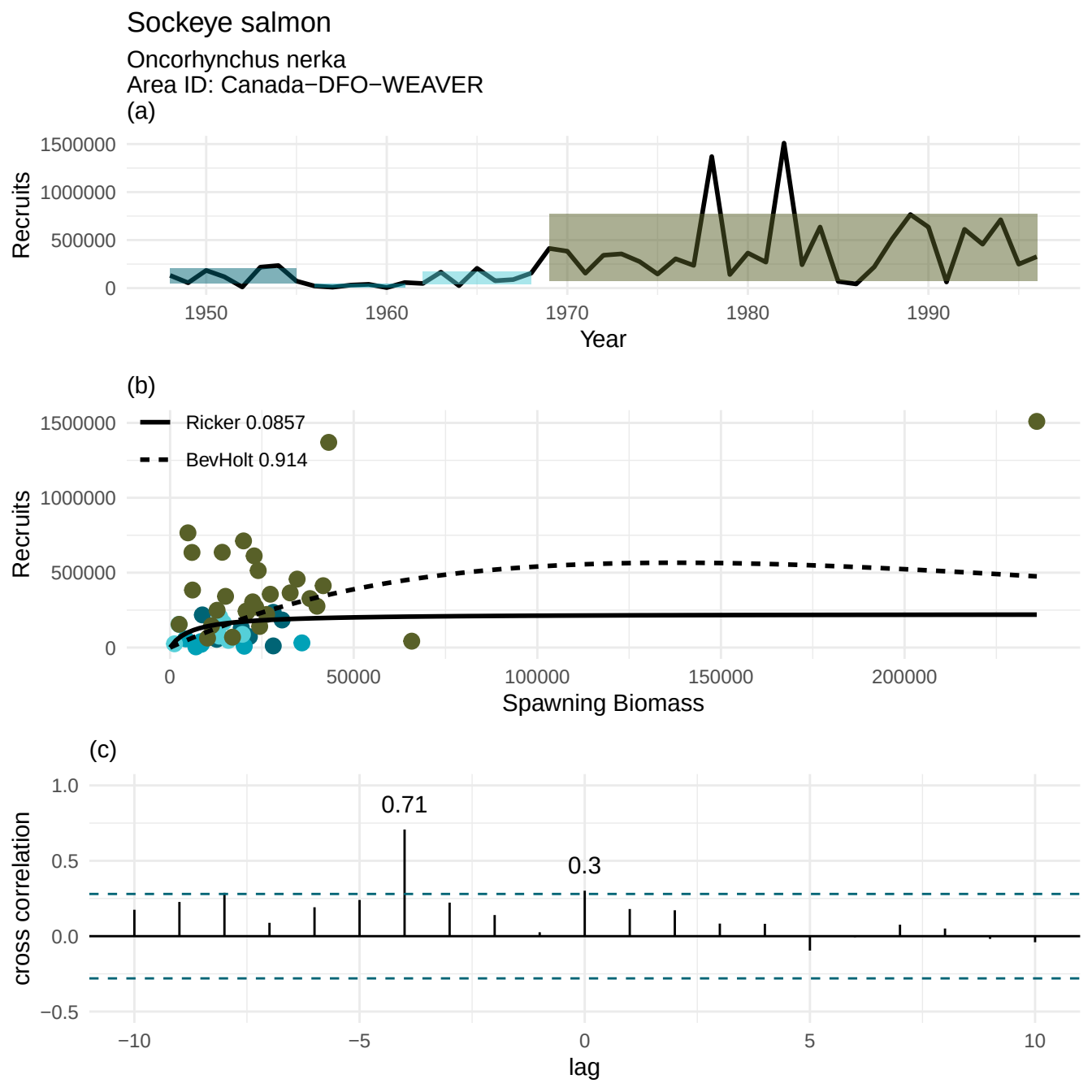

Sockeye salmon
Oncorhynchus nerka
Area ID: Canada−DFO−SKEENA
(a)
Recruits
6e+06
4e+06
2e+06
0e+00
1950
1960
1970
1980
1990
Year
(b)
Ricker 0.512
BevHolt 0.488
Recruits
6e+06
4e+06
2e+06
0e+00
0
500000
1000000
1500000
2000000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.68
0.54
−10
−5
0
5
10
lag

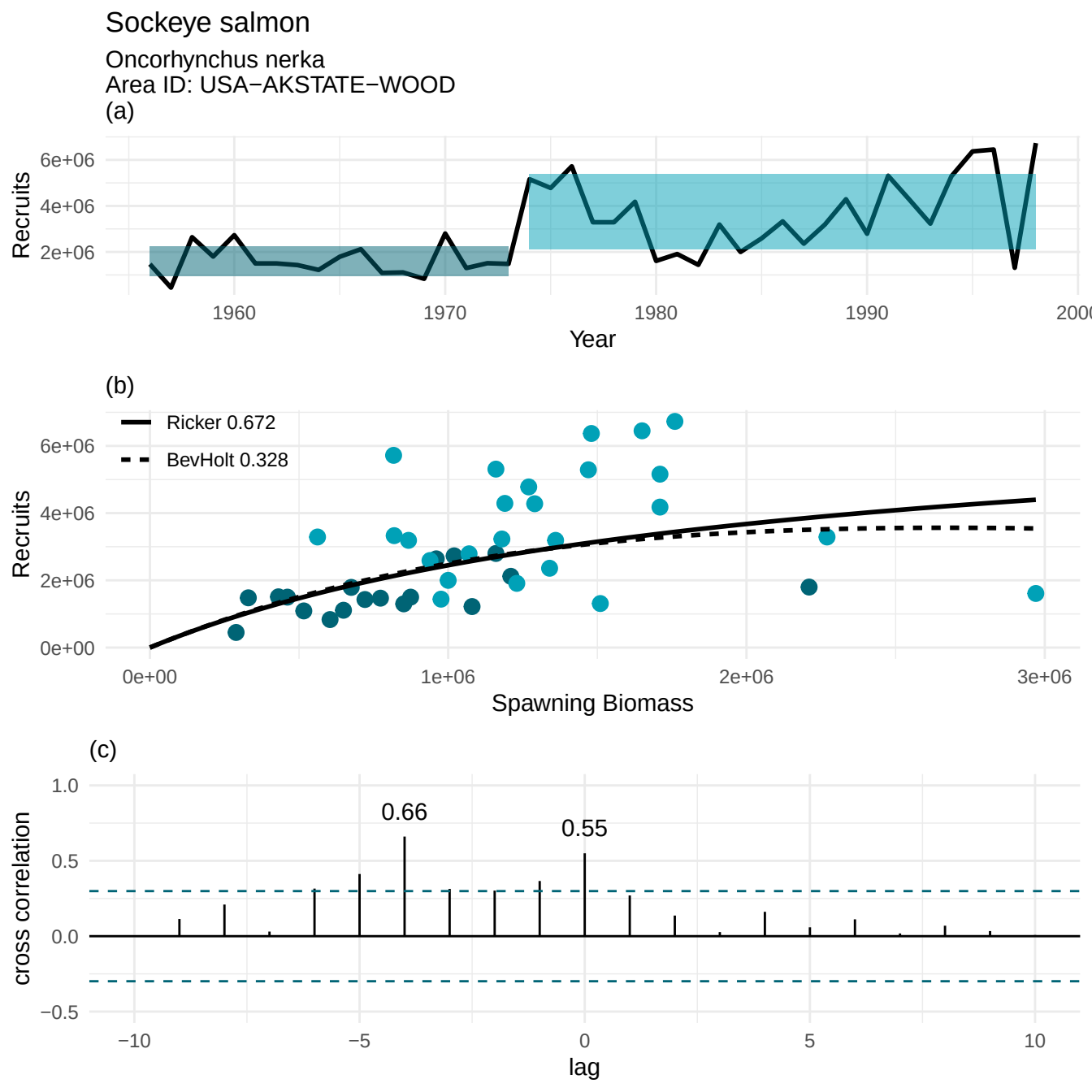

Sockeye salmon
Oncorhynchus nerka
Area ID: Canada−DFO−STELLAKO
(a)
Recruits
1500000
1000000
500000
0
1950
1960
1970
1980
1990
Year
(b)
Ricker 0.472
BevHolt 0.528
Recruits
1500000
1000000
500000
0
0e+00
1e+05
2e+05
3e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.73
0.61
−10
−5
0
5
10
lag

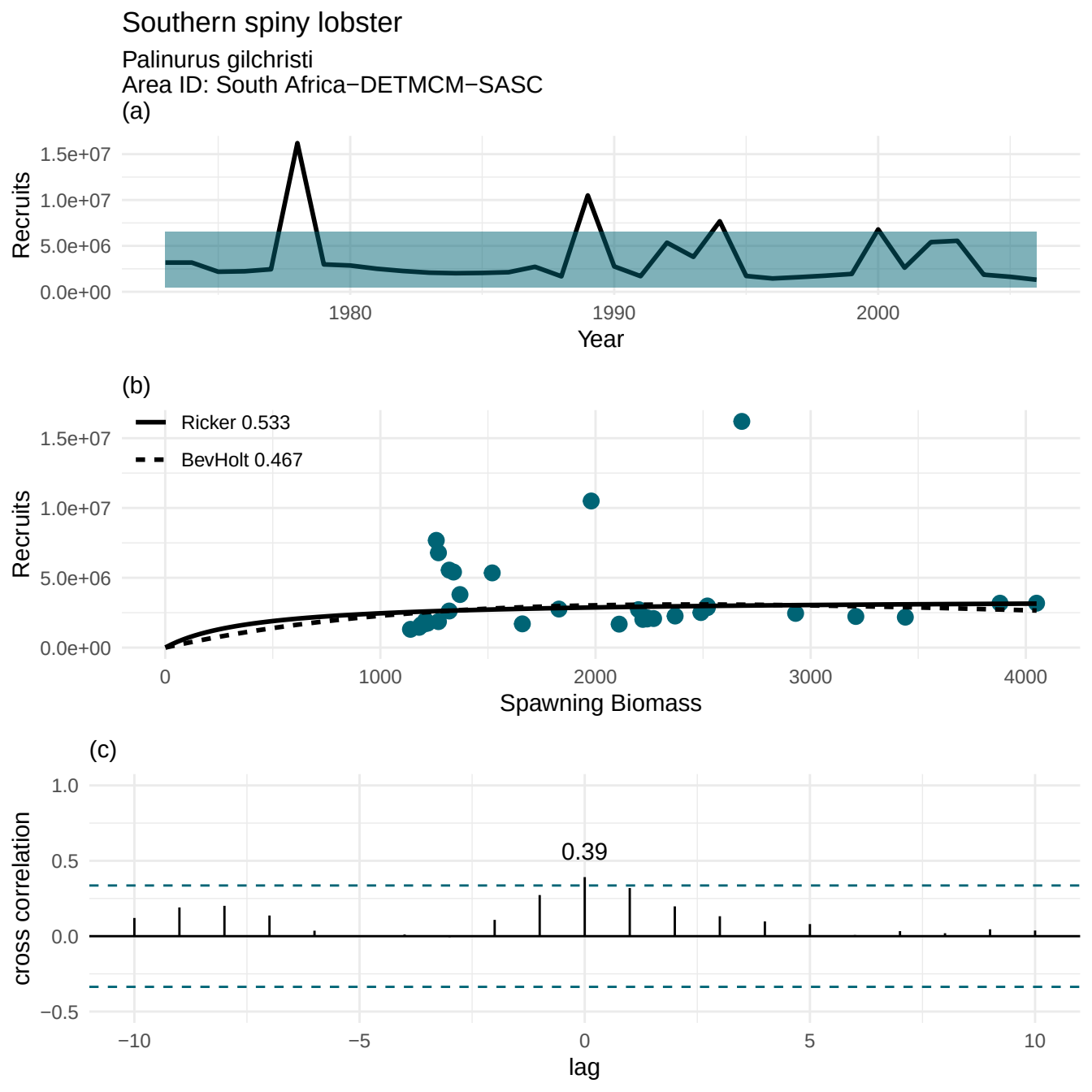

Sockeye salmon
Oncorhynchus nerka
Area ID: USA−AKSTATE−TOGIAK
(a)
Recruits
1500000
1000000
500000
1960
1970
1980
1990
2000
Year
(b)
Ricker 0.732
BevHolt 0.268
Recruits
1500000
1000000
500000
0
0e+00
2e+05
4e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.69
0.44
−10
−5
0
5
10
lag

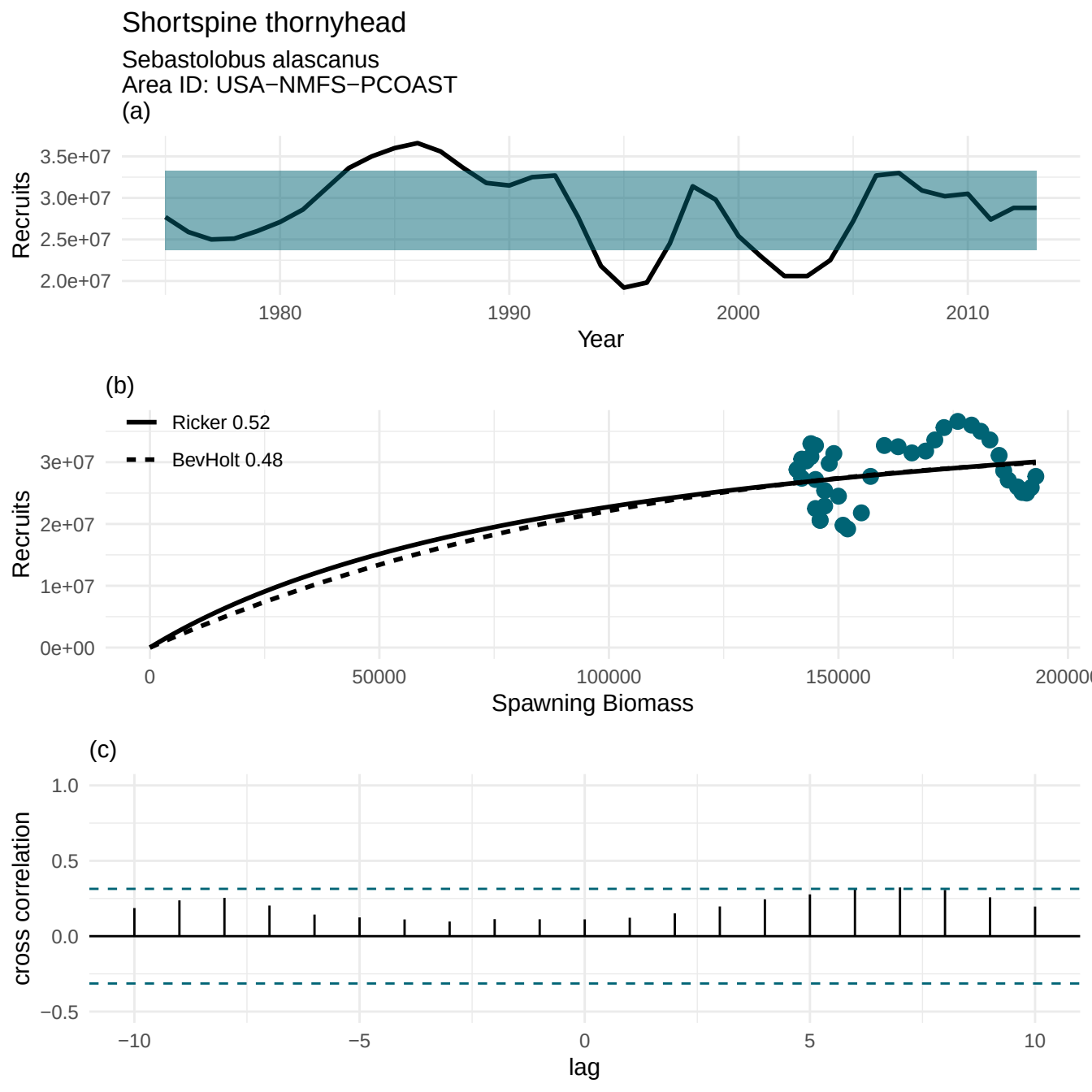

Sockeye salmon
Oncorhynchus nerka
Area ID: USA−AKSTATE−UCOOKI
(a)
Recruits
1e+07
5e+06
1970
1975
1980
1985
1990
Year
(b)
Ricker 0.503
BevHolt 0.497
Recruits
1e+07
5e+06
0e+00
0
500000
1000000
1500000
2000000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.66
0.78
−10
−5
0
5
10
lag

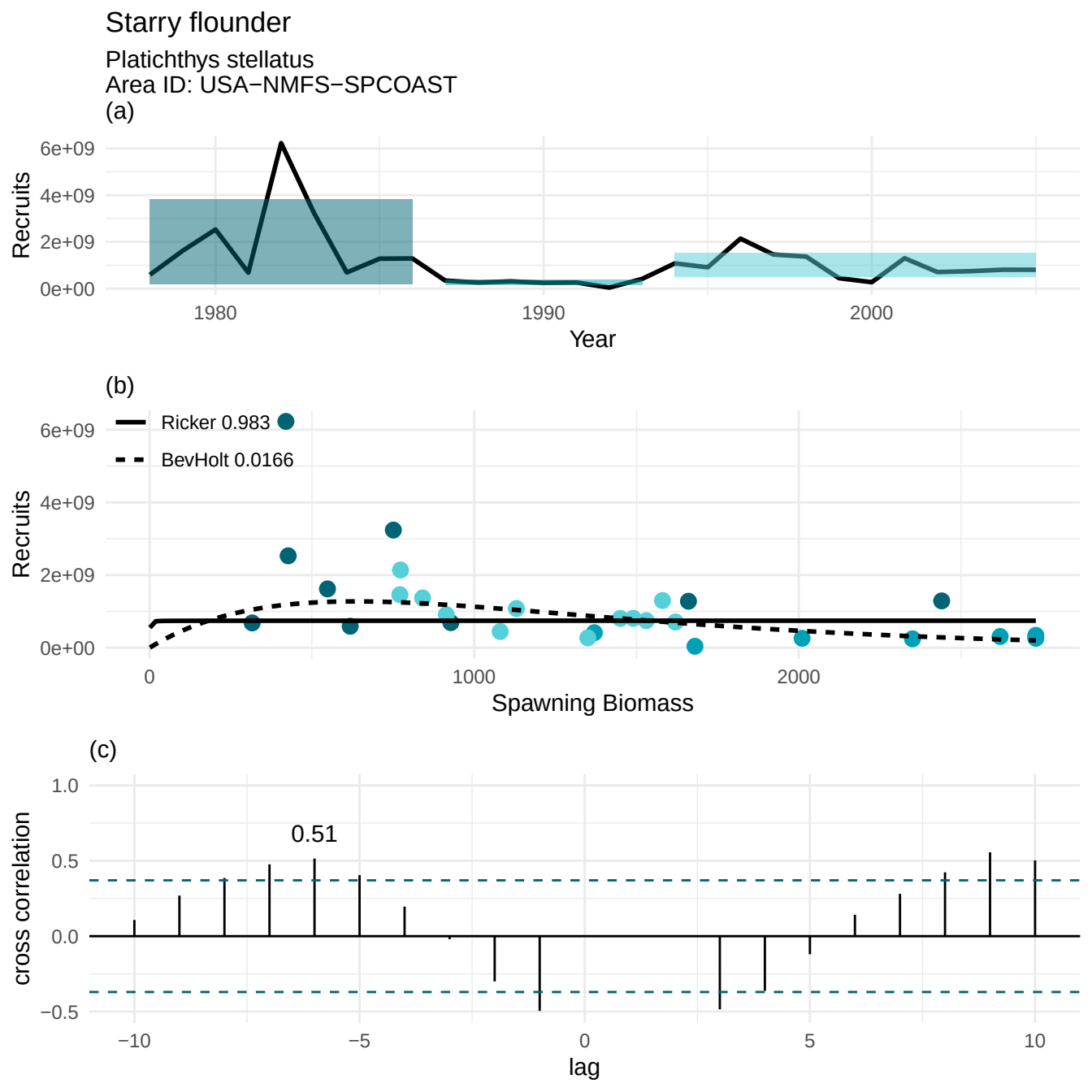

Sockeye salmon
Oncorhynchus nerka
Area ID: USA−AKSTATE−UGASHIK
(a)
Recruits
8e+06
6e+06
4e+06
2e+06
0e+00
1960
1970
1980
1990
Year
(b)
Ricker 0.496
BevHolt 0.504
Recruits
0e+00
1e+06
2e+06
3e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.75
0.65
−10
−5
0
5
10
lag

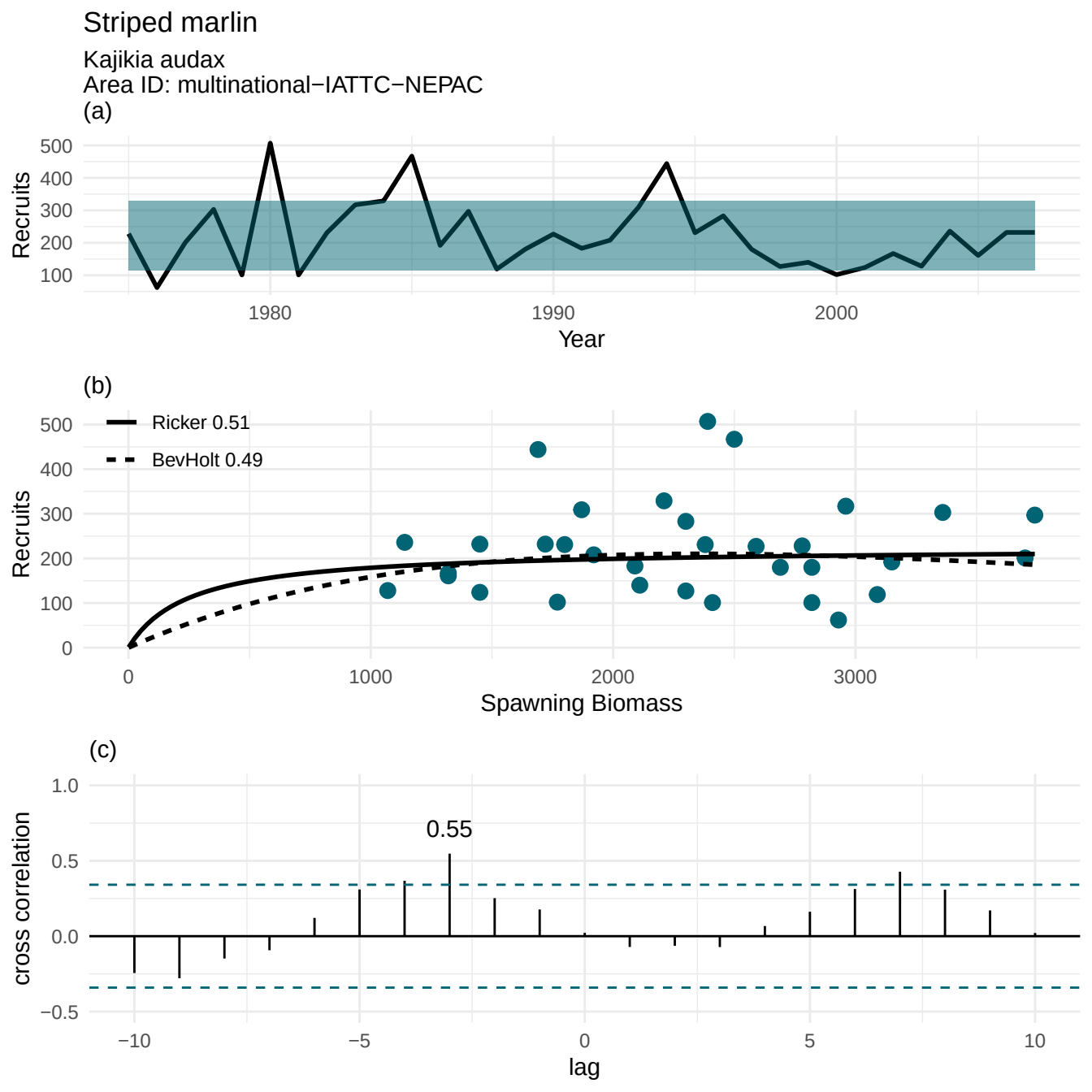

Sockeye salmon
Oncorhynchus nerka
Area ID: Canada−DFO−WEAVER
(a)
Recruits
1500000
1000000
500000
0
1950
1960
1970
1980
1990
Year
(b)
Ricker 0.0857
BevHolt 0.914
Recruits
1500000
1000000
500000
0
0
50000
100000
150000
200000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.71
0.3
−10
−5
0
5
10
lag

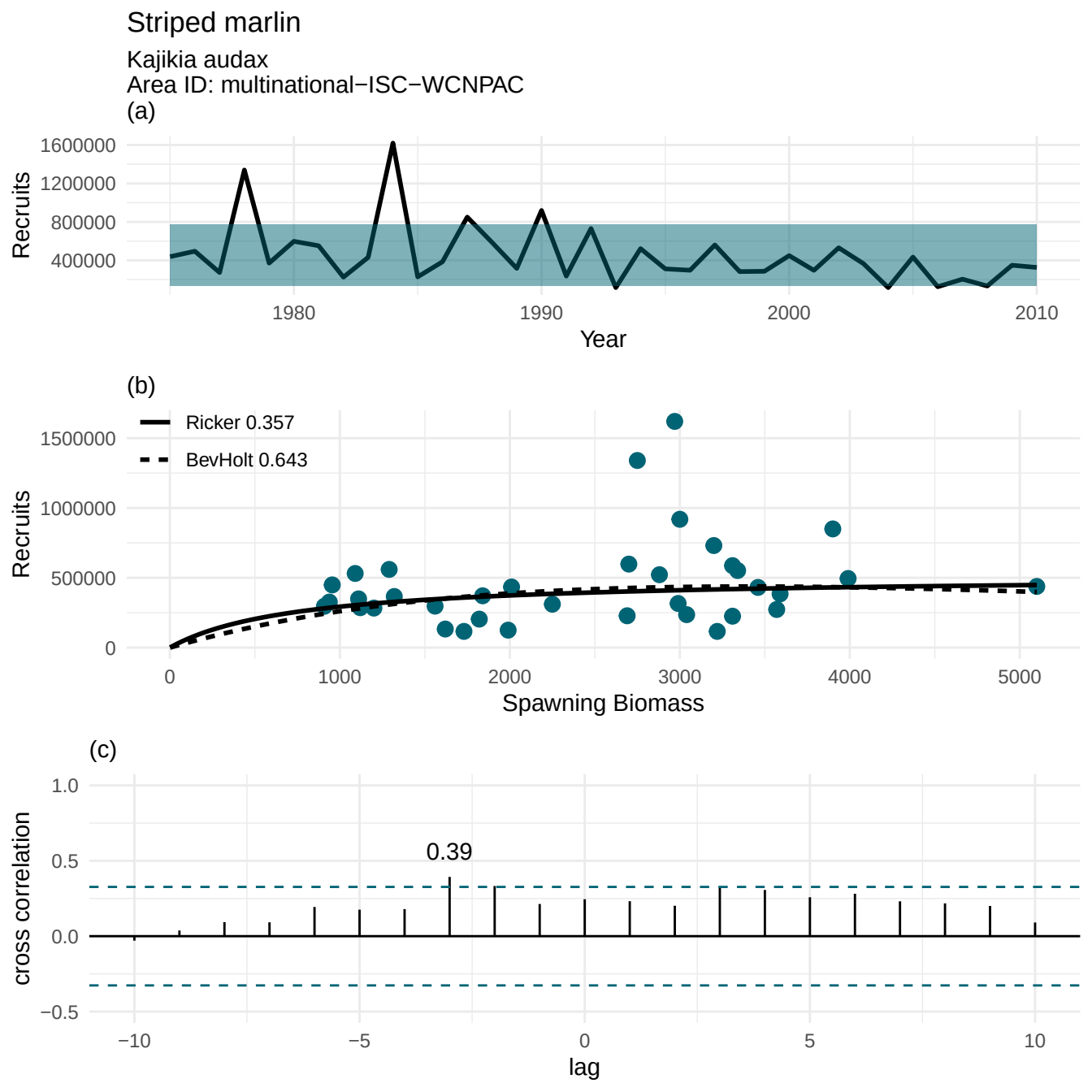

Sockeye salmon
Oncorhynchus nerka
Area ID: USA−AKSTATE−WOOD
(a)
Recruits
6e+06
4e+06
2e+06
1960
1970
1980
1990
2000
Year
(b)
Ricker 0.672
BevHolt 0.328
Recruits
6e+06
4e+06
2e+06
0e+00
0e+00
1e+06
2e+06
3e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.66
0.55
−10
−5
0
5
10
lag

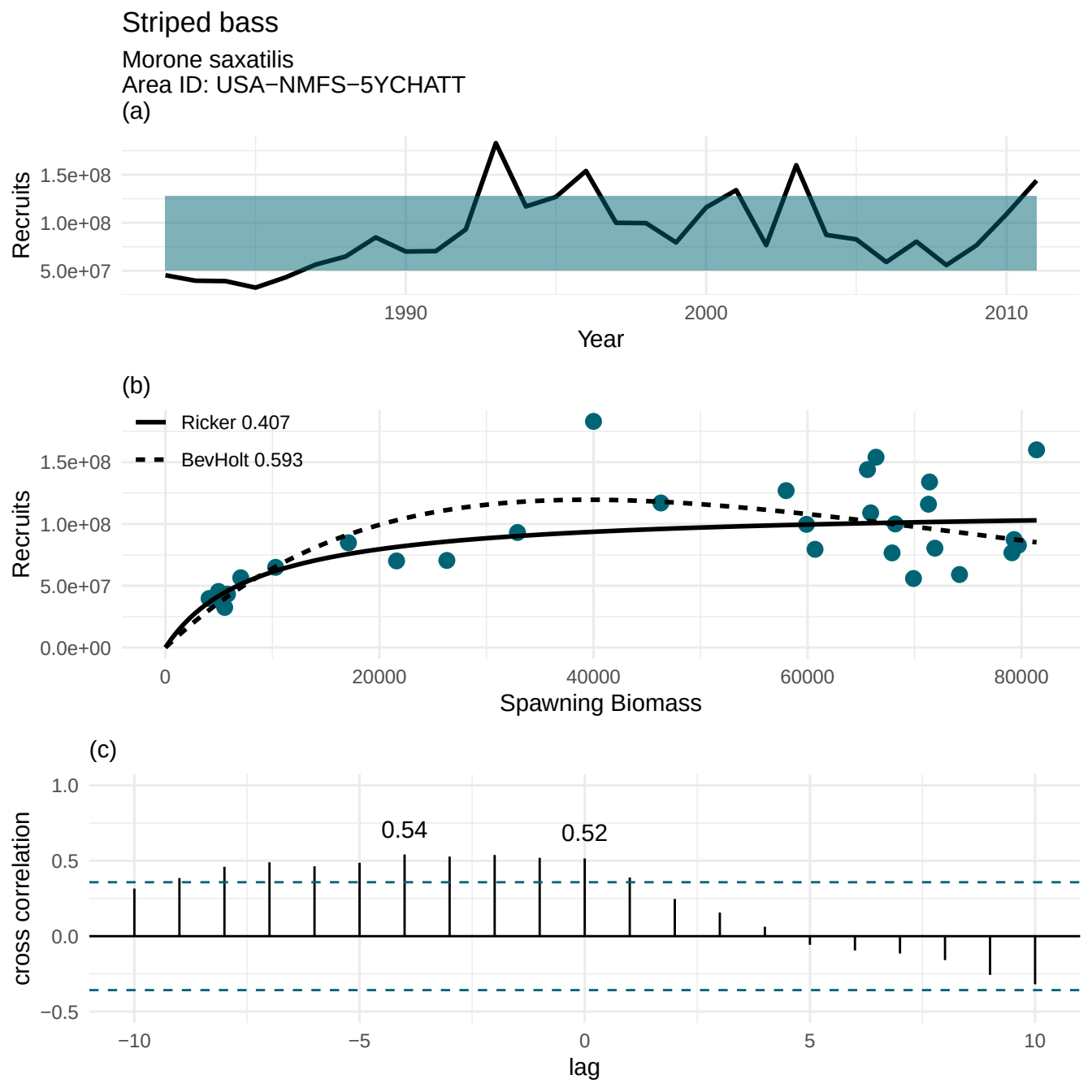

Southern spiny lobster
Palinurus gilchristi
Area ID: South Africa−DETMCM−SASC
(a)
Recruits
1.5e+07
1.0e+07
5.0e+06
0.0e+00
1980
1990
2000
Year
(b)
Ricker 0.533
BevHolt 0.467
Recruits
1.5e+07
1.0e+07
5.0e+06
0.0e+00
0
1000
2000
3000
4000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.39
−10
−5
0
5
10
lag

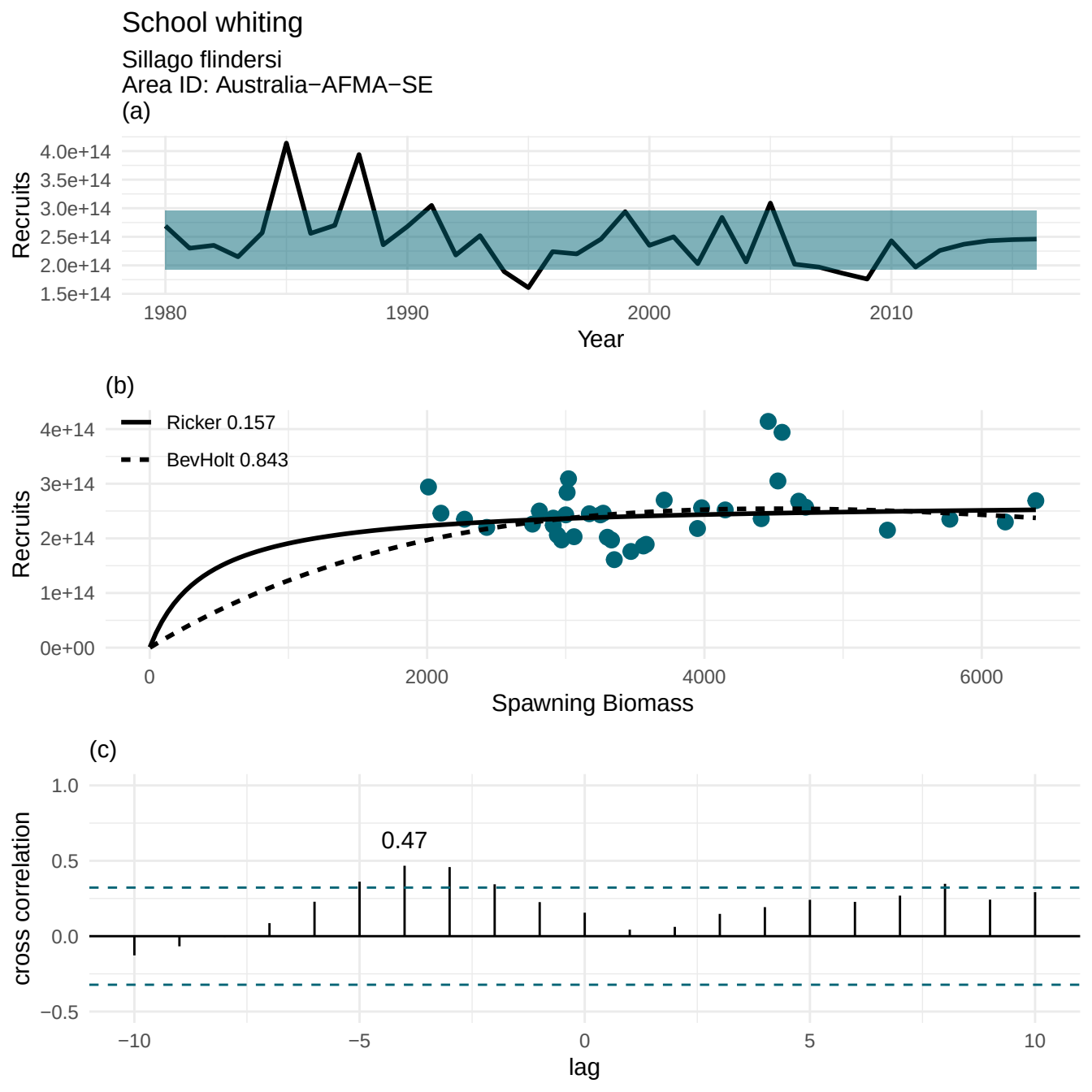

Shortspine thornyhead
Sebastolobus alascanus
Area ID: USA−NMFS−PCOAST
(a)
Recruits
3.5e+07
3.0e+07
2.5e+07
2.0e+07
1980
1990
2000
2010
Year
(b)
Ricker 0.52
BevHolt 0.48
Recruits
3e+07
2e+07
1e+07
0e+00
0
50000
100000
150000
200000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

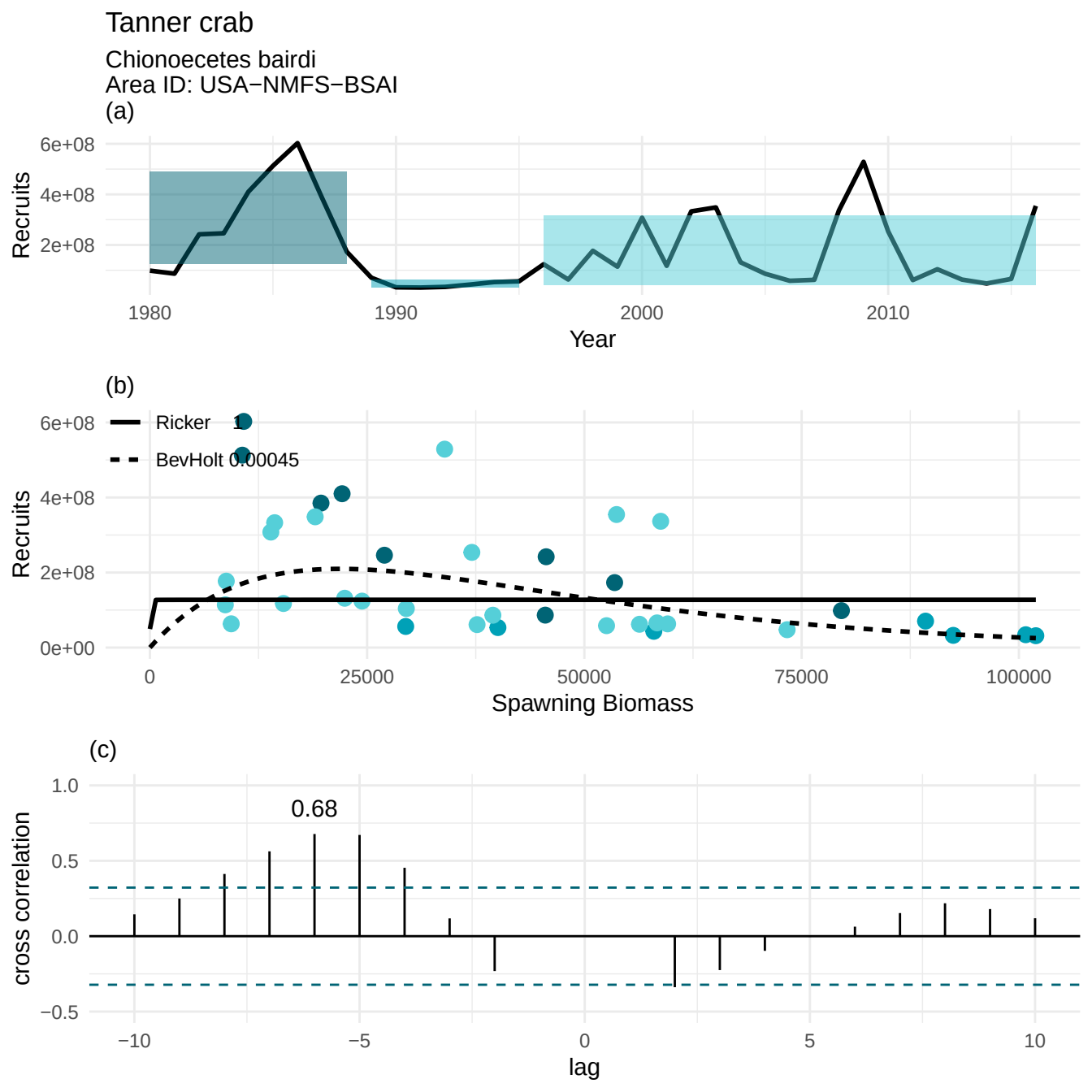

Starry flounder
Platichthys stellatus
Area ID: USA−NMFS−SPCOAST
(a)
Recruits
6e+09
4e+09
2e+09
0e+00
1980
1990
2000
Year
(b)
Ricker 0.983
BevHolt 0.0166
Recruits
6e+09
4e+09
2e+09
0e+00
0
1000
2000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.51
−10
−5
0
5
10
lag

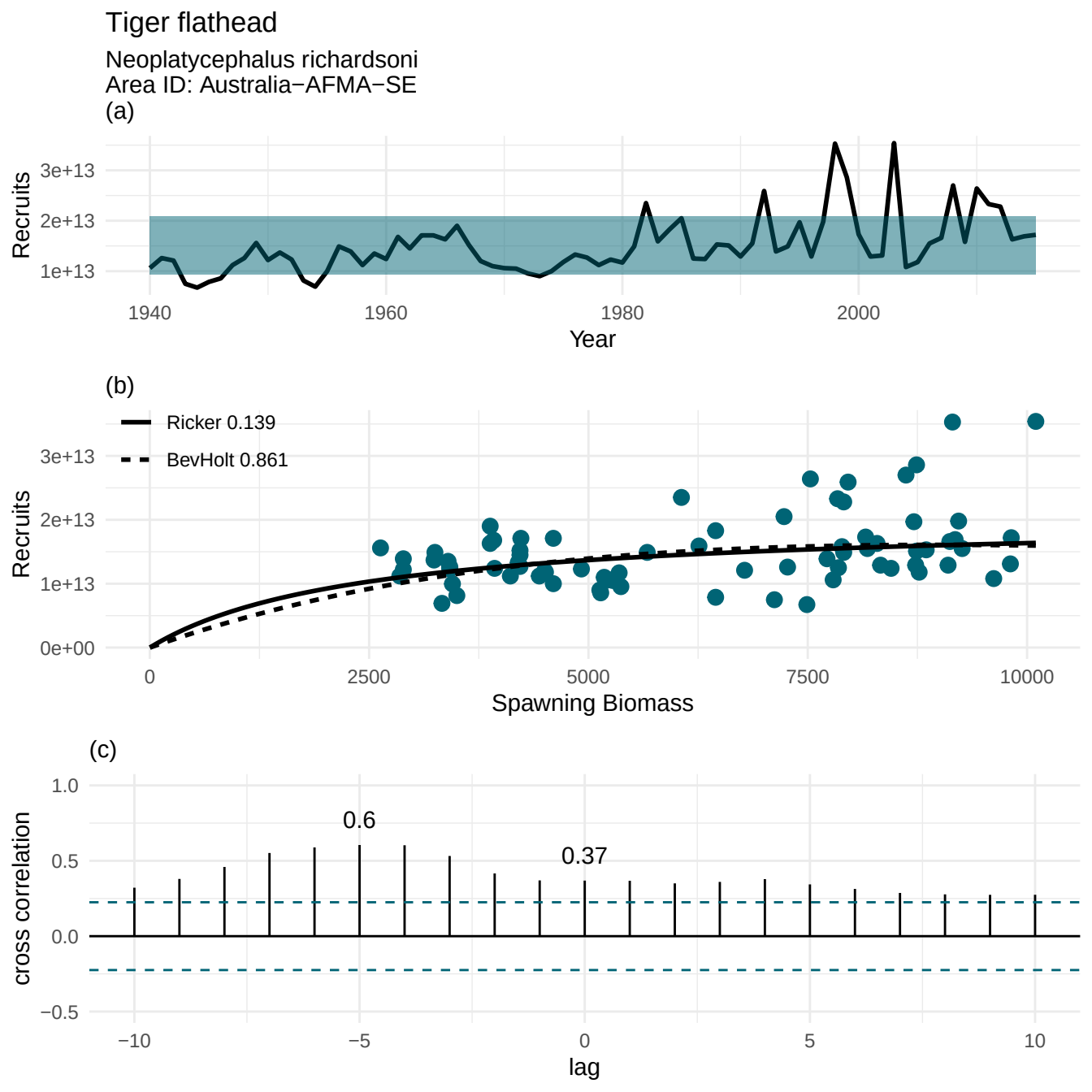

Striped marlin
Kajikia audax
Area ID: multinational−IATTC−NEPAC
(a)
Recruits
500
400
300
200
100
1980
1990
2000
Year
(b)
Ricker 0.51
BevHolt 0.49
Recruits
500
400
300
200
100
0
0
1000
2000
3000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.55
−10
−5
0
5
10
lag

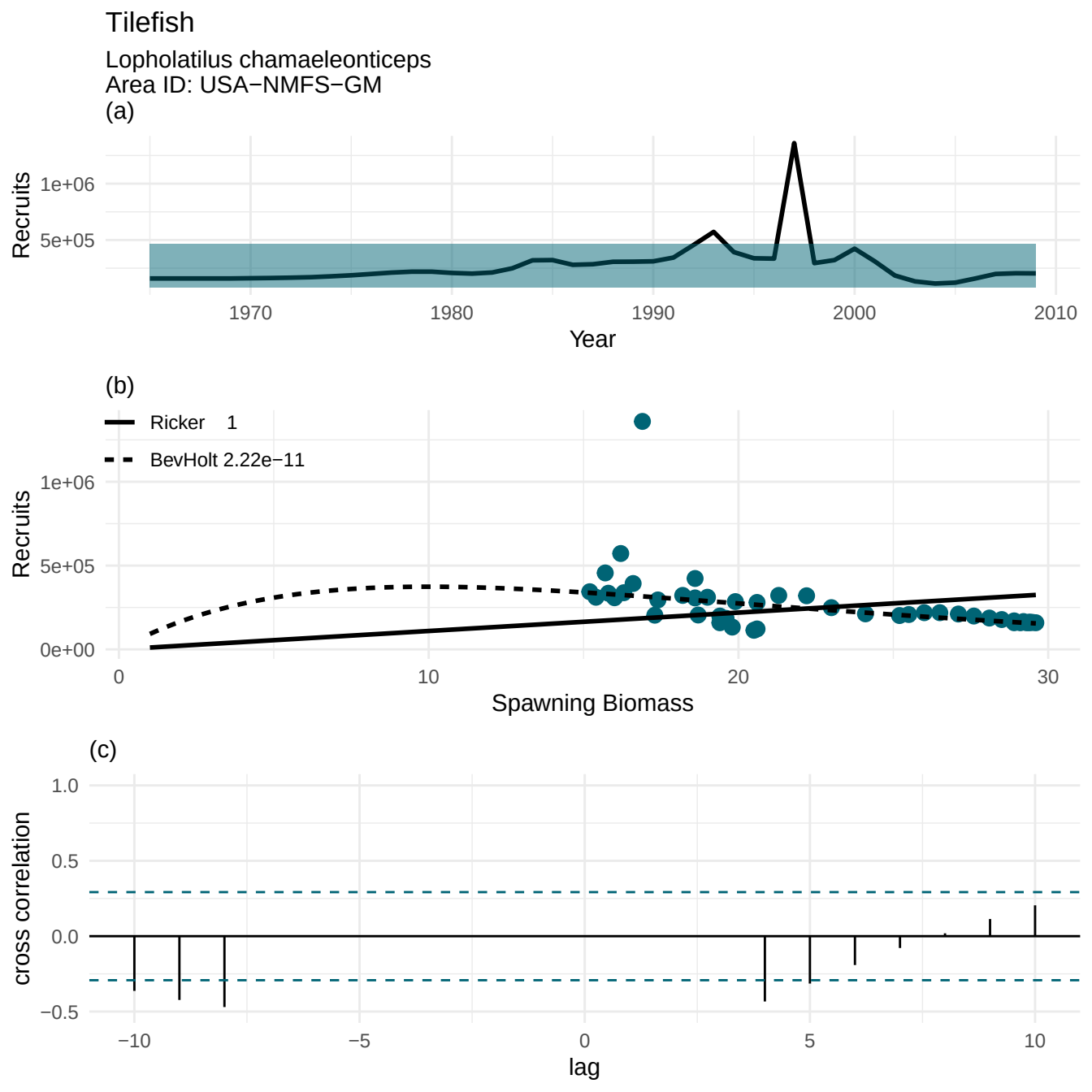

Striped marlin
Kajikia audax
Area ID: multinational−ISC−WCNPAC
(a)
Recruits
1600000
1200000
800000
400000
1980
1990
2000
2010
Year
(b)
Ricker 0.357
BevHolt 0.643
Recruits
1500000
1000000
500000
0
0
1000
2000
3000
4000
5000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.39
−10
−5
0
5
10
lag

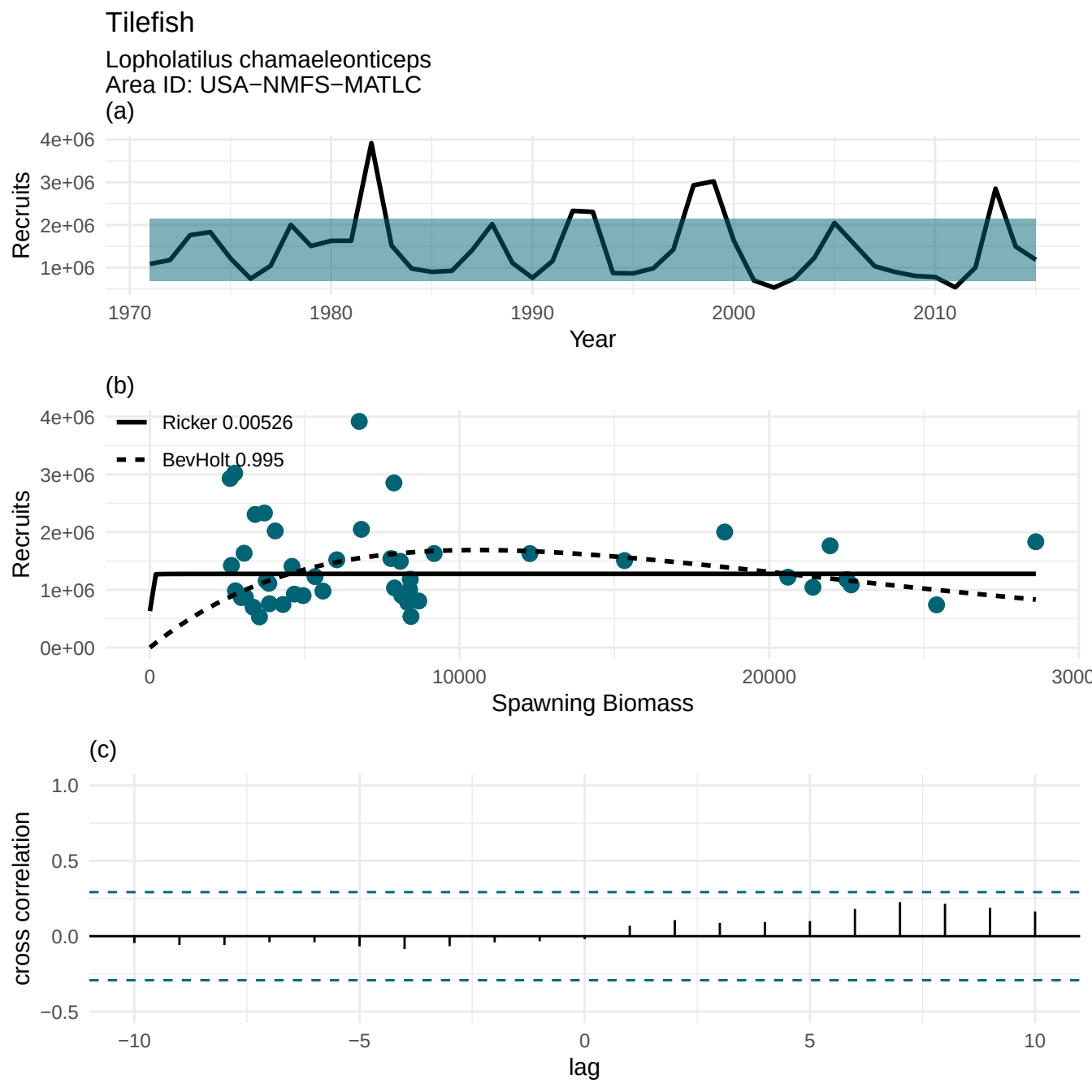

Striped bass
Morone saxatilis
Area ID: USA−NMFS−5YCHATT
(a)
Recruits
1.5e+08
1.0e+08
5.0e+07
1990
2000
2010
Year
(b)
Ricker 0.407
BevHolt 0.593
Recruits
1.5e+08
1.0e+08
5.0e+07
0.0e+00
0
20000
40000
60000
80000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.54
0.52
−10
−5
0
5
10
lag

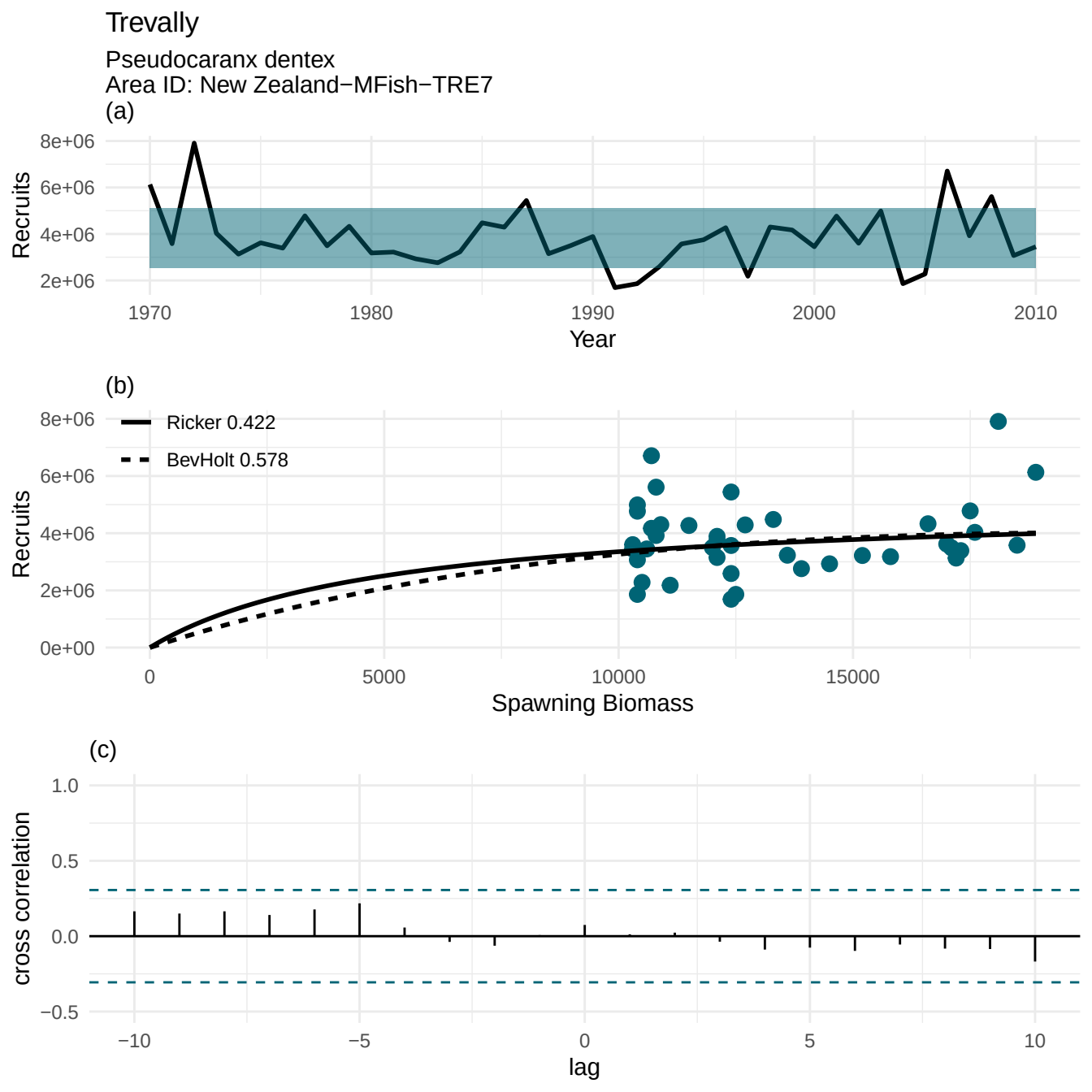

School whiting
Sillago flindersi
Area ID: Australia−AFMA−SE
(a)
Recruits
4.0e+14
3.5e+14
3.0e+14
2.5e+14
2.0e+14
1.5e+14
1980
1990
2000
2010
Year
(b)
Ricker 0.157
BevHolt 0.843
Recruits
4e+14
3e+14
2e+14
1e+14
0e+00
0
2000
4000
6000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.47
−10
−5
0
5
10
lag

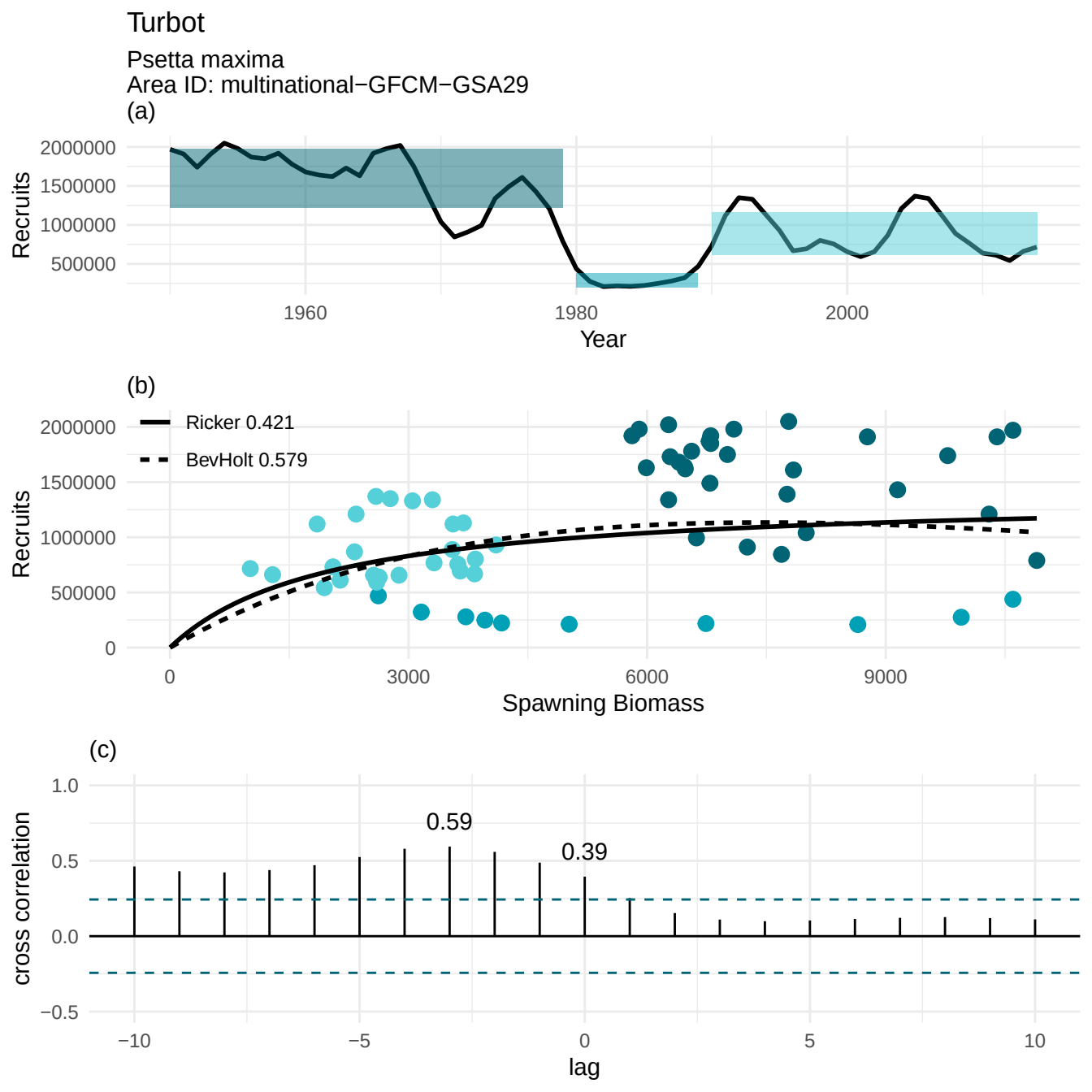

Tanner crab
Chionoecetes bairdi
Area ID: USA−NMFS−BSAI
(a)
Recruits
6e+08
4e+08
2e+08
1980
1990
2000
2010
Year
(b)
Ricker 1
BevHolt 0.00045
Recruits
6e+08
4e+08
2e+08
0e+00
0
25000
50000
75000
100000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.68
−10
−5
0
5
10
lag

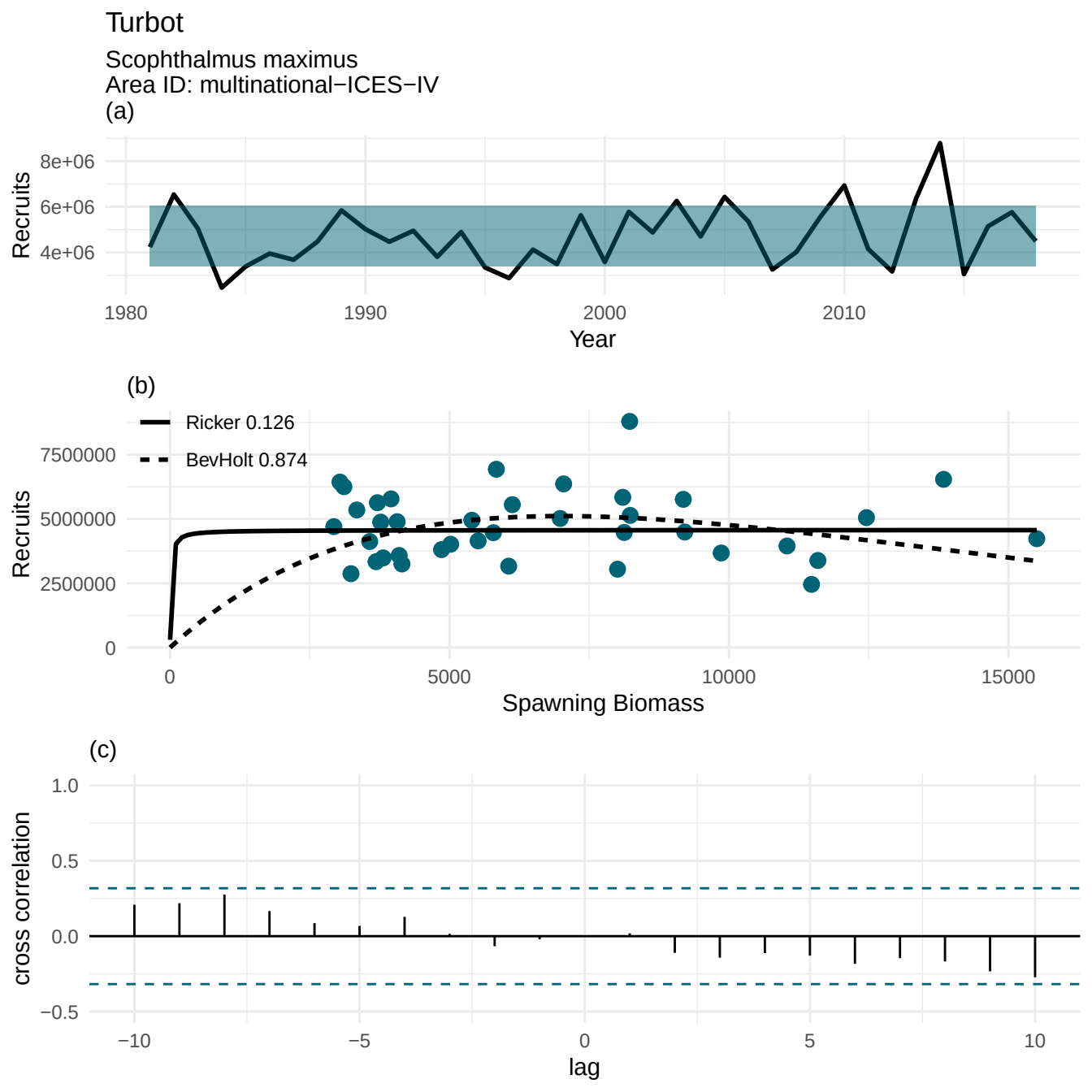

Tiger flathead
Neoplatycephalus richardsoni
Area ID: Australia−AFMA−SE
(a)
Recruits
3e+13
2e+13
1e+13
1940
1960
1980
2000
Year
(b)
Ricker 0.139
BevHolt 0.861
Recruits
3e+13
2e+13
1e+13
0e+00
0
2500
5000
7500
10000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.6
0.37
−10
−5
0
5
10
lag

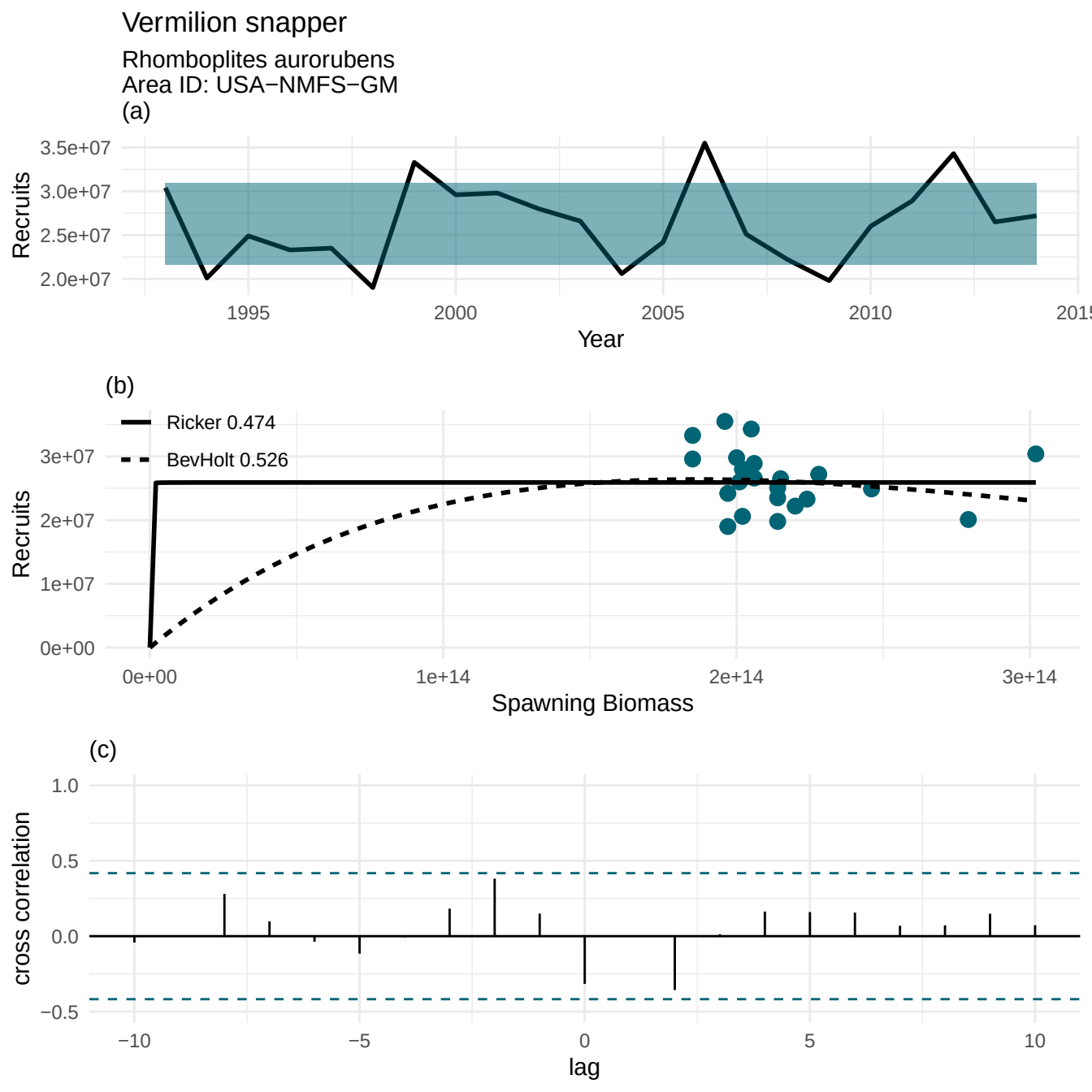

Tilefish
Lopholatilus chamaeleonticeps
Area ID: USA−NMFS−GM
(a)
Recruits
1e+06
5e+05
1970
1980
1990
2000
2010
Year
(b)
Ricker 1
BevHolt 2.22e−11
Recruits
1e+06
5e+05
0e+00
0
10
20
30
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

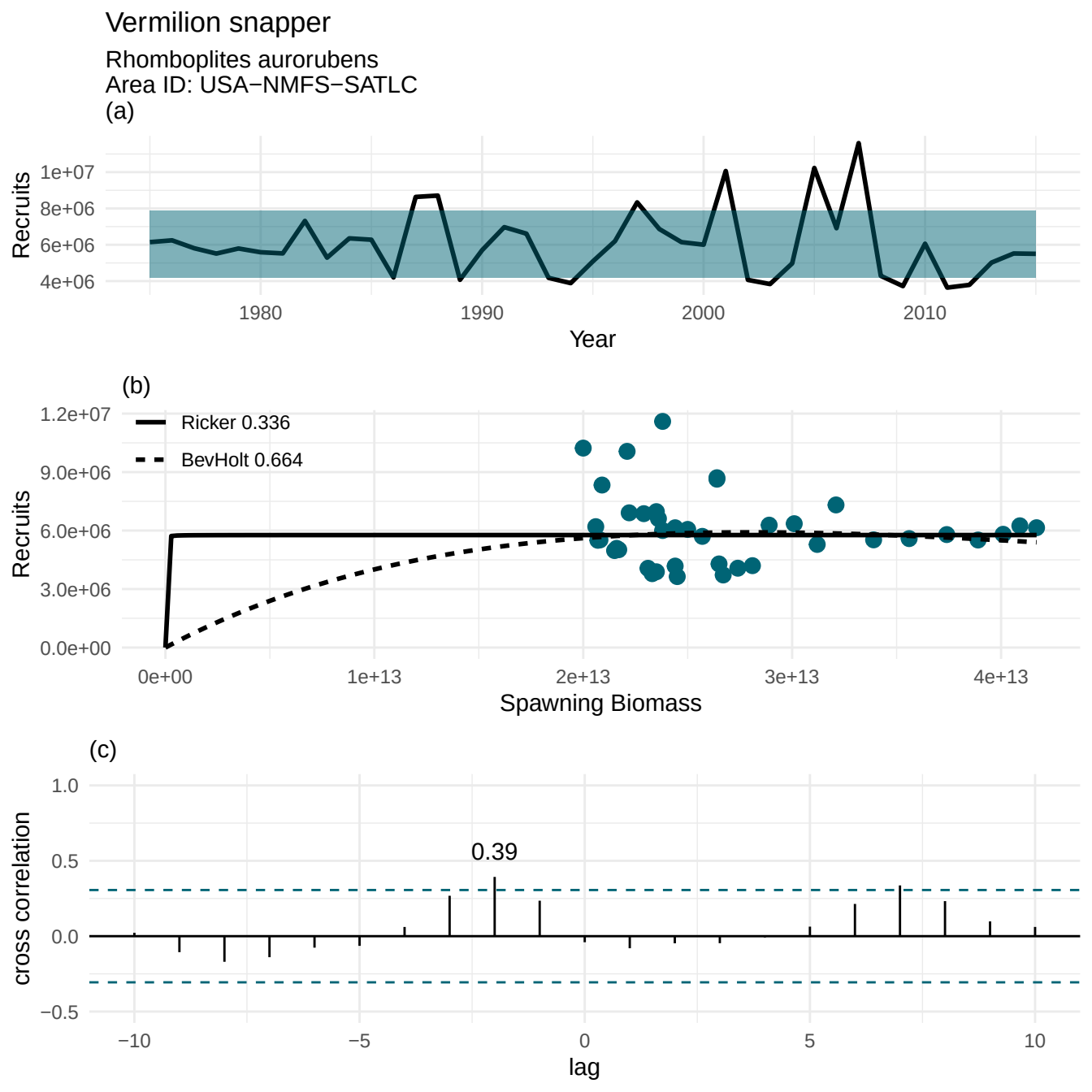

Tilefish
Lopholatilus chamaeleonticeps
Area ID: USA−NMFS−MATLC
(a)
Recruits
4e+06
3e+06
2e+06
1e+06
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.00526
BevHolt 0.995
Recruits
4e+06
3e+06
2e+06
1e+06
0e+00
0
10000
20000
3000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

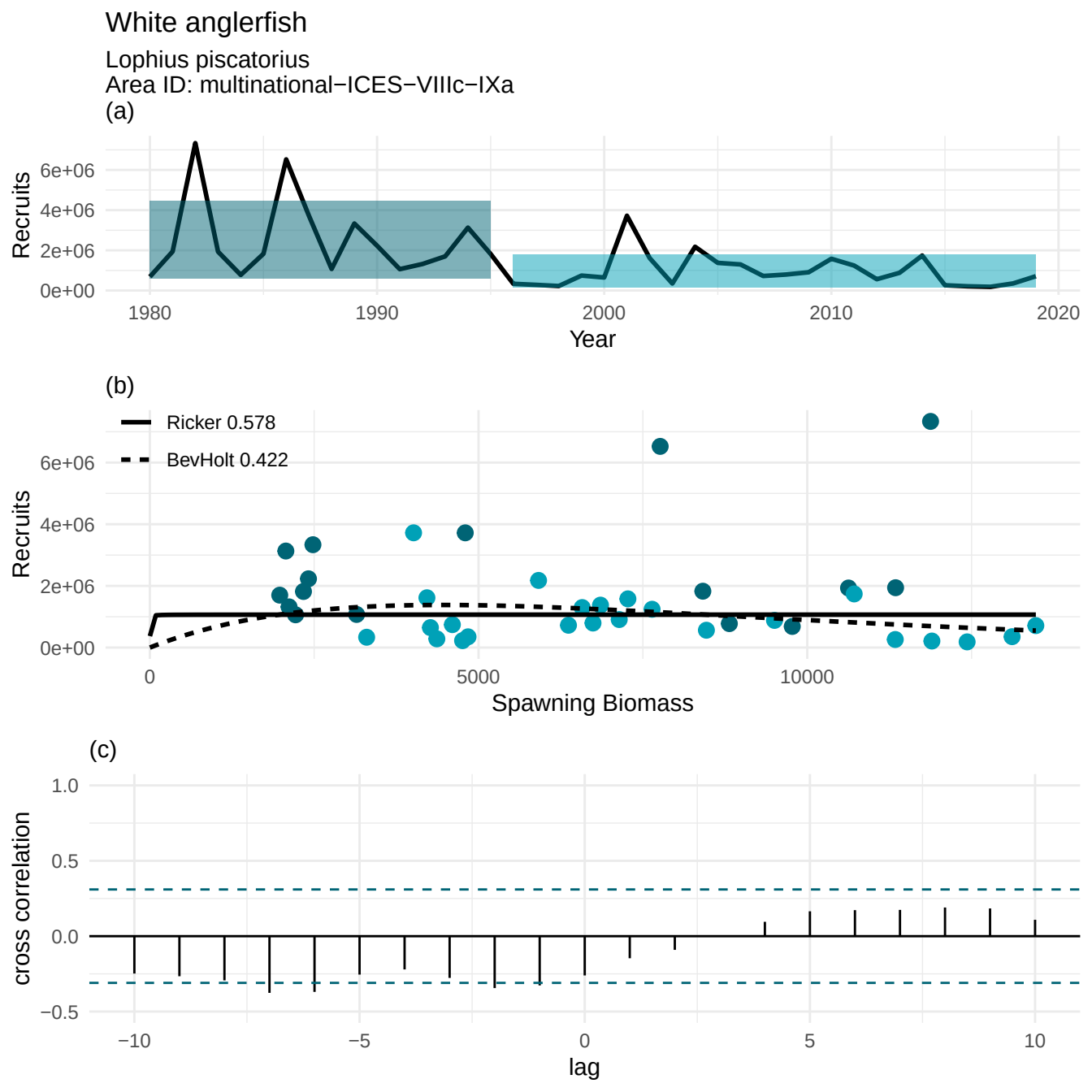

Trevally
Pseudocaranx dentex
Area ID: New Zealand−MFish−TRE7
(a)
Recruits
8e+06
6e+06
4e+06
2e+06
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.422
BevHolt 0.578
Recruits
8e+06
6e+06
4e+06
2e+06
0e+00
0
5000
10000
15000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

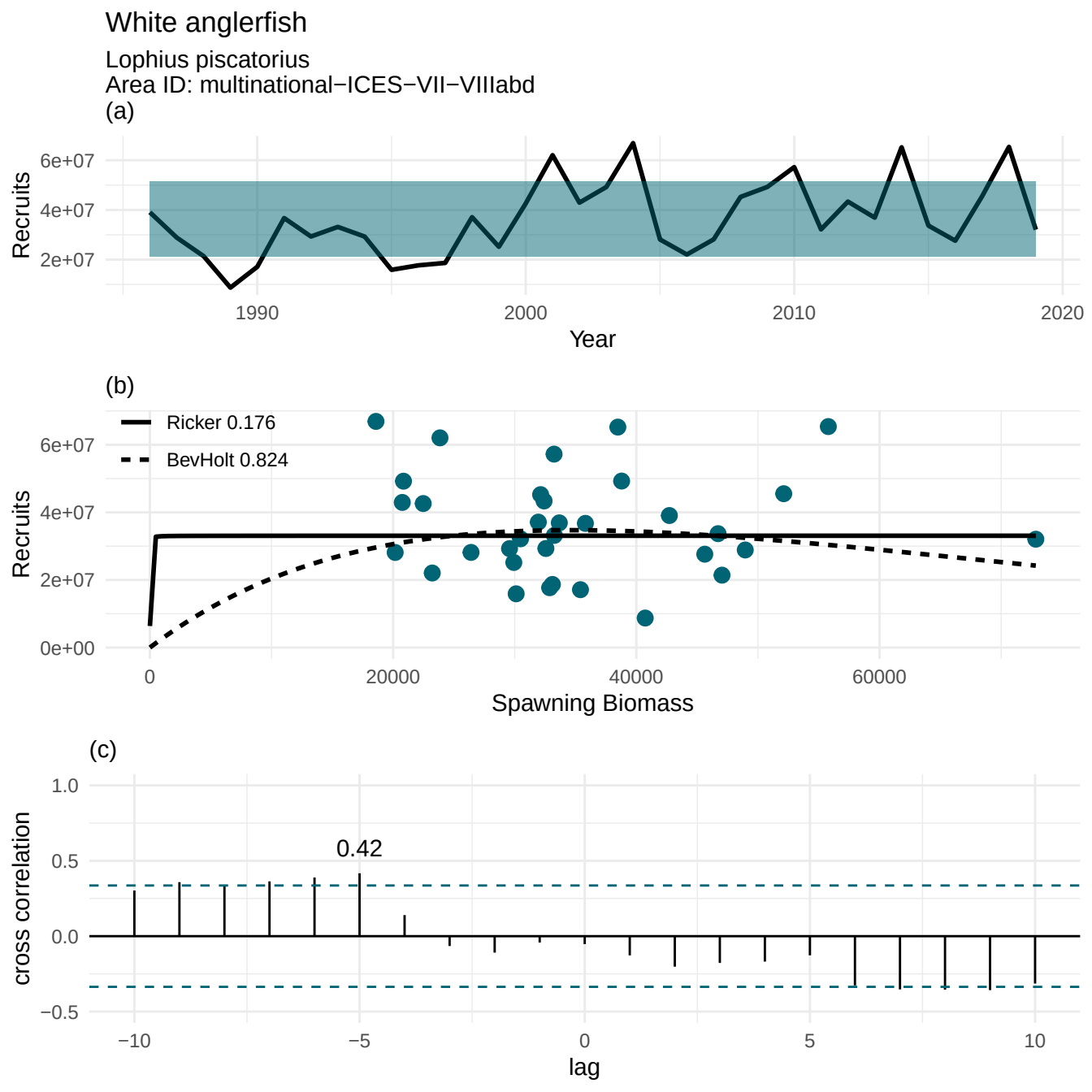

Turbot
Psetta maxima
Area ID: multinational−GFCM−GSA29
(a)
Recruits
2000000
1500000
1000000
500000
1960
1980
2000
Year
(b)
Ricker 0.421
BevHolt 0.579
Recruits
2000000
1500000
1000000
500000
0
0
3000
6000
9000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.59
0.39
−10
−5
0
5
10
lag

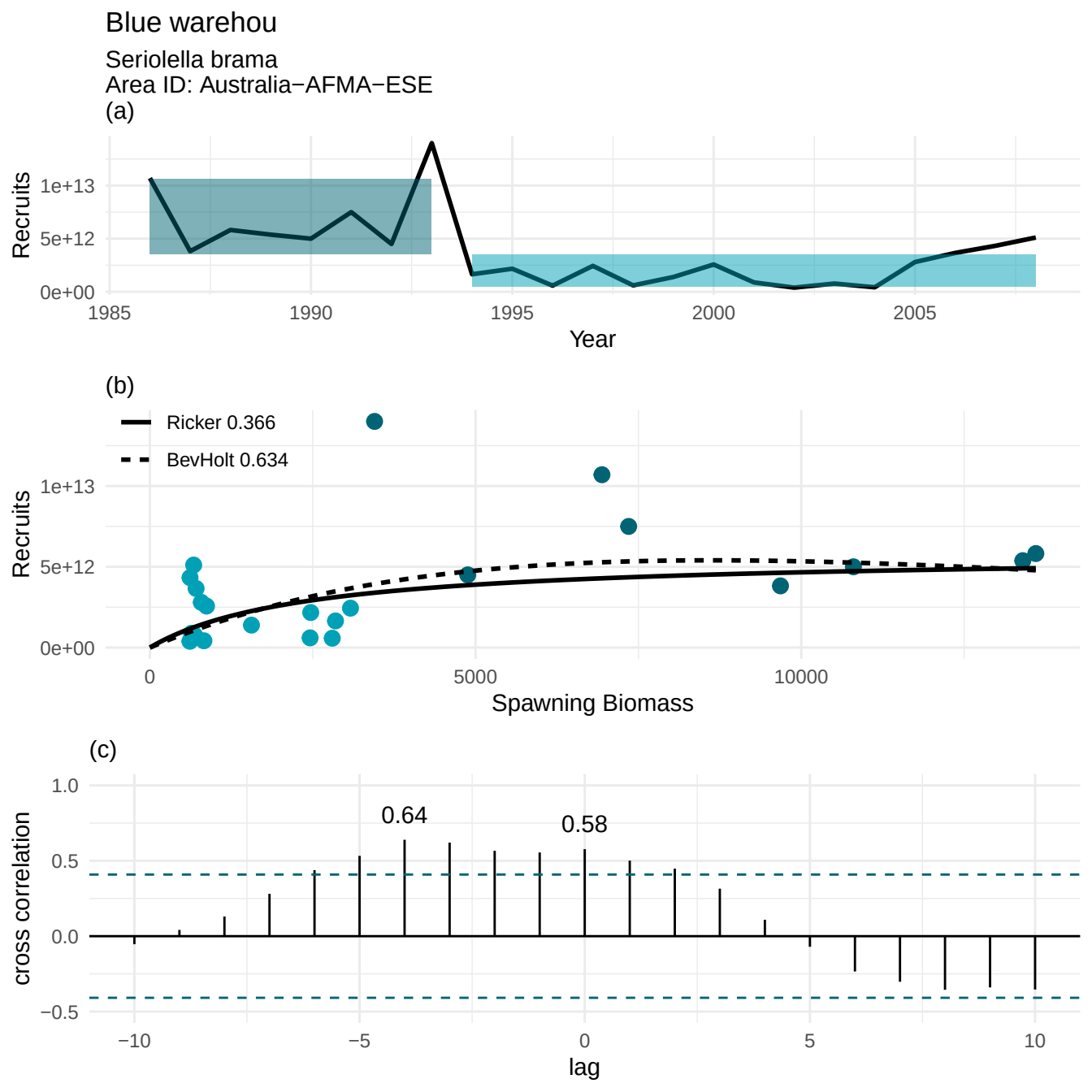

Turbot
Scophthalmus maximus
Area ID: multinational−ICES−IV
(a)
Recruits
8e+06
6e+06
4e+06
1980
1990
2000
2010
Year
(b)
Ricker 0.126
BevHolt 0.874
Recruits
7500000
5000000
2500000
0
0
5000
10000
15000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

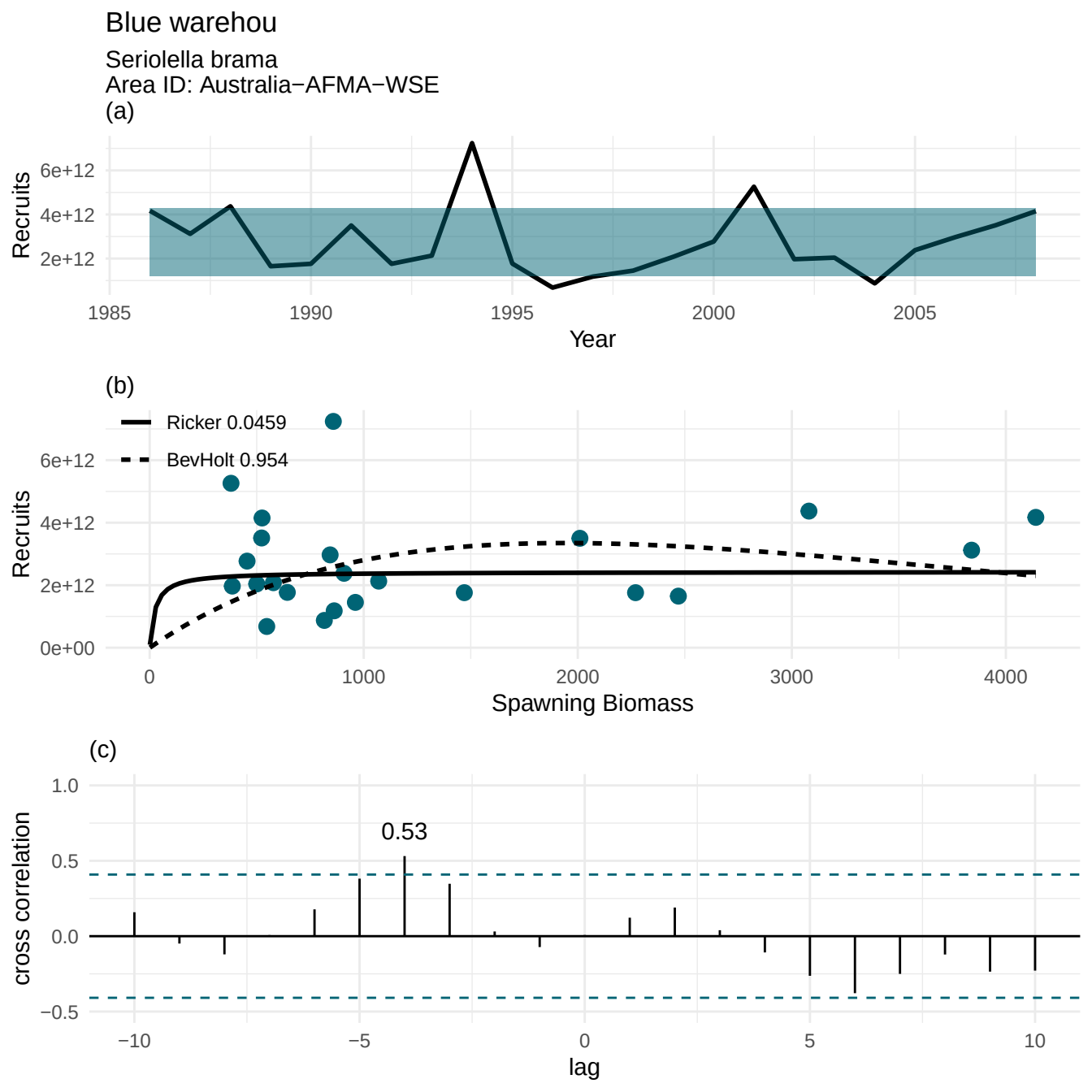

Vermilion snapper
Rhomboplites aurorubens
Area ID: USA−NMFS−GM
(a)
Recruits
3.5e+07
3.0e+07
2.5e+07
2.0e+07
1995
2000
2005
2010
Year
(b)
Ricker 0.474
BevHolt 0.526
Recruits
3e+07
2e+07
1e+07
0e+00
0e+00
1e+14
2e+14
3e+14
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

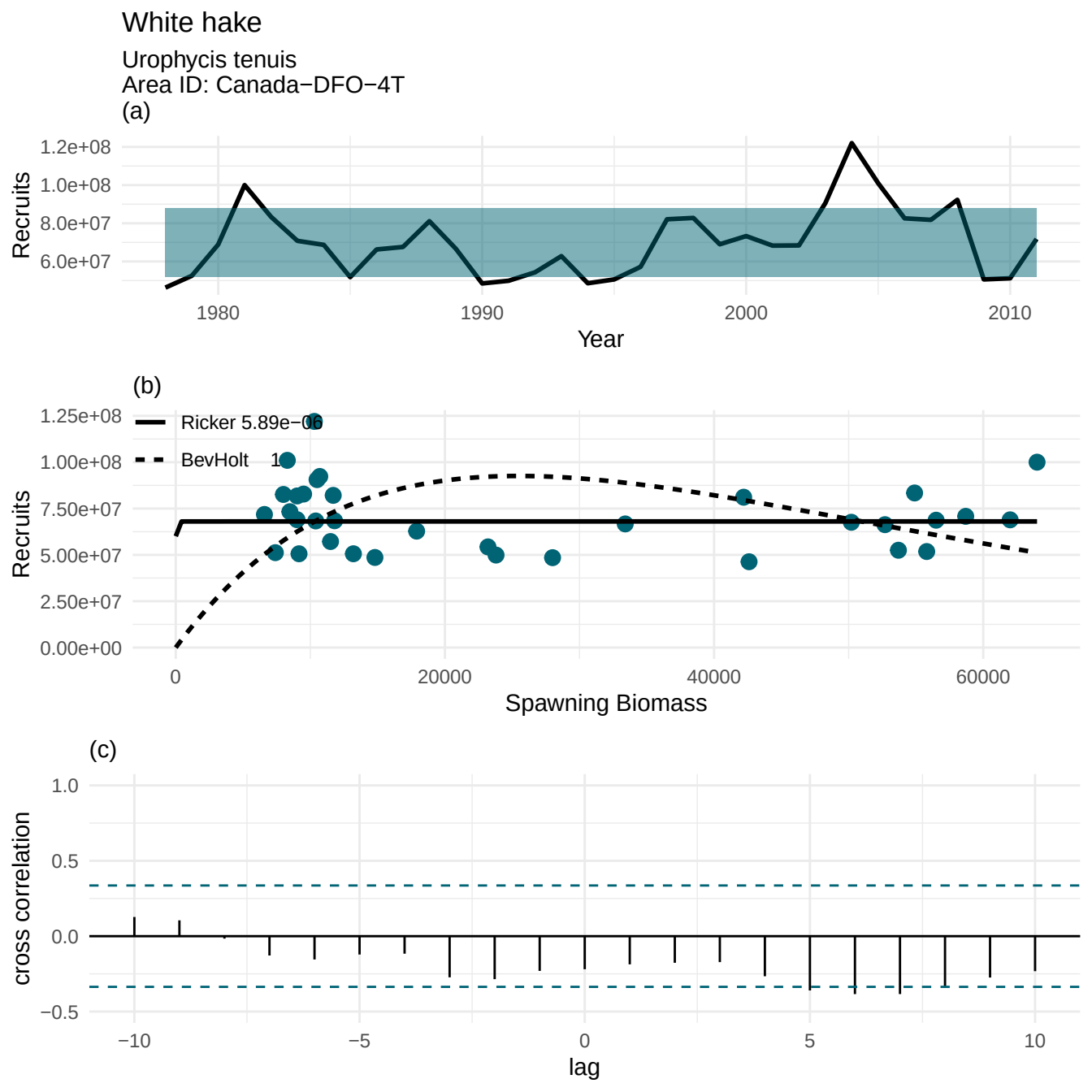

Vermilion snapper
Rhomboplites aurorubens
Area ID: USA−NMFS−SATLC
(a)
Recruits
1e+07
8e+06
6e+06
4e+06
1980
1990
2000
2010
Year
(b)
Ricker 0.336
BevHolt 0.664
Recruits
1.2e+07
9.0e+06
6.0e+06
3.0e+06
0.0e+00
0e+00
1e+13
2e+13
3e+13
4e+13
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.39
−10
−5
0
5
10
lag

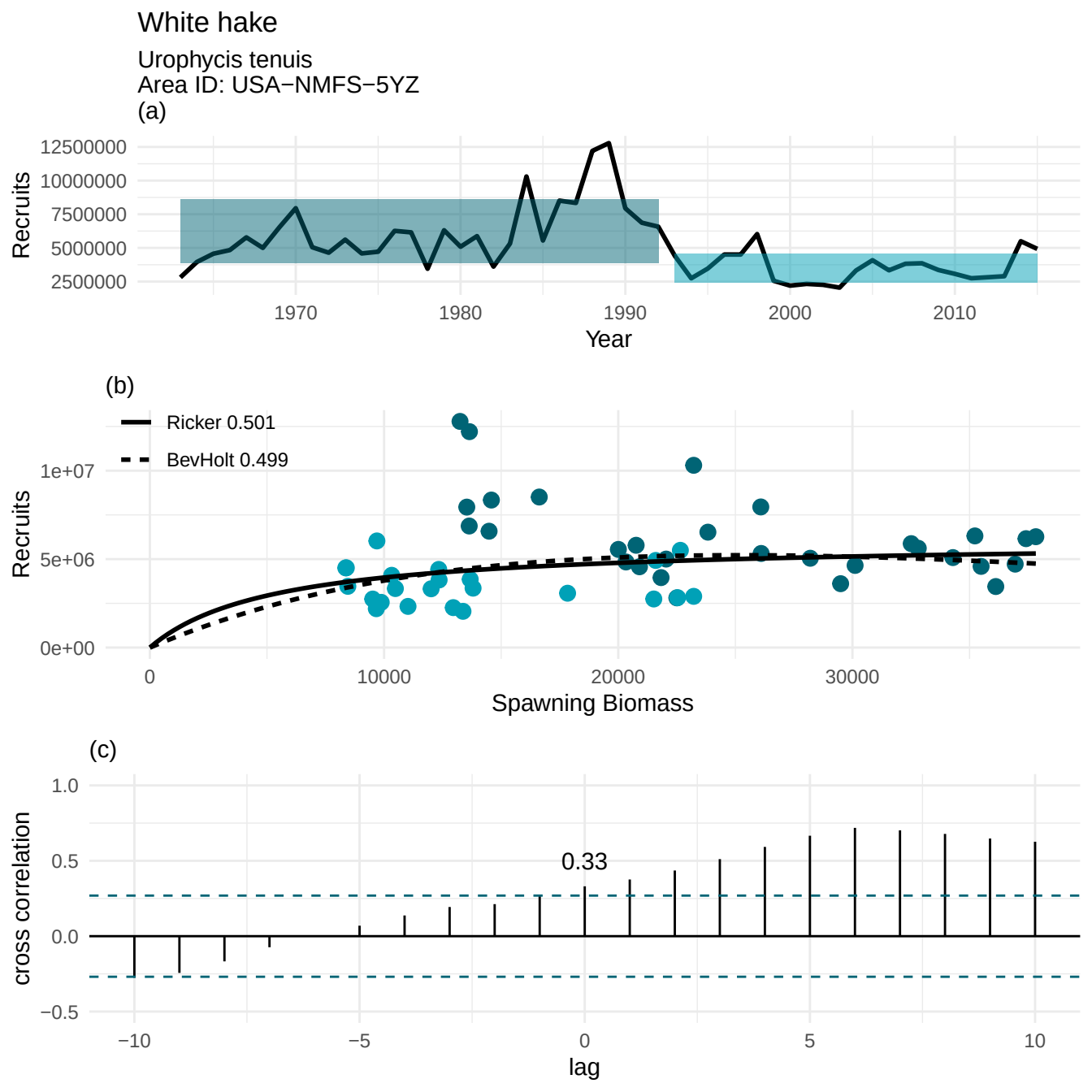

White anglerfish
Lophius piscatorius
Area ID: multinational−ICES−VIIIc−IXa
(a)
Recruits
6e+06
4e+06
2e+06
0e+00
1980
1990
2000
2010
2020
Year
(b)
Ricker 0.578
BevHolt 0.422
Recruits
6e+06
4e+06
2e+06
0e+00
0
5000
10000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

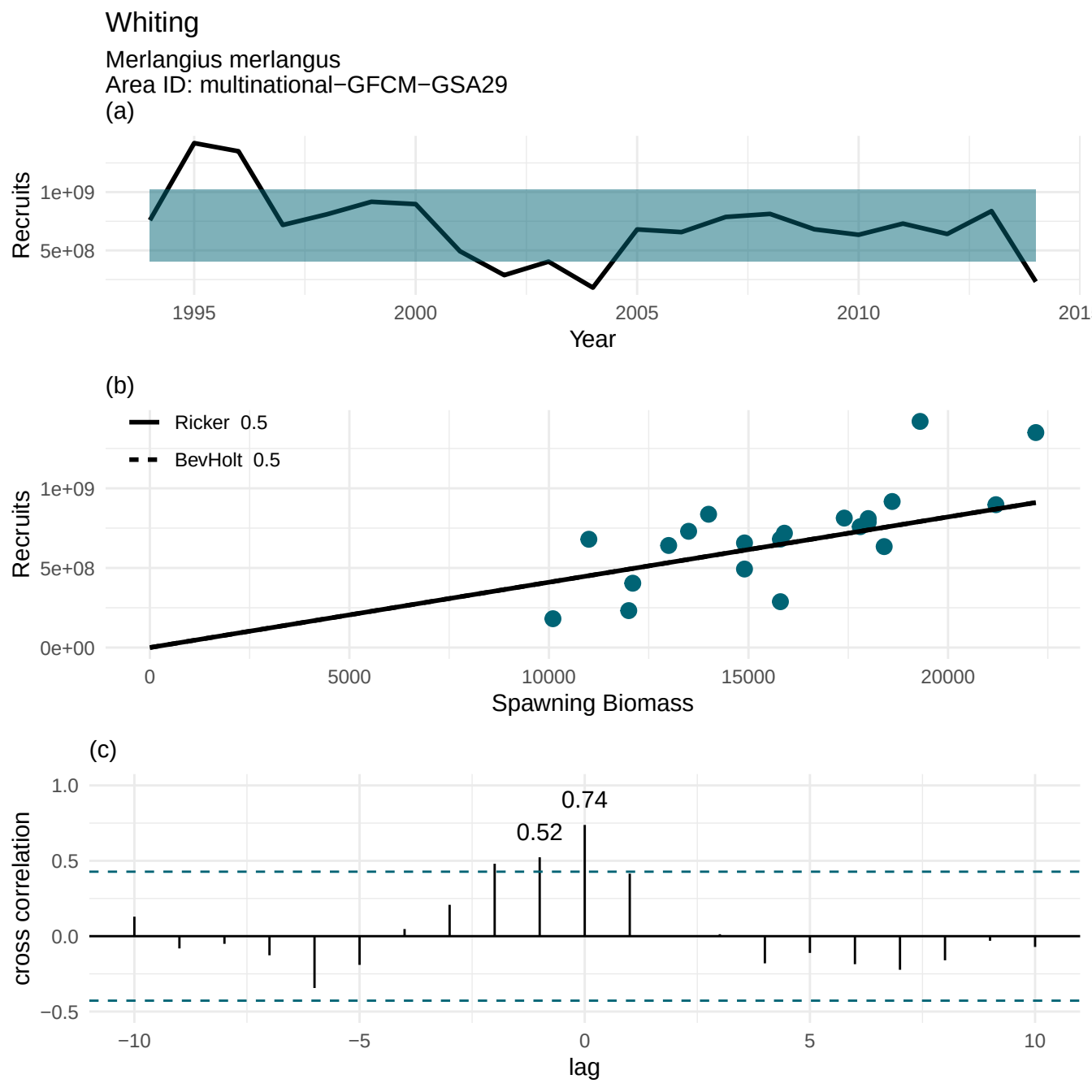

White anglerfish
Lophius piscatorius
Area ID: multinational−ICES−VII−VIIIabd
(a)
Recruits
6e+07
4e+07
2e+07
1990
2000
2010
2020
Year
(b)
Ricker 0.176
BevHolt 0.824
Recruits
6e+07
4e+07
2e+07
0e+00
0
20000
40000
60000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.42
−10
−5
0
5
10
lag

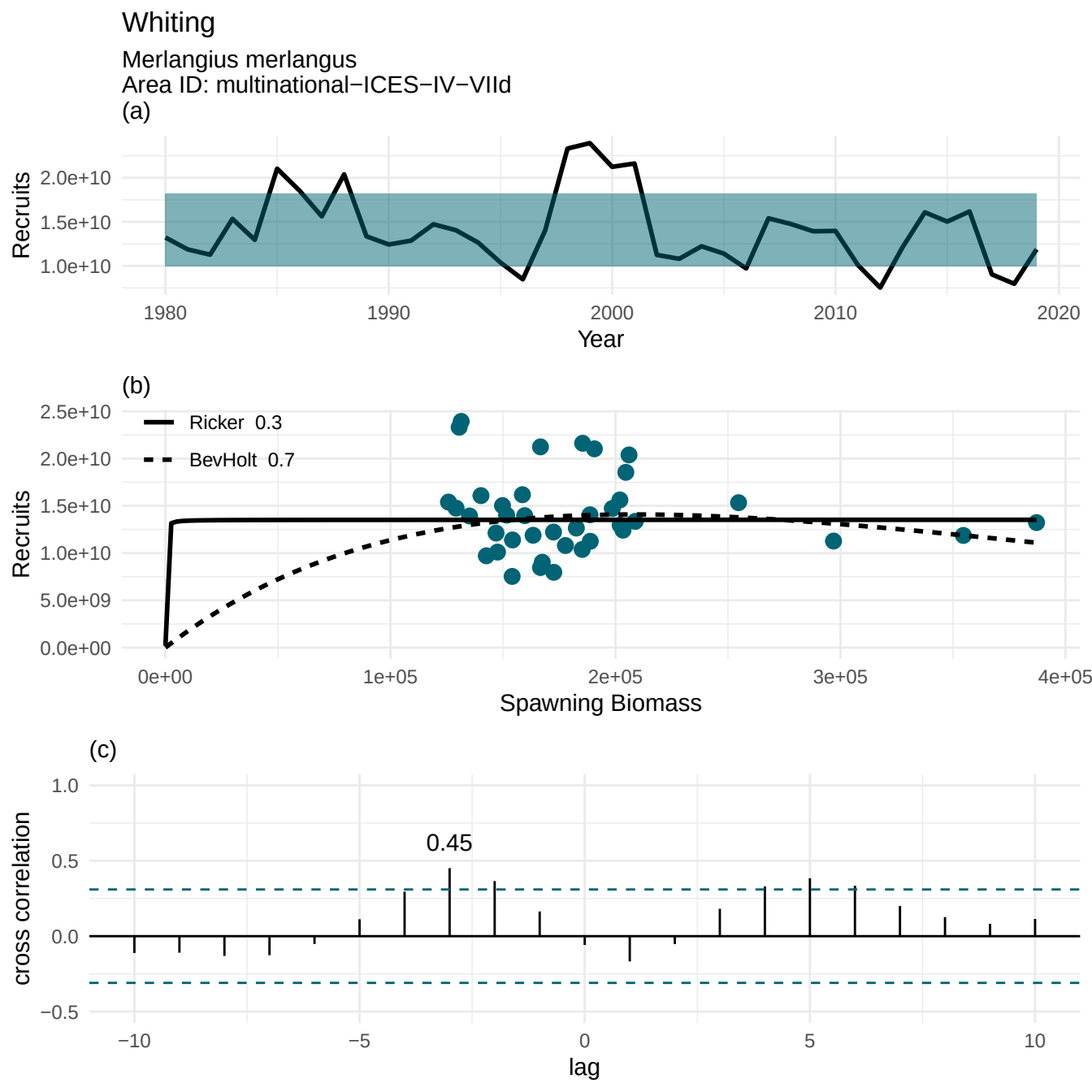

Blue warehou
Seriolella brama
Area ID: Australia−AFMA−ESE
(a)
Recruits
1e+13
5e+12
0e+00
1985
1990
1995
2000
2005
Year
(b)
Ricker 0.366
BevHolt 0.634
Recruits
1e+13
5e+12
0e+00
0
5000
10000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.64
0.58
−10
−5
0
5
10
lag

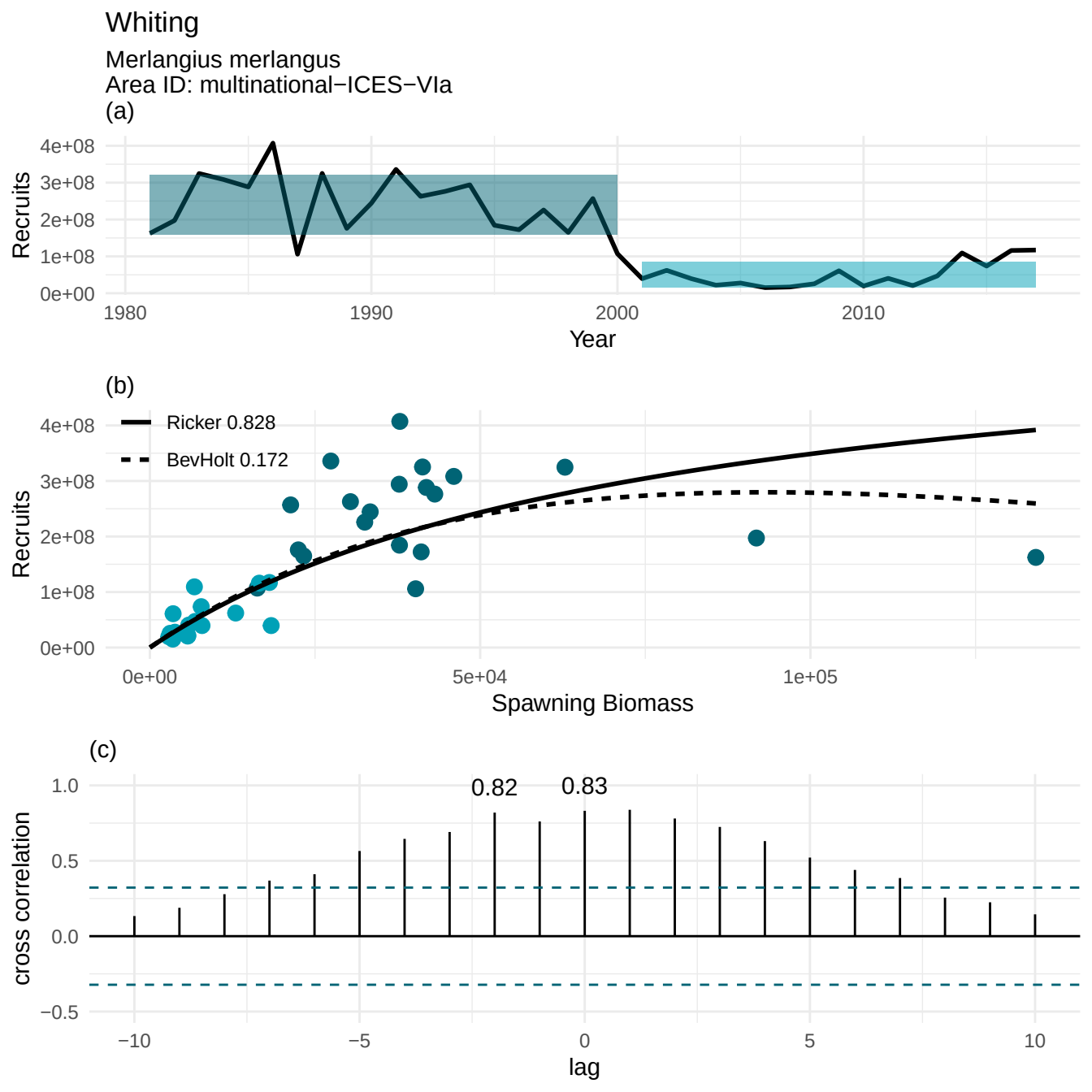

Blue warehou
Seriolella brama
Area ID: Australia−AFMA−WSE
(a)
Recruits
6e+12
4e+12
2e+12
1985
1990
1995
2000
2005
Year
(b)
Ricker 0.0459
BevHolt 0.954
Recruits
6e+12
4e+12
2e+12
0e+00
0
1000
2000
3000
4000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.53
−10
−5
0
5
10
lag

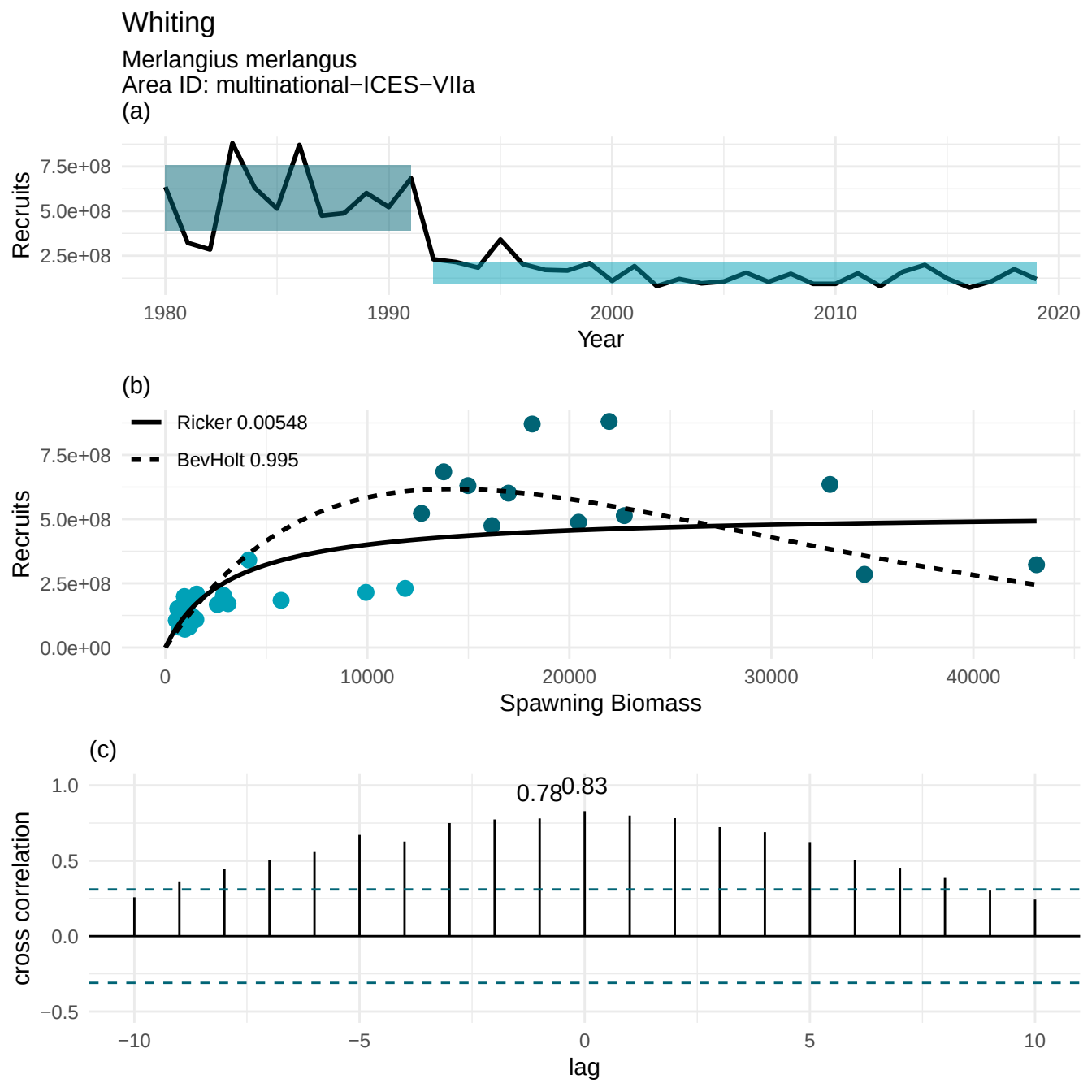

White hake
Urophycis tenuis
Area ID: Canada−DFO−4T
(a)
Recruits
1.2e+08
1.0e+08
8.0e+07
6.0e+07
1980
1990
2000
2010
Year
(b)
Ricker 5.89e−08
BevHolt 1
Recruits
1.25e+08
1.00e+08
7.50e+07
5.00e+07
2.50e+07
0.00e+00
0
20000
40000
60000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

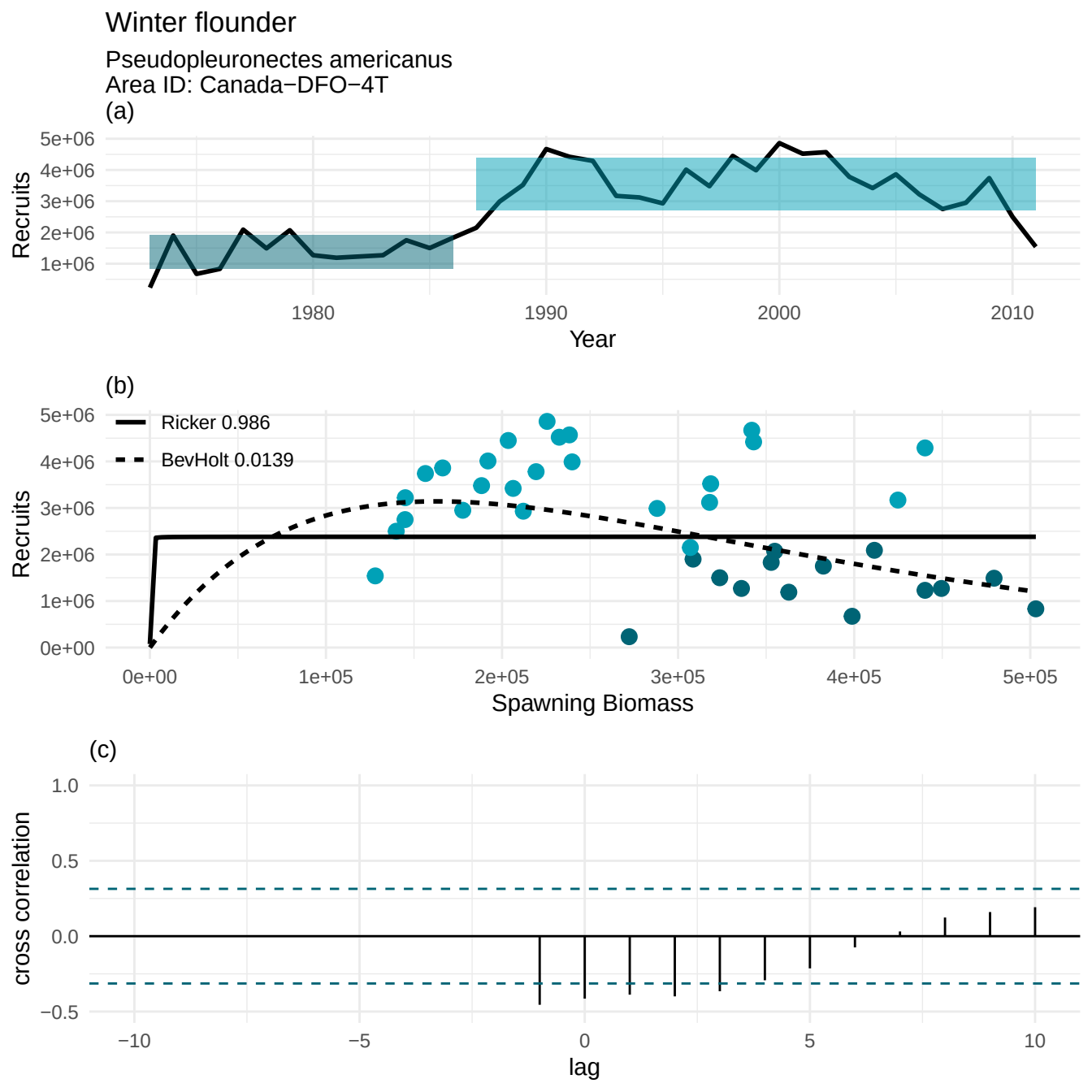

White hake
Urophycis tenuis
Area ID: USA−NMFS−5YZ
(a)
Recruits
12500000
10000000
7500000
5000000
2500000
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.501
BevHolt 0.499
Recruits
1e+07
5e+06
0e+00
0
10000
20000
30000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.33
−10
−5
0
5
10
lag

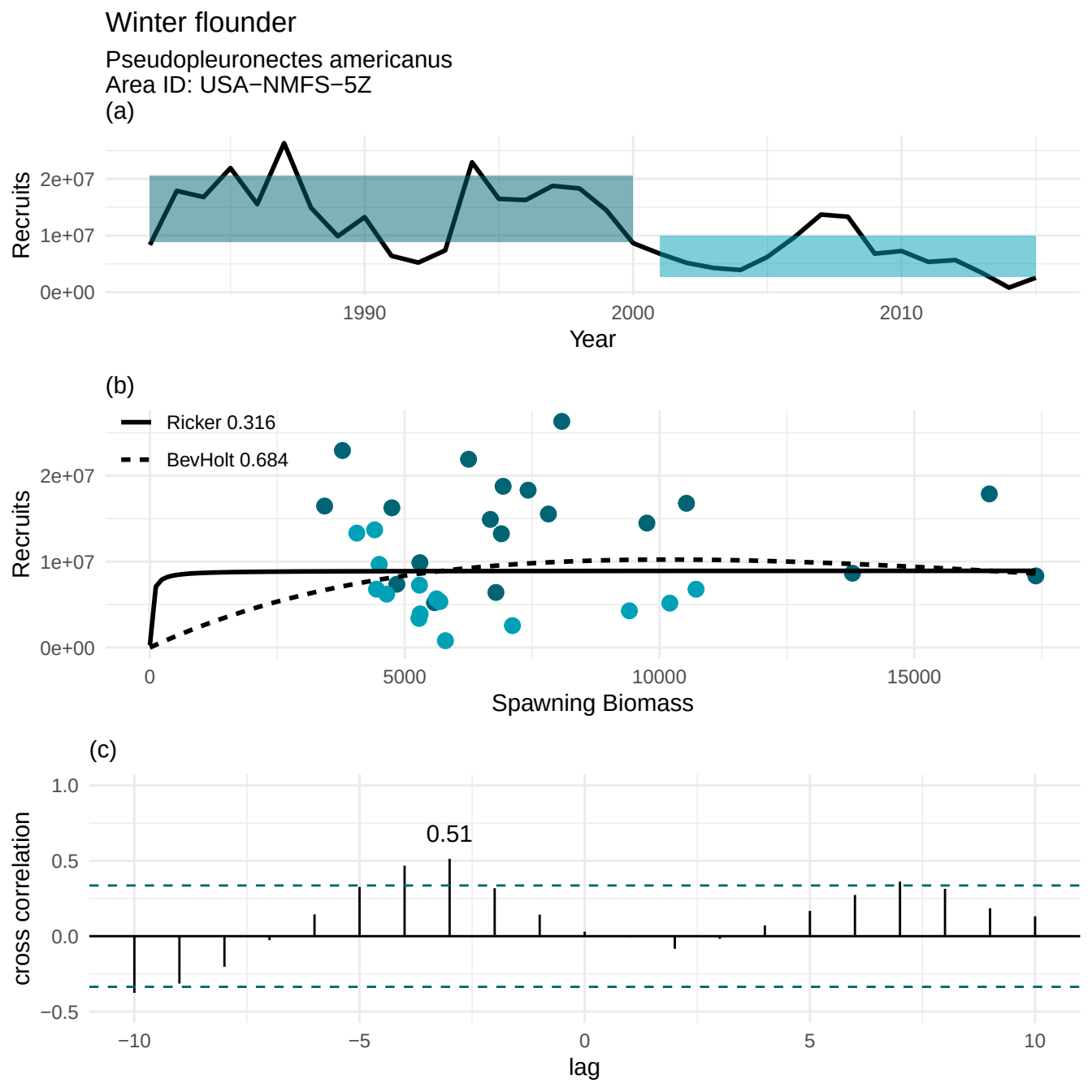

Whiting
Merlangius merlangus
Area ID: multinational−GFCM−GSA29
(a)
Recruits
1e+09
5e+08
1995
2000
2005
2010
201
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
1e+09
5e+08
0e+00
0
5000
10000
15000
20000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.74
0.52
−10
−5
0
5
10
lag

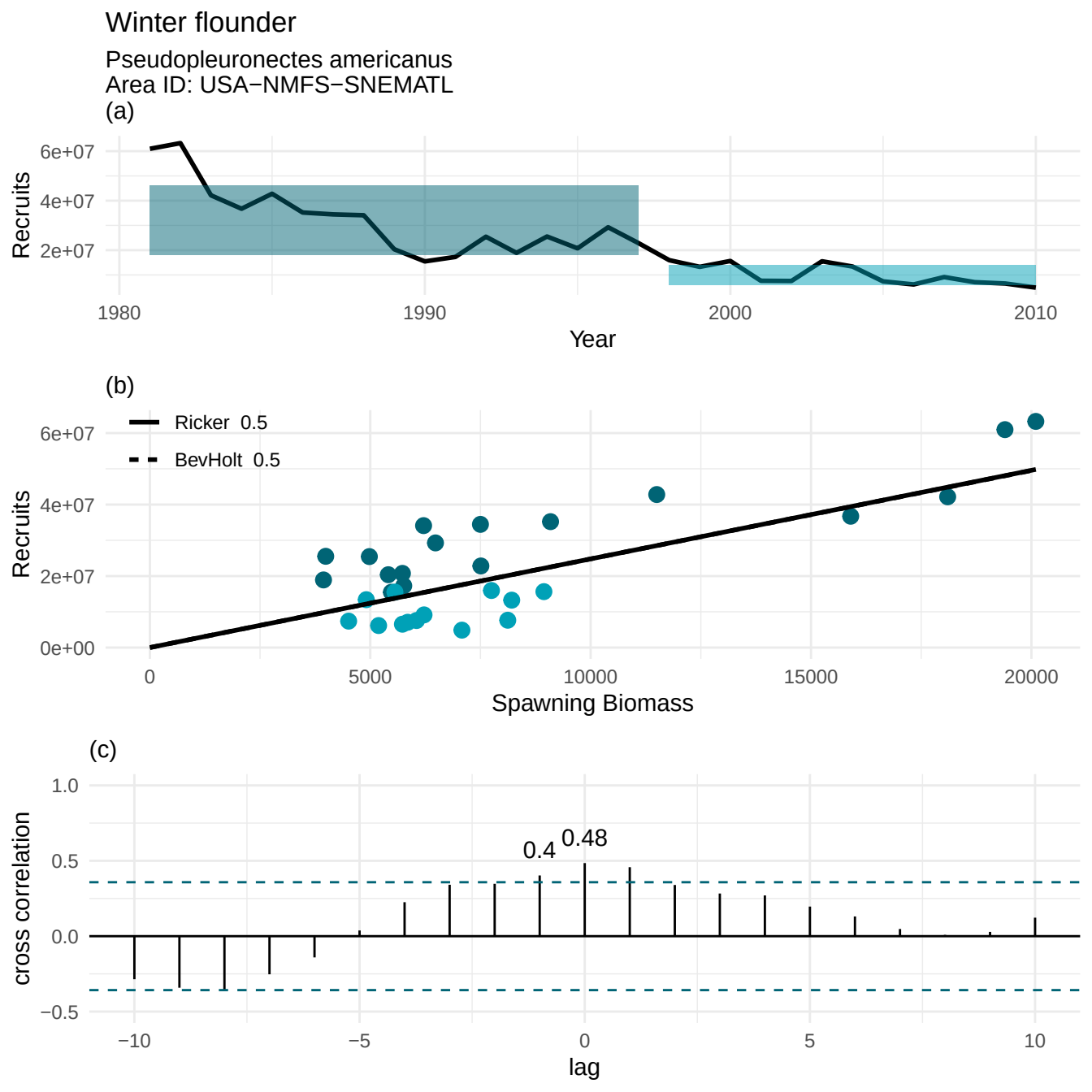

Whiting
Merlangius merlangus
Area ID: multinational−ICES−IV−VIId
(a)
Recruits
2.0e+10
1.5e+10
1.0e+10
1980
1990
2000
2010
2020
Year
(b)
Ricker 0.3
BevHolt 0.7
Recruits
2.5e+10
2.0e+10
1.5e+10
1.0e+10
5.0e+09
0.0e+00
0e+00
1e+05
2e+05
3e+05
4e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.45
−10
−5
0
5
10
lag

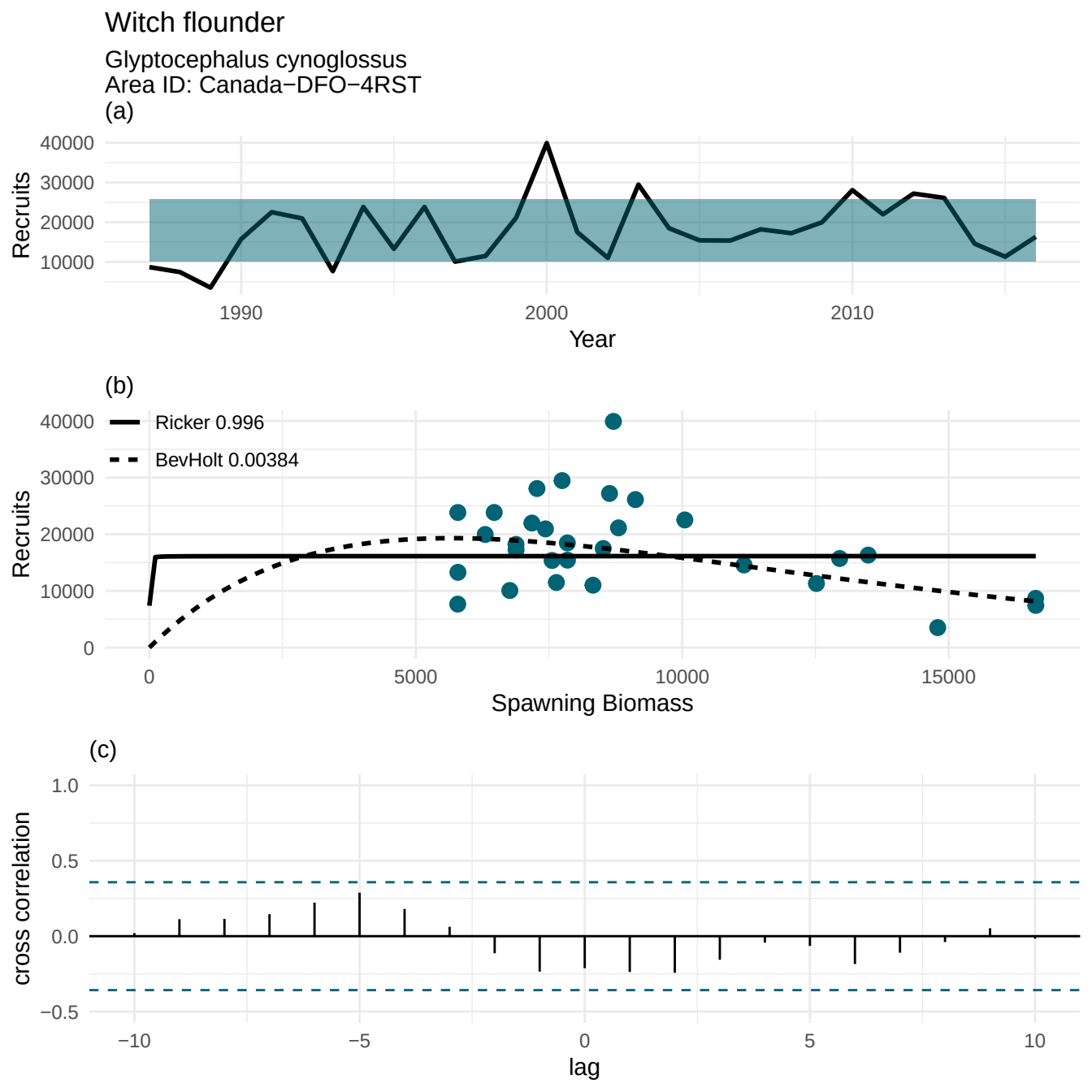

Whiting
Merlangius merlangus
Area ID: multinational−ICES−VIa
(a)
Recruits
4e+08
3e+08
2e+08
1e+08
0e+00
1980
1990
2000
2010
Year
(b)
Ricker 0.828
BevHolt 0.172
Recruits
4e+08
3e+08
2e+08
1e+08
0e+00
0e+00
5e+04
1e+05
Spawning Biomass
(c)
0.82
0.83
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

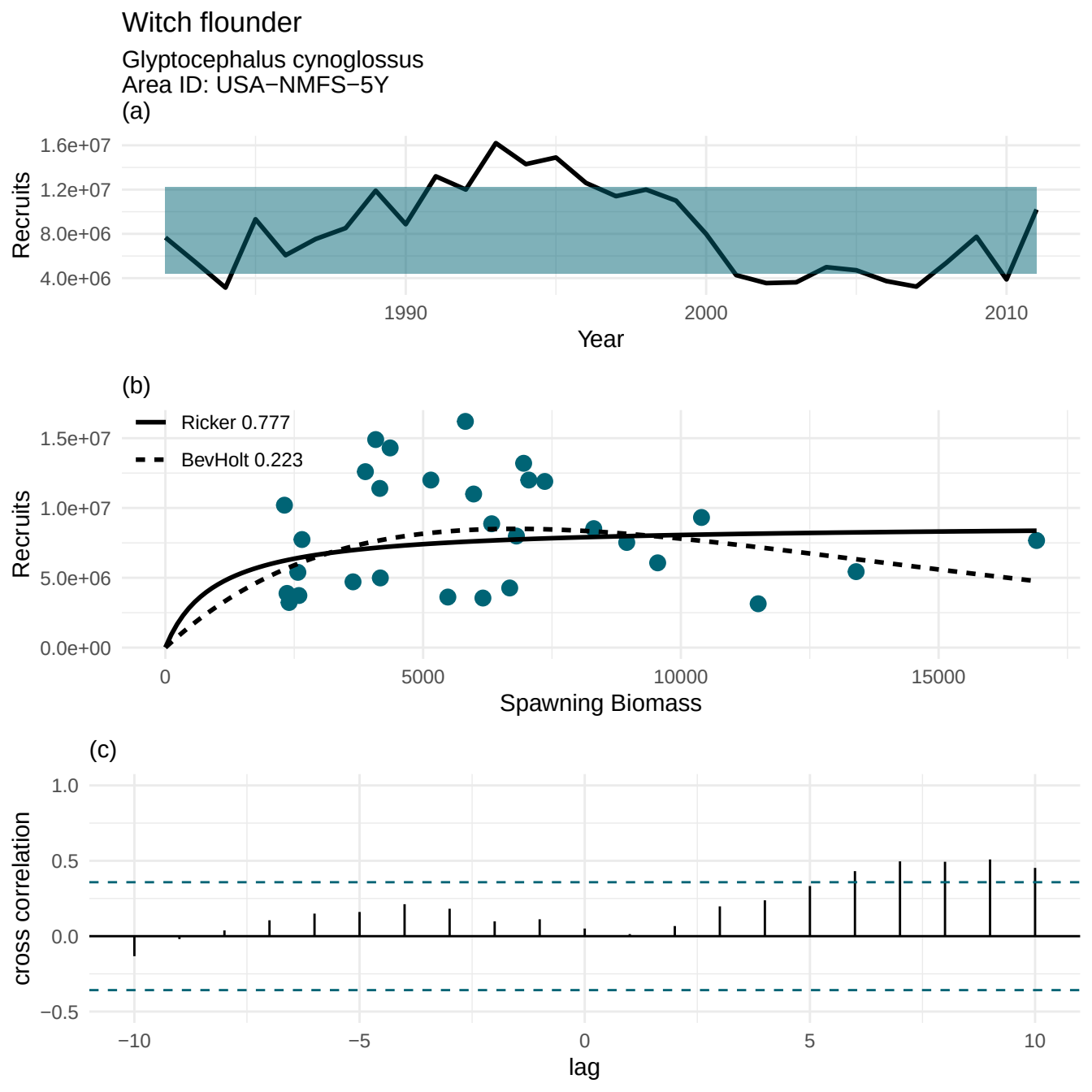

Whiting
Merlangius merlangus
Area ID: multinational−ICES−VIIa
(a)
Recruits
7.5e+08
5.0e+08
2.5e+08
1980
1990
2000
2010
2020
Year
(b)
Ricker 0.00548
BevHolt 0.995
Recruits
7.5e+08
5.0e+08
2.5e+08
0.0e+00
0
10000
20000
30000
40000
Spawning Biomass
(c)
0.78
0.83
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

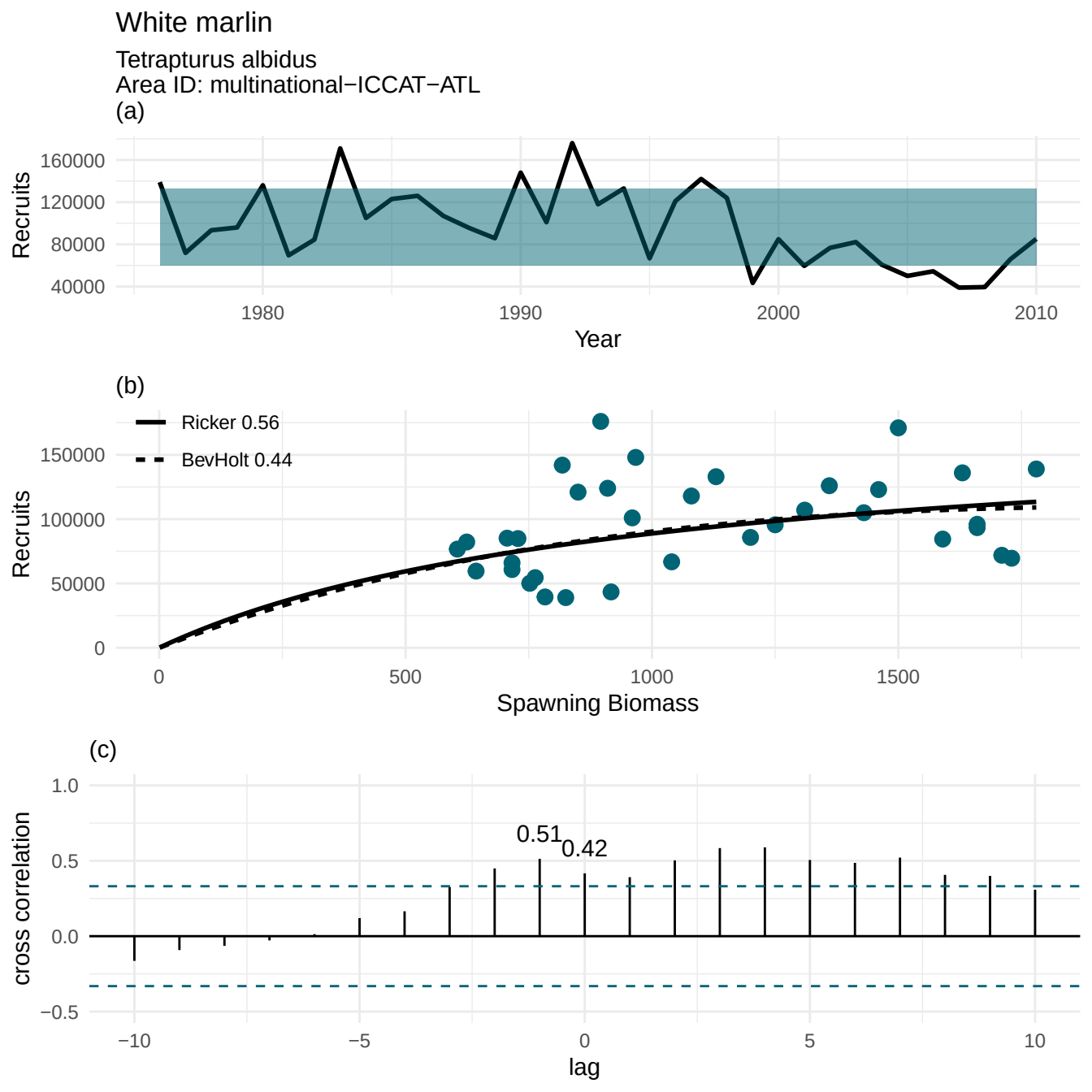

Winter flounder
Pseudopleuronectes americanus
Area ID: Canada−DFO−4T
(a)
Recruits
5e+06
4e+06
3e+06
2e+06
1e+06
1980
1990
2000
2010
Year
(b)
Ricker 0.986
BevHolt 0.0139
Recruits
5e+06
4e+06
3e+06
2e+06
1e+06
0e+00
0e+00
1e+05
2e+05
3e+05
4e+05
5e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

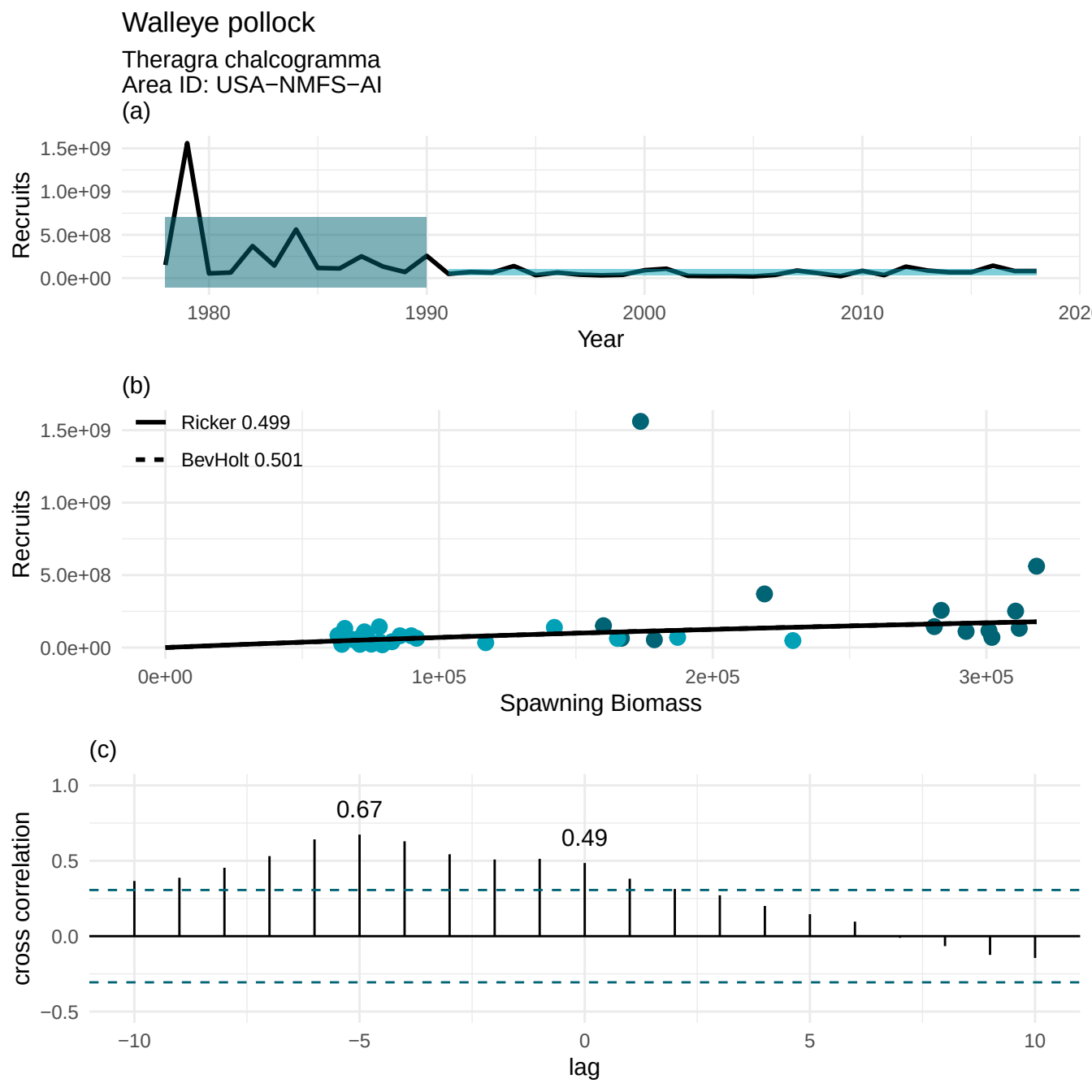

Winter flounder
Pseudopleuronectes americanus
Area ID: USA−NMFS−5Z
(a)
Recruits
2e+07
1e+07
0e+00
1990
2000
2010
Year
(b)
Ricker 0.316
BevHolt 0.684
Recruits
2e+07
1e+07
0e+00
0
5000
10000
15000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.51
−10
−5
0
5
10
lag

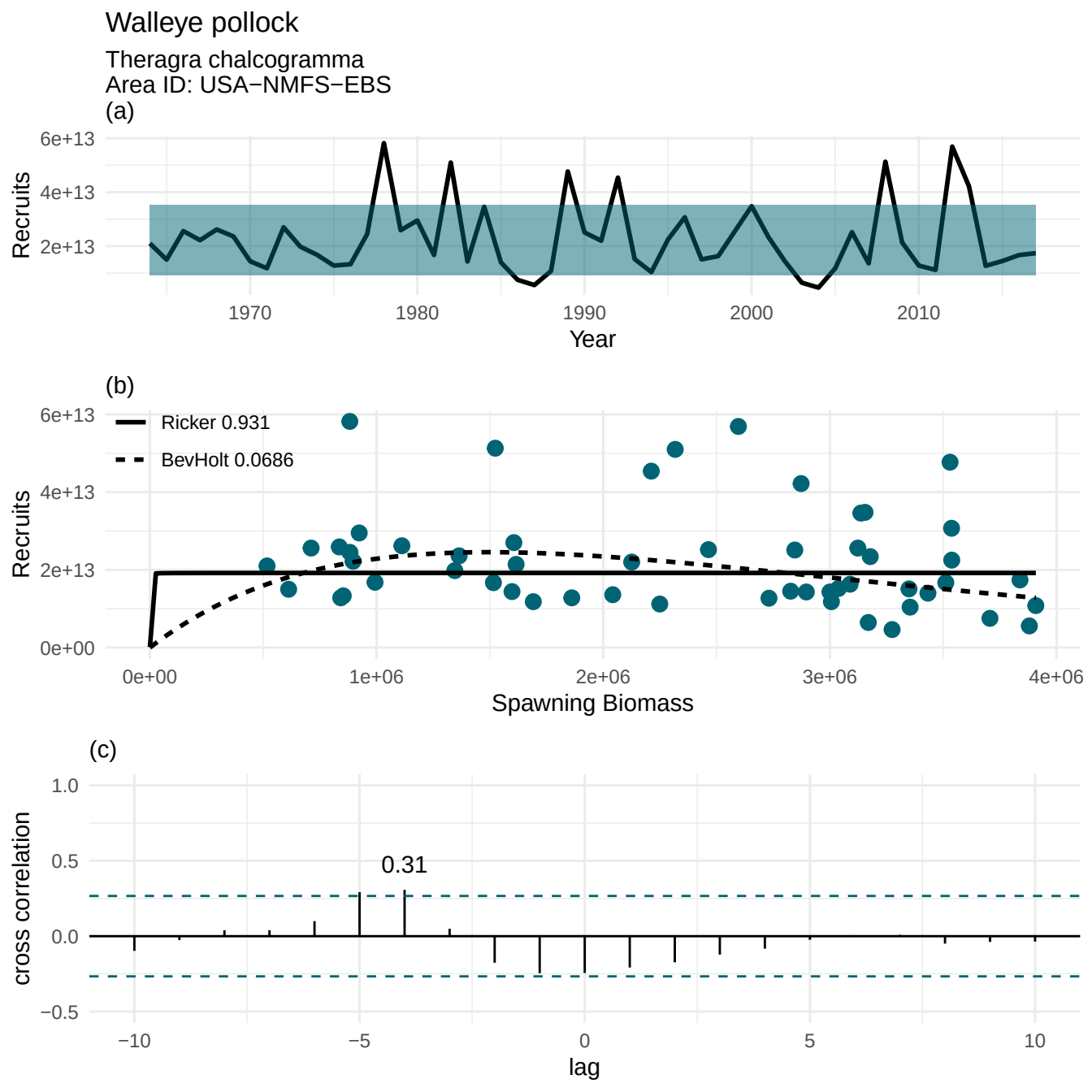

Winter flounder
Pseudopleuronectes americanus
Area ID: USA−NMFS−SNEMATL
(a)
Recruits
6e+07
4e+07
2e+07
1980
1990
2000
2010
Year
(b)
Ricker 0.5
BevHolt 0.5
Recruits
6e+07
4e+07
2e+07
0e+00
0
5000
10000
15000
20000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.4
0.48
−10
−5
0
5
10
lag

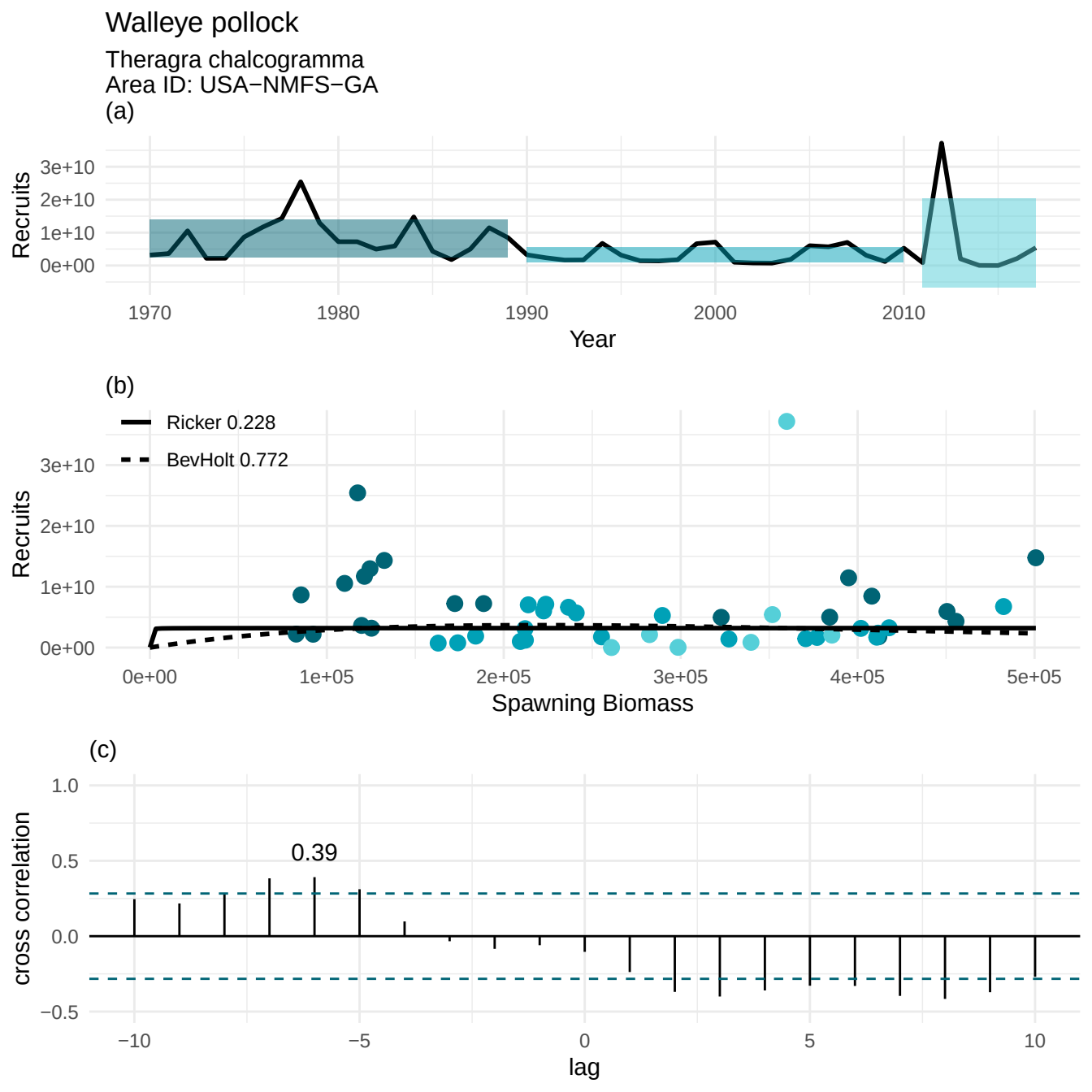

Witch flounder
Glyptocephalus cynoglossus
Area ID: Canada−DFO−4RST
(a)
Recruits
40000
30000
20000
10000
1990
2000
2010
Year
(b)
Ricker 0.996
BevHolt 0.00384
Recruits
40000
30000
20000
10000
0
0
5000
10000
15000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

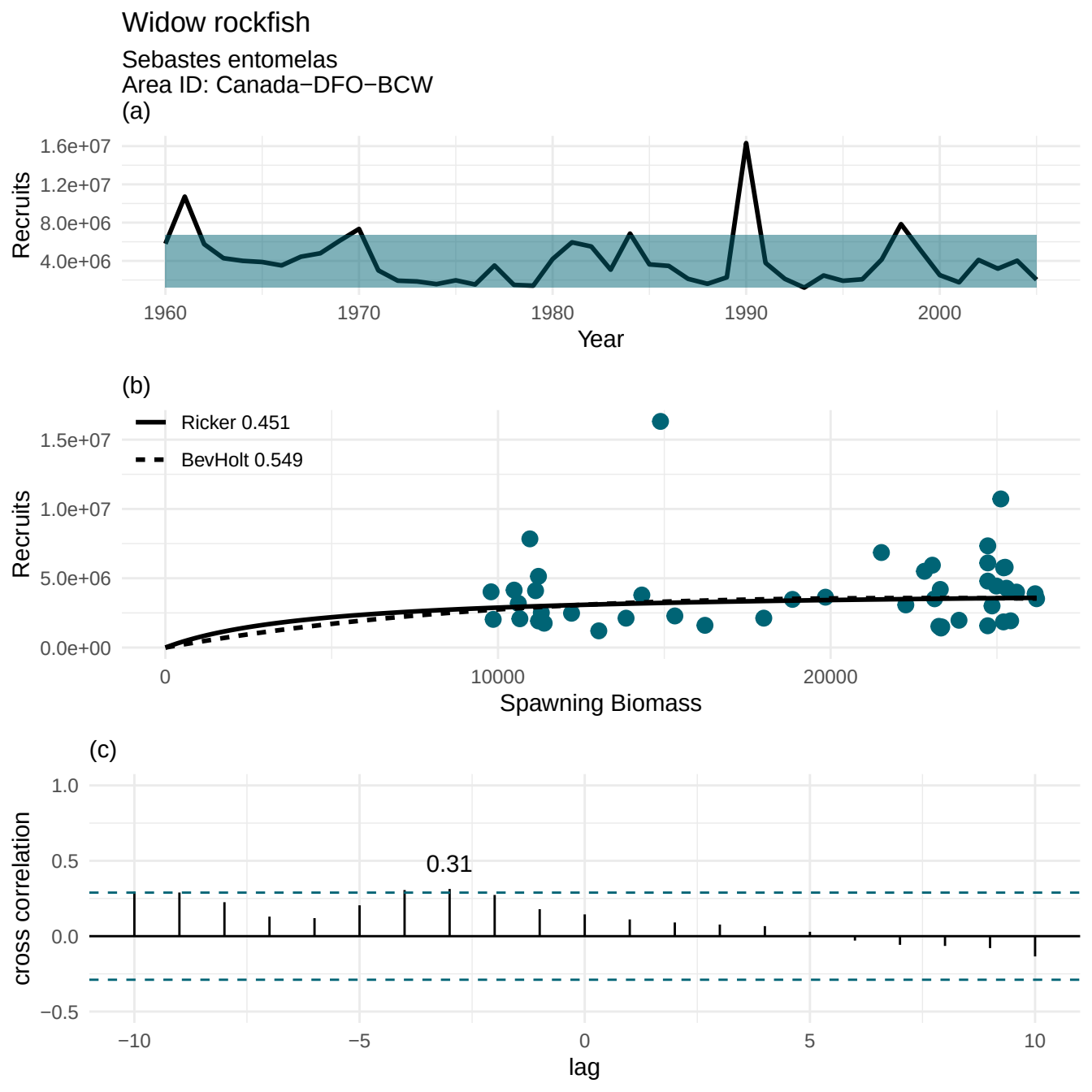

Witch flounder
Glyptocephalus cynoglossus
Area ID: USA−NMFS−5Y
(a)
Recruits
1.6e+07
1.2e+07
8.0e+06
4.0e+06
1990
2000
2010
Year
(b)
Ricker 0.777
BevHolt 0.223
Recruits
1.5e+07
1.0e+07
5.0e+06
0.0e+00
0
5000
10000
15000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

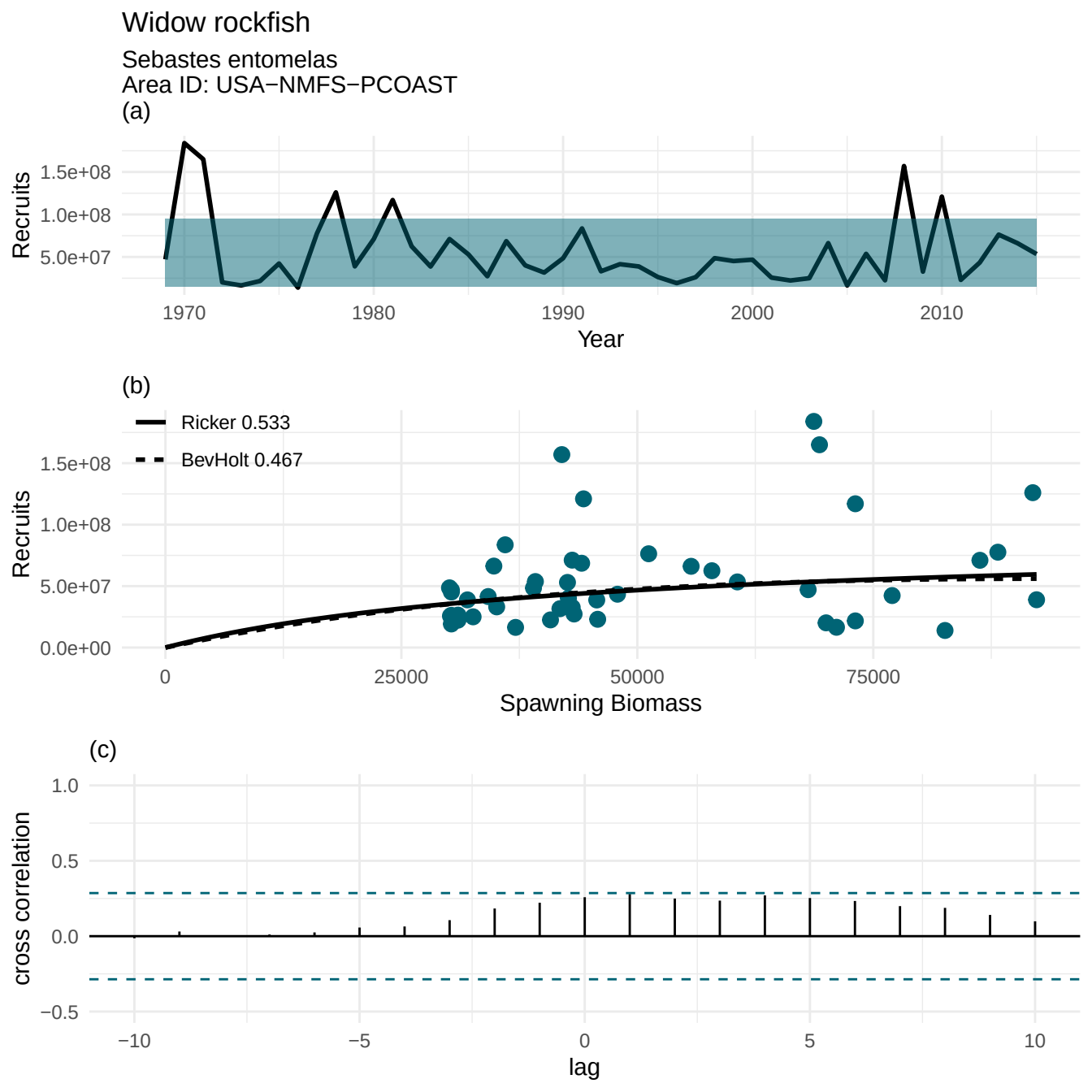

White marlin
Tetrapturus albidus
Area ID: multinational−ICCAT−ATL
(a)
Recruits
160000
120000
80000
40000
1980
1990
2000
2010
Year
(b)
Ricker 0.56
BevHolt 0.44
Recruits
150000
100000
50000
0
0
500
1000
1500
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.51
0.42
−10
−5
0
5
10
lag

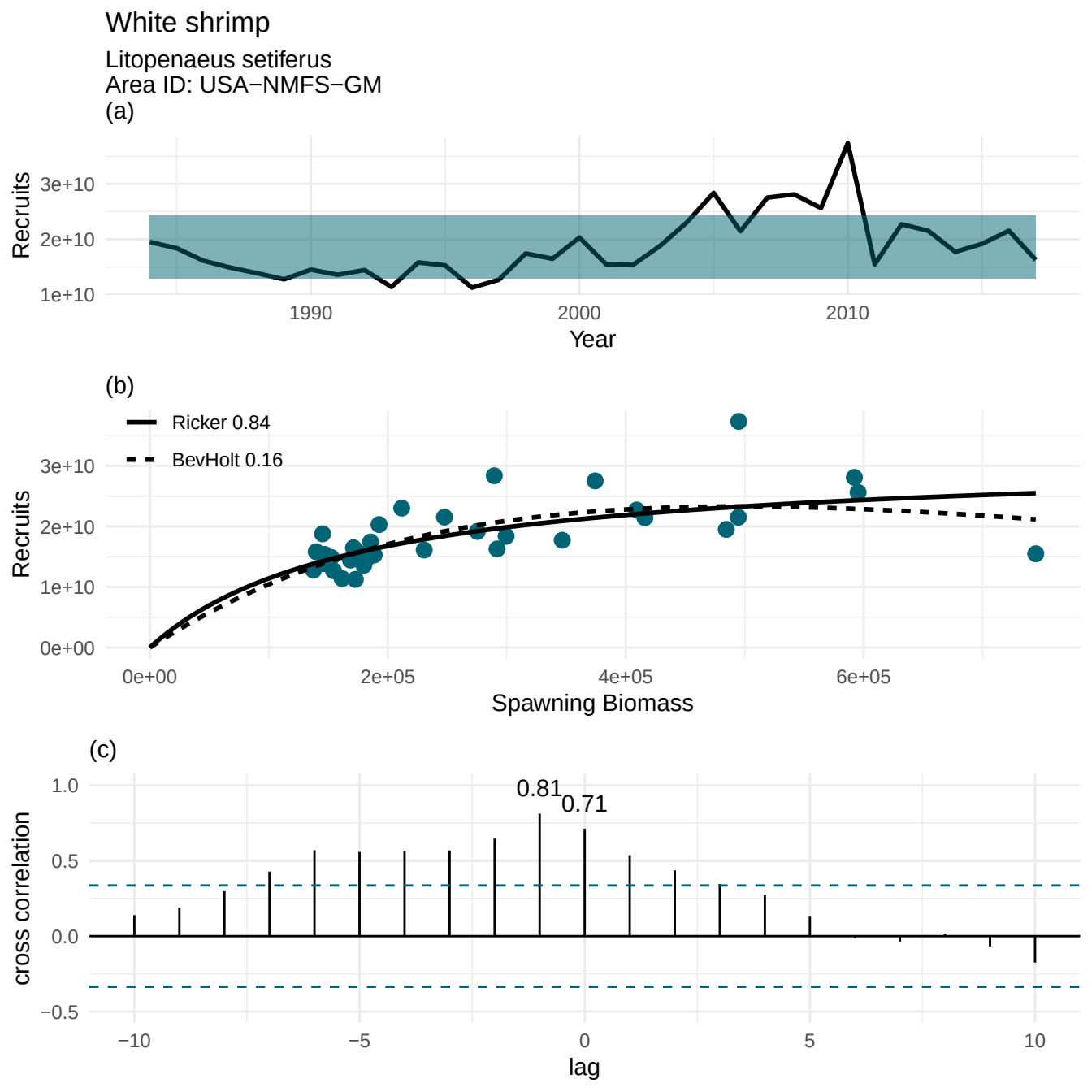

Walleye pollock
Theragra chalcogramma
Area ID: USA−NMFS−AI
(a)
Recruits
1.5e+09
1.0e+09
5.0e+08
0.0e+00
1980
1990
2000
2010
Year
(b)
Ricker 0.499
BevHolt 0.501
Recruits
1.5e+09
1.0e+09
5.0e+08
0.0e+00
0e+00
1e+05
2e+05
3e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.67
0.49
−10
−5
0
5
10
lag

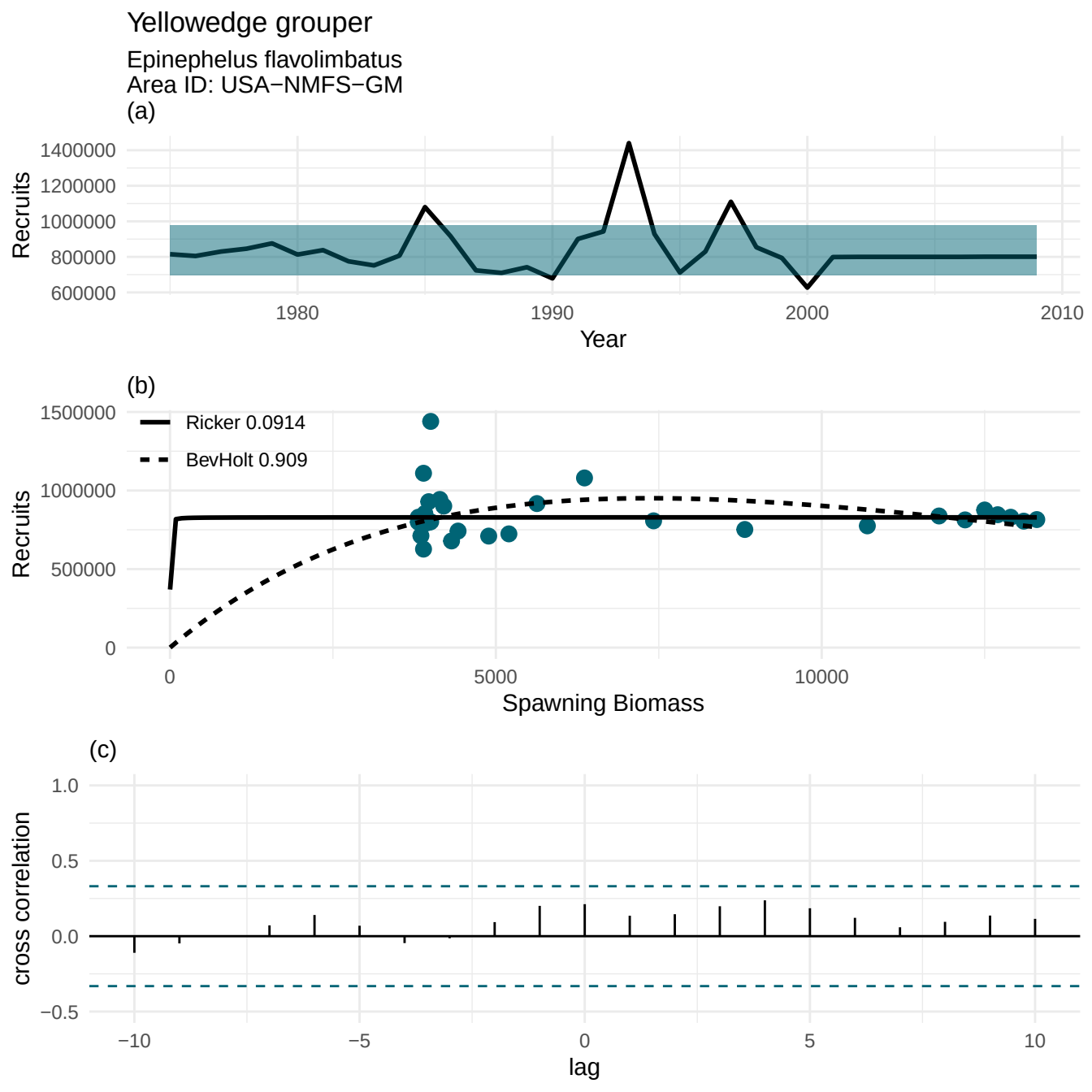

Walleye pollock
Theragra chalcogramma
Area ID: USA−NMFS−EBS
(a)
Recruits
6e+13
4e+13
2e+13
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.931
BevHolt 0.0686
Recruits
6e+13
4e+13
2e+13
0e+00
0e+00
1e+06
2e+06
3e+06
4e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.31
−10
−5
0
5
10
lag

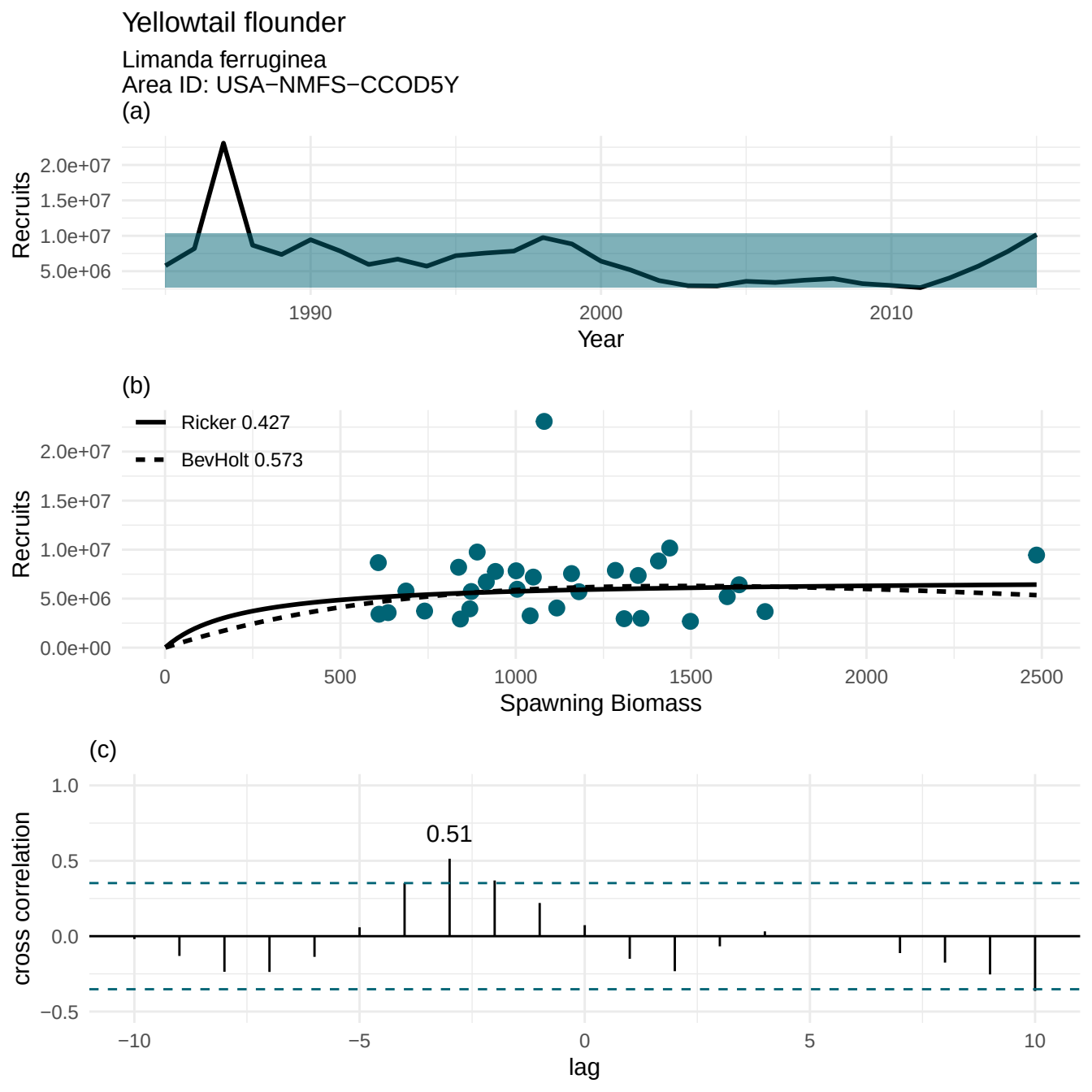

Walleye pollock
Theragra chalcogramma
Area ID: USA−NMFS−GA
(a)
Recruits
3e+10
2e+10
1e+10
0e+00
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.228
BevHolt 0.772
Recruits
3e+10
2e+10
1e+10
0e+00
0e+00
1e+05
2e+05
3e+05
4e+05
5e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.39
−10
−5
0
5
10
lag

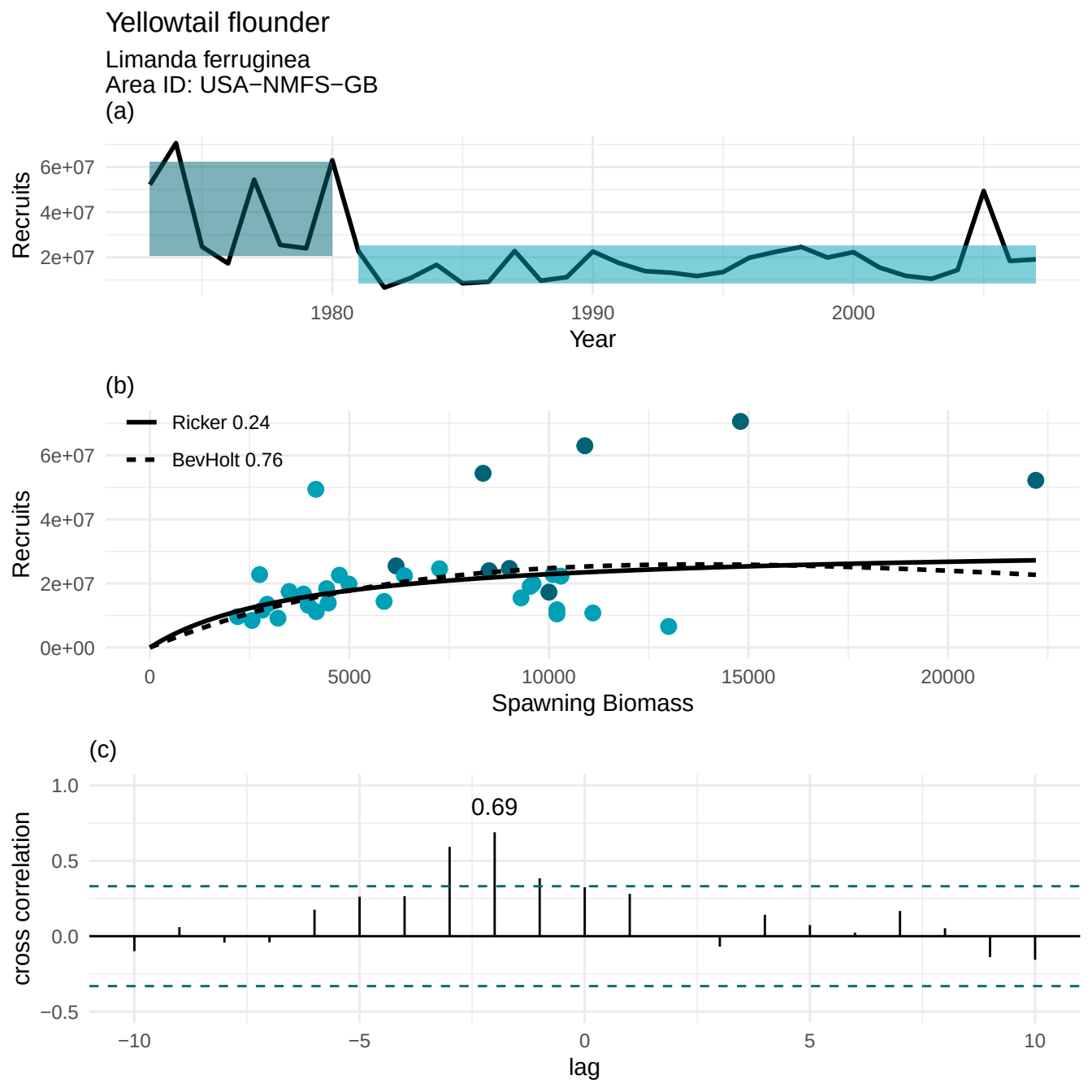

Widow rockfish
Sebastes entomelas
Area ID: Canada−DFO−BCW
(a)
Recruits
1.6e+07
1.2e+07
8.0e+06
4.0e+06
1960
1970
1980
1990
2000
Year
(b)
Ricker 0.451
BevHolt 0.549
Recruits
1.5e+07
1.0e+07
5.0e+06
0.0e+00
0
10000
20000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.31
−10
−5
0
5
10
lag

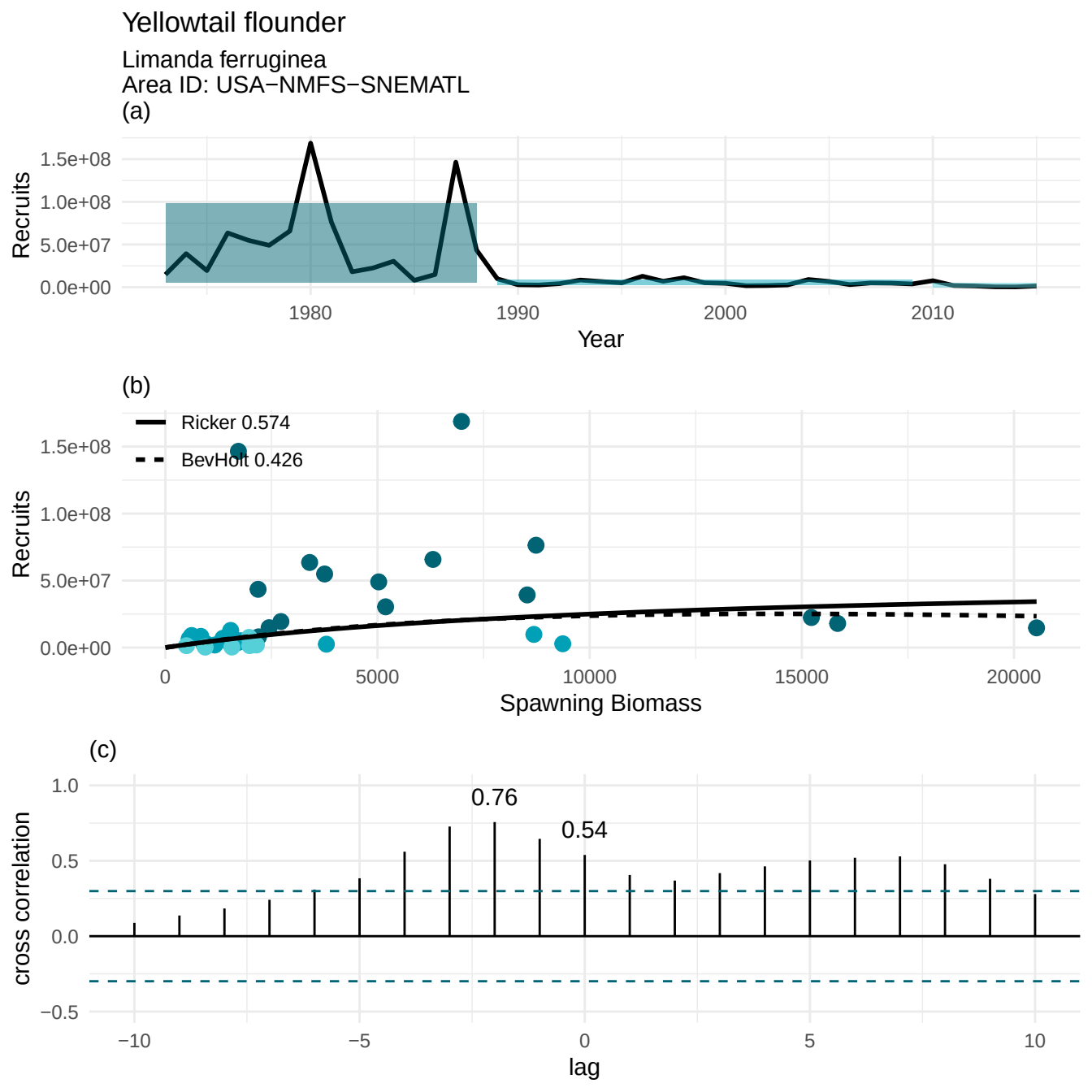

Widow rockfish
Sebastes entomelas
Area ID: USA−NMFS−PCOAST
(a)
Recruits
1.5e+08
1.0e+08
5.0e+07
1970
1980
1990
2000
2010
Year
(b)
Ricker 0.533
BevHolt 0.467
Recruits
1.5e+08
1.0e+08
5.0e+07
0.0e+00
0
25000
50000
75000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

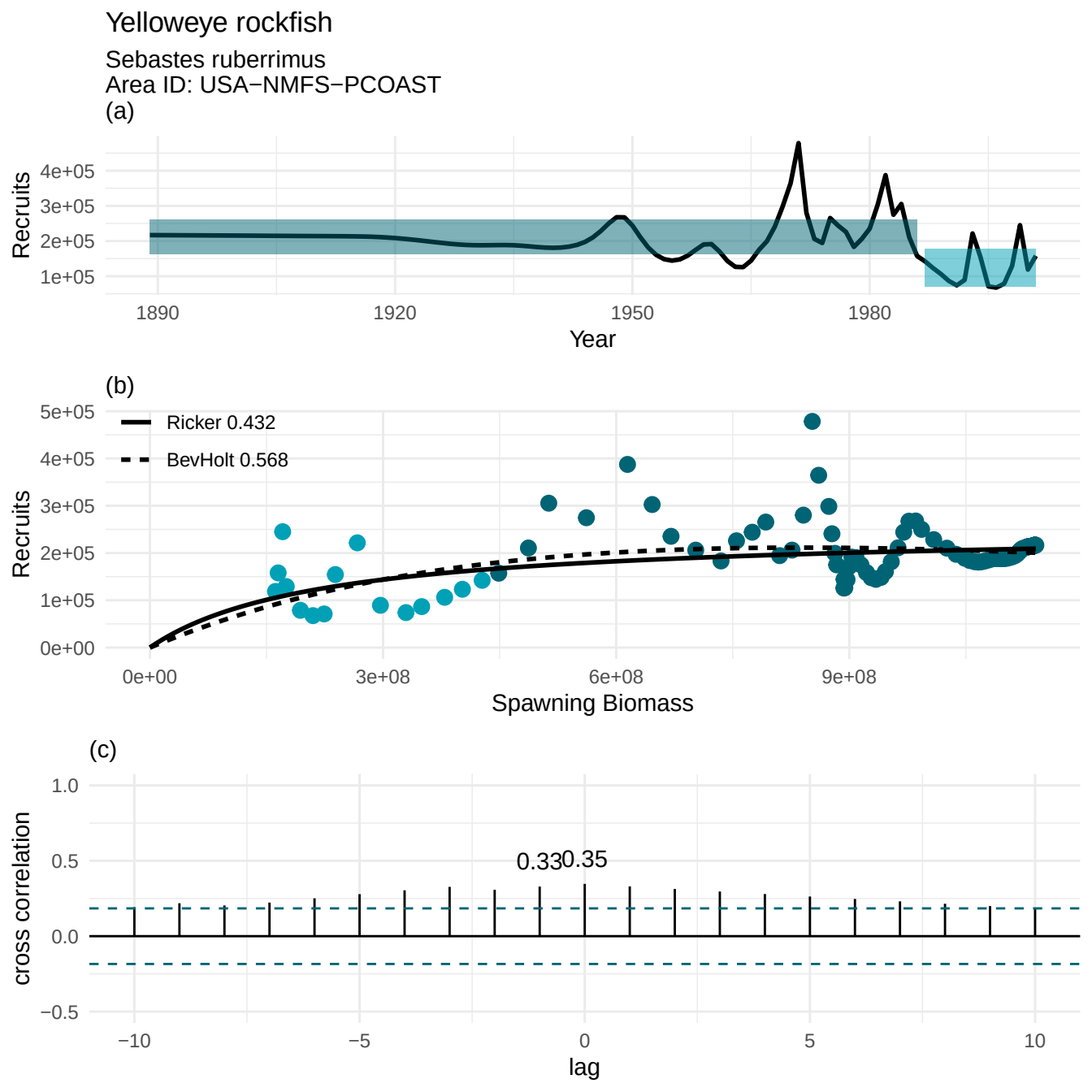

White shrimp
Litopenaeus setiferus
Area ID: USA−NMFS−GM
(a)
Recruits
3e+10
2e+10
1e+10
1990
2000
2010
Year
(b)
Ricker 0.84
BevHolt 0.16
Recruits
3e+10
2e+10
1e+10
0e+00
0e+00
2e+05
4e+05
6e+05
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.81
0.71
−10
−5
0
5
10
lag

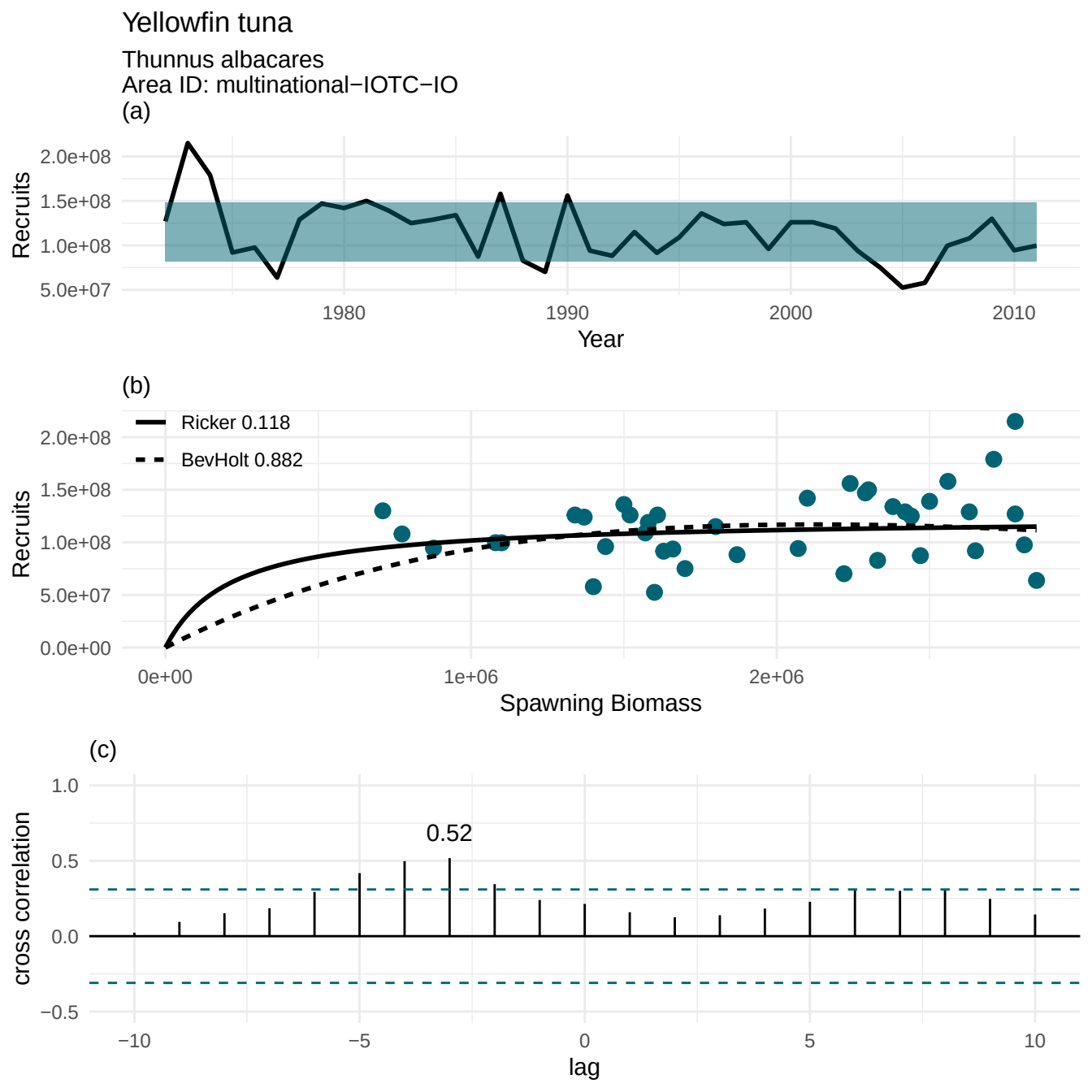

Yellowedge grouper
Epinephelus flavolimbatus
Area ID: USA−NMFS−GM
(a)
Recruits
1400000
1200000
1000000
800000
600000
1980
1990
2000
2010
Year
(b)
Ricker 0.0914
BevHolt 0.909
Recruits
1500000
1000000
500000
0
0
5000
10000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag

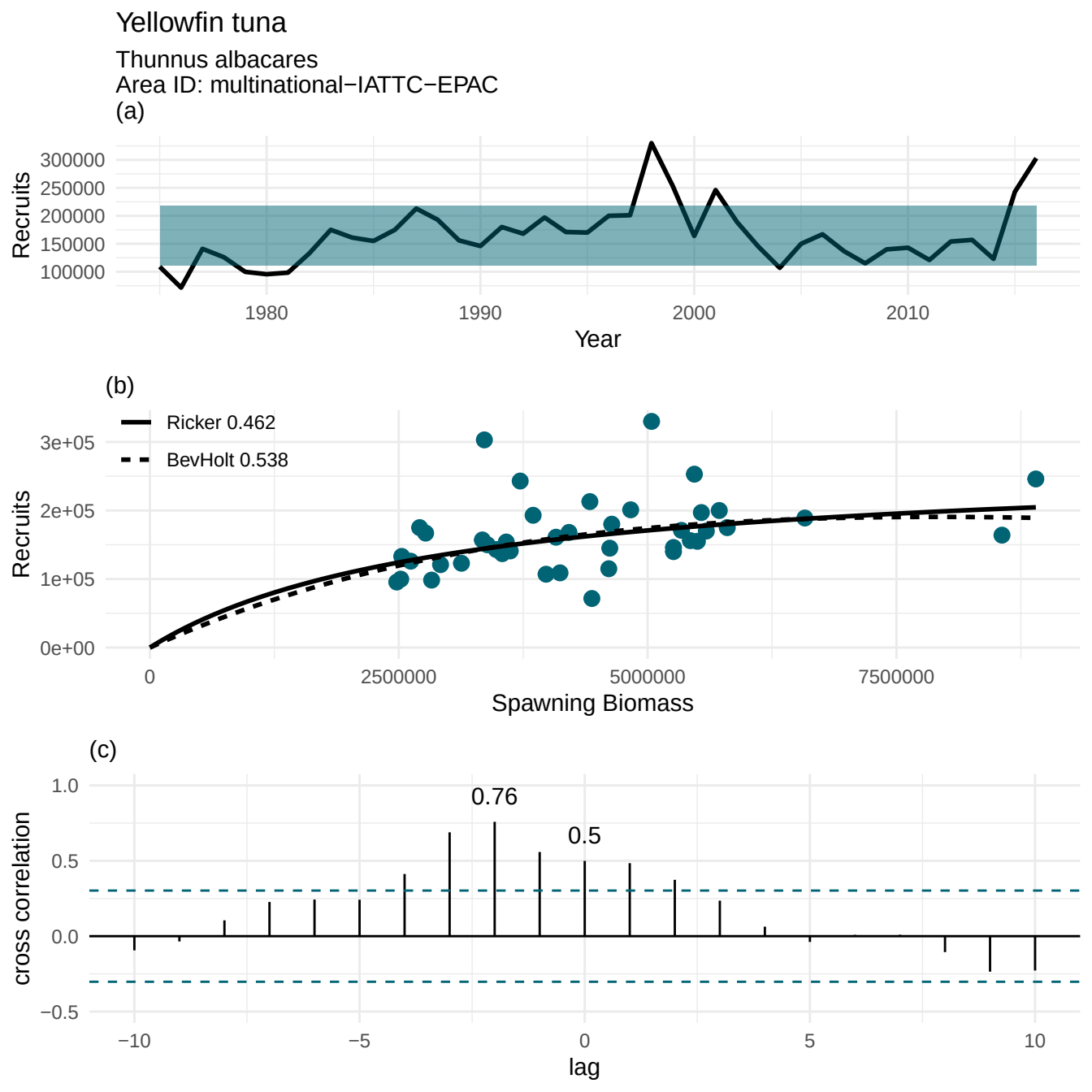

Yellowtail flounder
Limanda ferruginea
Area ID: USA−NMFS−CCOD5Y
(a)
Recruits
2.0e+07
1.5e+07
1.0e+07
5.0e+06
1990
2000
2010
Year
(b)
Ricker 0.427
BevHolt 0.573
Recruits
2.0e+07
1.5e+07
1.0e+07
5.0e+06
0.0e+00
0
500
1000
1500
2000
2500
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.51
−10
−5
0
5
10
lag

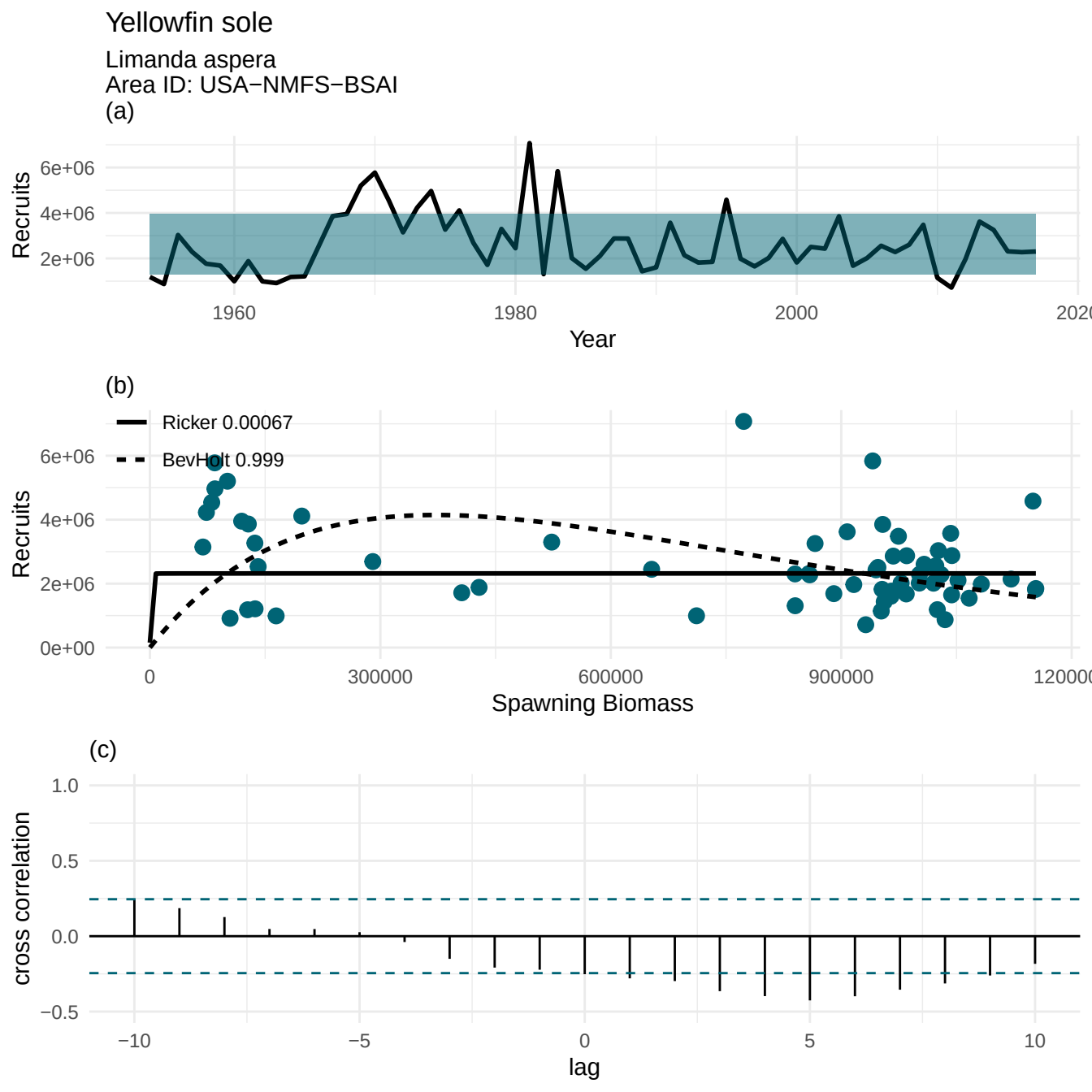

Yellowtail flounder
Limanda ferruginea
Area ID: USA−NMFS−GB
(a)
Recruits
6e+07
4e+07
2e+07
1980
1990
2000
Year
(b)
Ricker 0.24
BevHolt 0.76
Recruits
6e+07
4e+07
2e+07
0e+00
0
5000
10000
15000
20000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.69
−10
−5
0
5
10
lag

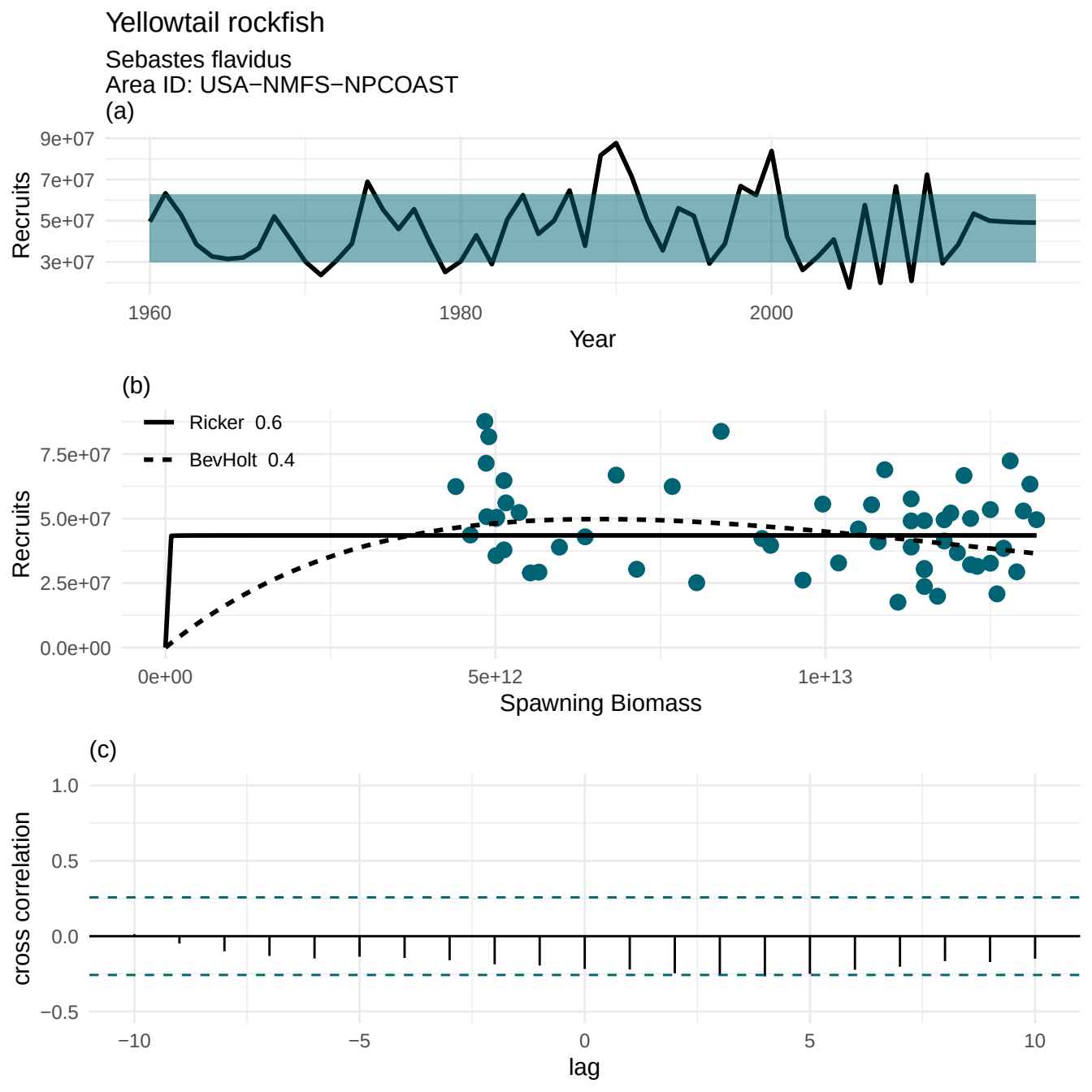

Yellowtail flounder
Limanda ferruginea
Area ID: USA−NMFS−SNEMATL
(a)
Recruits
1.5e+08
1.0e+08
5.0e+07
0.0e+00
1980
1990
2000
2010
Year
(b)
Ricker 0.574
BevHolt 0.426
Recruits
1.5e+08
1.0e+08
5.0e+07
0.0e+00
0
5000
10000
15000
20000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.76
0.54
−10
−5
0
5
10
lag


Yelloweye rockfish
Sebastes ruberrimus
Area ID: USA−NMFS−PCOAST
(a)
Recruits
4e+05
3e+05
2e+05
1e+05
1890
1920
1950
1980
Year
(b)
Ricker 0.432
BevHolt 0.568
Recruits
5e+05
4e+05
3e+05
2e+05
1e+05
0e+00
0e+00
3e+08
6e+08
9e+08
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.33
0.35
−10
−5
0
5
10
lag


Yellowfin tuna
Thunnus albacares
Area ID: multinational−IOTC−IO
(a)
Recruits
2.0e+08
1.5e+08
1.0e+08
5.0e+07
1980
1990
2000
2010
Year
(b)
Ricker 0.118
BevHolt 0.882
Recruits
2.0e+08
1.5e+08
1.0e+08
5.0e+07
0.0e+00
0e+00
1e+06
2e+06
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.52
−10
−5
0
5
10
lag


Yellowfin tuna
Thunnus albacares
Area ID: multinational−IATTC−EPAC
(a)
Recruits
300000
250000
200000
150000
100000
1980
1990
2000
2010
Year
(b)
Ricker 0.462
BevHolt 0.538
Recruits
3e+05
2e+05
1e+05
0e+00
0
2500000
5000000
7500000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
0.76
0.5
−10
−5
0
5
10
lag


Yellowfin sole
Limanda aspera
Area ID: USA−NMFS−BSAI
(a)
Recruits
6e+06
4e+06
2e+06
1960
1980
2000
Year
(b)
Ricker 0.00067
BevHolt 0.999
Recruits
6e+06
4e+06
2e+06
0e+00
0
300000
600000
900000
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag


Yellowtail rockfish
Sebastes flavidus
Area ID: USA−NMFS−NPCOAST
(a)
Recruits
9e+07
7e+07
5e+07
3e+07
1960
1980
2000
Year
(b)
Ricker 0.6
BevHolt 0.4
Recruits
7.5e+07
5.0e+07
2.5e+07
0.0e+00
0e+00
5e+12
1e+13
Spawning Biomass
(c)
cross correlation
1.0
0.5
0.0
−0.5
−10
−5
0
5
10
lag