

Table S1. The life-history parameters used for simulating the population dynamics of the 27 species in the four life history strategy groups. The fecundity were determined with the following options: 2: fecundity = $a \cdot L^b$, 4: fecundity = $a + b \cdot L$, 5: fecundity = $a + b \cdot wt$. L is length in cm and wt is weight in kg.

strategist group	opportunistic strategists				
Number	1	2	3	4	5
scientific name	<i>Stenobranchus leucopsarus</i>	<i>Thaleichthys pacificus</i>	<i>Ammodytes hexapterus</i>	<i>Sardinops sagax</i>	<i>Clupea harengus pallasii</i>
common name	Northern lampfish	Eulachon	Pacific sandlance	sardine	Herring
Parameter					
Natural mortality (year ⁻¹)	0.7 (0.6~0.8) ¹	0.8 (0.7~0.9) ⁵	0.5 (0.4~0.6) ⁹	0.7 (0.6~0.8) ¹²	0.7 (0.6~0.8) ¹⁵
Length at min age (cm)	2 (0.01~7) ¹	3 (0.01~8) ⁵	4 (0.01~9) ⁹	5 (0.01~10) ¹²	4.2 (0.01~9.2) ¹⁵
Length at max age (cm)	11 (6~16) ¹	19 (14~24) ⁵	24 (19~29) ⁹	34 (29~39) ¹²	27 (22~32) ¹⁵
growth rate (year ⁻¹)	0.3 (0.2~0.4) ¹	0.3 (0.2~0.4) ⁵	0.2 (0.1~0.3) ⁹	0.3 (0.2~0.4) ¹²	0.5 (0.4~0.6) ¹⁵
Coefficient of variation of length at young fish (-)	0.1 (0.01~0.5)				
Coefficient of variation of length at old fish (-)	0.1 (0.01~0.5)				
Length-weight scaling (kg cm ^{-β})	4.5e-03 (0~3) ¹	3.9e-06 (0~3) ⁵	2.6e-5 (0~3) ⁹	9e-06 (0~3) ¹²	4.3e-05 (0~3) ¹⁵
Allometric factor (-)	3.3 (2.5~3.5) ¹	3.2 (2.5~3.5) ⁵	3.2 (2.5~3.6) ⁹	3.1 (2.5~3.5) ¹²	3.2 (2.5~3.5) ¹⁵
Length at 50% maturity (cm)	3 (0.01~8) ²	7.9 (2.9~12.9) ⁶	7.7 (2.7~12.7) ⁹	16 (11~21) ¹²	18.3 (13.3~23.3) ¹⁶
Maturity slope (cm ⁻¹)	-0.2 (-0.3~-0.1) ²	-0.5 (-0.6~-0.4) ⁶	-0.4 (-0.5~-0.3) ⁹	-0.9 (-1.0~-0.8) ¹²	-0.2 (-0.3~-0.1) ¹⁶
fecundity option	5	4	5	5	5
Fecundity intercept (eggs/kg)	0.01 (-0.1~0.1) ³	-49 (-54~-44) ⁷	-0.7 (-0.8~-0.6) ¹⁰	-12 (-17~-7) ¹³	-38 (-43~-33) ¹⁷

Fecundity slope (eggs/kg ²)	1 (-4~6) ³	516 (511~521) ⁷	710 (705~715) ¹⁰	453 (448~458) ¹³	560 (555~565) ¹⁷
Log mean virgin recruitment (-)	10 (8~12) ⁴	11 (9~13) ⁸	11.4 (9.4~13.4) ¹¹	9 (7~11) ¹⁴	10.2 (8.2~12.2) ¹⁸
Steepness (-)	0.5 (0.4~0.6) ⁴	0.8 (0.7~0.9) ⁸	0.8 (0.7~0.9) ¹¹	0.6 (0.5~0.7) ¹⁴	0.9 (0.8~1.0) ¹⁸
reference	1. Fishbase 2. Sassa et al., 2014 3. Eva Garcia Seoane, 2013 4. Brand et al., 2007	5. Fishbase 6. Y.Liang et al., 2014 7. Hay, 2000 8. Brand et al., 2007	9. Fishbase 10. Nelson & Ross, 1991 11. Brand et al., 2007	12. Fishbase 13. Griffith et al., 2005 14. Galindo- Cortes et al., 2010	15. Fishbase 16. Haist & Stocker, 1985 17. Burd & Howlett, 1974 18. Nash et al., 2009

strategist group	equilibrium strategists						
Number	6	7	8	9	10	11	12
scientific name	<i>Raja rhina</i>	<i>Raja binoculata</i>	<i>Alopias pelagicus</i>	<i>Carcharhinus longimanus</i>	<i>Squalus acanthias</i>	<i>Hydrolagus colliei</i>	<i>Hexanchus griseus</i>
common name	Longnose skate	Big skate	pelagic thresher	Oceanic whitetip shark	dogfish	spotted ratfish	Sixgill shark
Parameter							
Natural mortality (year ⁻¹)	0.1 (0.01~0.2) ¹⁹	0.1 (0.01~0.2) ²²	0.12 (0.02~0.22) ²⁷	0.15 (0.05~0.25) ³¹	0.21 (0.11~0.31) ³⁵	0.3 (0.2~0.4) ³⁹	0.1 (0.01~0.2) ⁴³
Length at min age (cm)	15 (10~20) ¹⁹	23 (18~28) ²²	28 (23~33) ²⁷	30 (25~35) ³¹	10.3 (5.3~15.3) ³⁵	11 (6~16) ³⁹	37 (32~42) ⁴³
Length at max age (cm)	132 (127~137) ¹⁹	247 (242~252) ²²	328 (323~333) ²⁷	402 (397~407) ³¹	85.4 (80.4~90.4) ³⁵	96 (91~101) ³⁹	484 (479~489) ⁴³
growth rate (year ⁻¹)	0.1 (0.01~0.2) ¹⁹	0.1 (0.01~0.2) ²²	0.12 (0.02~0.22) ²⁷	0.1 (0.01~0.2) ³¹	0.14 (0.04~0.24) ³⁵	0.2 (0.1~0.3) ³⁹	0.2 (0.1~0.3) ⁴³
Coefficient of variation of length at young fish (-)	0.1 (-0.01~0.5)						
Coefficient of variation	0.1 (0.01~0.5)						

of length at old fish (-)							
Length-weight scaling (kg cm ⁻³)	2.2e-5 (0~3) ¹⁹	3.1e-5 (0~3) ²²	1.6e-5 (0~3) ²⁷	1.7e-04 (0~3) ³¹	1e-06 (0~3) ³⁵	3e-7 (0~3) ³⁹	3.4e-05 (0~3) ⁴³
Allometric factor (-)	3.3 (2.5~3.5) ¹⁹	3.2 (2.5~3.5) ²²	3 (2.5~3.5) ²⁷	3 (2.5~3.5) ³¹	3.2 (2.5~3.5) ³⁵	3 (2.5~3.5) ³⁹	3.1 (2.5~3.5) ⁴³
Length at 50% maturity (cm)	113 (108~118) ²⁰	149 (144~154) ²³	285 (280~290) ²⁸	225 (220~230) ³²	72.8 (67.8~77.8) ³⁶	39 (34~44) ⁴⁰	215 (210~220) ⁴⁴
Maturity slope (cm ⁻¹)	-0.03 (-0.13~0.07) ²⁰	-0.01 (-0.11~0.09) ²³	-0.04 (- 0.14~0.06) ²⁸	-0.02 (- 0.12~0.08) ³²	-0.06 (- 0.16~0.04) ³⁶	-0.09 (- 0.19~0.01) ⁴⁰	-0.01 (- 0.11~0.99) ⁴⁴
fecundity option	4	4	4	4	4	4	4
Fecundity intercept (eggs/kg)	-0.03 (-0.04~- 0.02) ²⁰	-0.03 (-0.04~- 0.02) ²⁴	-0.1 (-0.2~0) ²⁹	-0.1 (-0.2~0) ³³	-2 (-7~3) ³⁷	-2 (-7~3) ⁴¹	-0.1 (-0.2~0) ⁴⁵
Fecundity slope (eggs/kg ²)	0.001 (0.0005~0.0015) ²⁰	0.001 (0.0005~0.0015) ²⁴	0.0005 (-0.1~0.1) ²⁹	0.0005 (- 0.1~0.1) ³³	0.1 (0.01~0.2) ³⁷	0.1 (0.01~0.2) ⁴¹	0.0005 (- 0.1~0.1) ⁴⁵
Log mean virgin recruitment (-)	7 (5~9) ²¹	7 (5~9) ²⁵	5.7 (3.7~7.7) ³⁰	5.7 (3.7~7.7) ³⁴	5.6 (3.6~7.6) ³⁸	7.6 (5.6~9.6) ⁴²	3.9 (1.9~5.9) ⁴⁶
Steepness (-)	0.5 (0.4~0.6) ²¹	0.5 (0.4~0.6) ²⁵	0.5 (0.3~0.6) ³⁰	0.5 (0.3~0.6) ³⁴	0.83 (0.73~0.93) ³⁸	0.5 (0.3~0.6) ⁴²	0.5 (0.4~0.6) ⁴⁶

reference	19. Fishbase 20. Holden, 1975 21. Brand et al., 2007	22. Fishbase 23. Ebert et al., 2008 24. Holden, 1975 25. Brand et al., 2007	27. Fishbase 28. Drew et al., 2015 29. Hsu et al., 2011 30. Brand et al., 2007	31. Fishbase 32. Drew et al., 2015 33. Hsu et al., 2011 34. Brand et al., 2007	35. Fishbase 36. King & McPhie, 2015 37. Dutton & Gioia, 2019 38. Brand et al., 2007	39. Fishbase 40. King & McPhie, 2015 41. Dutton & Gioia, 2019 42. Brand et al., 2007	43. Fishbase 44. Ebert et al., 2008 45. Hsu et al., 2011 46. Brand et al., 2007
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Table S1. Cont.

strategist group	salmonic strategists				
Number	13	14	15	16	17
scientific name	<i>Oncorhynchus gorbuscha</i>	<i>Oncorhynchus keta</i>	<i>Oncorhynchus kisutch</i>	<i>Oncorhynchus nerka</i>	<i>Oncorhynchus tshawytscha</i>
common name	Chum salmon	Pink salmon	Coho salmon	Sockeye salmon	Chinook salmon
Parameter					
Natural mortality (year ⁻¹)	0.5 (0.4~0.6) ⁴⁷	0.4 (0.3~0.5) ⁵⁰	0.3 (0.2~0.4) ⁵³	0.6 (0.5~0.7) ⁵⁴	0.2 (0.1~0.3) ⁵⁷
Length at min age (cm)	8 (3~13) ⁴⁷	11 (6~16) ⁵⁰	11 (6~16) ⁵³	8 (3~13) ⁵⁴	14 (9~19) ⁵⁷
Length at max age (cm)	79 (74~84) ⁴⁷	102 (97~107) ⁵⁰	108 (103~113) ⁵³	69 (64~74) ⁵⁴	153 (148~158) ⁵⁷
growth rate (year ⁻¹)	0.3 (0.2~0.4) ⁴⁷	0.4 (0.3~0.5) ⁵⁰	0.2 (0.1~0.3) ⁵³	0.6 (0.5~0.7) ⁵⁴	0.2 (0.1~0.3) ⁵⁷
Coefficient of variation of length at young fish (-)	0.1 (-0.01~0.5)				
Coefficient of variation of length at old fish (-)	0.1 (0.01~0.5)				
Length-weight scaling (kg cm ⁻³)	1e-4 (0~3) ⁴⁷	1.7e-5 (0~3) ⁵⁰	1.70E-05 (0~3) ⁵³	1e-4 (0~3) ⁵⁴	1e-4 (0~3) ⁵⁷
Allometric factor (-)	3.08 (2.5~3.5) ⁴⁷	3 (2.5~3.5) ⁵⁰	2.9 (2.5~3.5) ⁵³	3.08 (2.5~3.5) ⁵⁴	3.08 (2.5~3.5) ⁵⁷
Length at 50% maturity (cm)	42 (37~47) ⁴⁷	53 (48~58) ⁵⁰	57 (52~62) ⁵³	37 (32~42) ⁵⁴	77 (72~82) ⁵⁷
Maturity slope (cm ⁻¹)	-0.5 (-0.6~-0.4) ⁴⁷	-0.5 (-0.6~-0.4) ⁵⁰	-0.5 (-0.6~-0.4) ⁵³	-0.5 (-0.6~-0.4) ⁵⁴	-0.5 (-0.6~-0.4) ⁵⁷
fecundity option	5	4	4	4	5
Fecundity intercept (eggs/kg)	0.6 (0.5~0.7) ⁴⁸	-2.1 (-2.2~-2) ⁵¹	-2.5 (-2.6~-2.4) ⁵⁴	-5 (-10~0) ⁵⁵	2 (-3~7) ⁵⁸
Fecundity slope (eggs/kg ²)	0.7 (0.6~0.8) ⁴⁸	0.1 (0.01~0.2) ⁵¹	0.1 (0.01~0.2) ⁵⁴	0.1 (0.01~0.2) ⁵⁵	0.5 (0.4~0.6) ⁵⁸

Log mean virgin recruitment (-)	4 (2~6) ⁴⁹	5 (3~7) ⁵²	4 (2~6) ⁵⁵	4 (2~6) ⁵⁶	4 (2~6) ⁵⁹
Steepness (-)	1 (0.9~1.1) ⁴⁹	1 (0.9~1.1) ⁵²	1 (0.9~1.1) ⁵⁵	1 (0.9~1.1) ⁵⁶	1 (0.9~1.1) ⁵⁹
reference	47.Fishbase 48.Kwain, 1982 49.GodBout et al., 2008	50.Fishbase 51. Beacham, 1982 52. GodBout et al., 2008	53.Fishbase 54. Beacham, 1982 55. GodBout et al., 2008	54.Fishbase 55.Hartman & Conkle, 1960 56. GodBout et al., 2008	57.Fishbase 58.Kerns et al., 2016 59. GodBout et al., 2008

Table S1. Cont.

strategist group	periodic strategists									
Number	18	19	20	21	22	23	24	25	26	27
scientific name	<i>Sebastes pinniger</i>	<i>Sebastes maliger</i>	<i>Sebastes babcocki</i>	<i>Sebastes aleutianus</i>	<i>Sebastes reedi</i>	<i>Sebastes brevispinis</i>	<i>Sebastes ruberrimus</i>	<i>Hippoglossus stenolepis</i>	<i>Anoplopoma a fimbria</i>	<i>Sebastolobus alascanus</i>
common name	Canary rockfish	Quillback rockfish	Redbande d rockfish	Rougheye rockfish	Yellowmout h rockfish	Silvergray rockfish	Yelloweye rockfish	Halibut	sablefish	Shortspine thornyhead
Parameter										
Natural mortality (year ⁻¹)	0.2 (0.1~0.3) ⁶⁰	0.2 (0.1~0.3) ⁶⁰	0.3 (0.2~0.4) ⁶⁰	0.2 (0.1~0.3) ⁶⁰	0.2 (0.1~0.3) ⁶⁰	0.2 (0.1~0.3) ⁶⁰	0.1 (0.01~0.2) ⁶ ₀	0.1 (0.01~0.2) ⁶⁸	0.1 (0.01~0.2) ⁷²	0.2 (0.1~0.3) ⁷⁶
Length at min age (cm)	8 (3~13) ⁶⁰	7 (2~12) ⁶⁰	7 (2~12) ⁶⁰	7 (2~12) ⁶⁰	7 (2~12) ⁶⁰	8 (3~13) ⁶⁰	9 (4~14) ⁶⁰	19 (14~24) ⁶⁸	9.2 (4.2~14.2) ⁷²	9 (4~14) ⁷⁶
Length at max age (cm)	56 (51~61) ⁶⁰	63 (58~68) ⁶⁰	66 (61~71) ⁶⁰	51 (46~56) ⁶⁰	47 (42~52) ⁶⁰	57 (52~62) ⁶⁰	64 (59~69) ⁶⁰	185.2 (180.2~190.2) ⁶ ₈	75.6 (70.6~80.6) ⁷ ₂	83 (78~88) ⁷⁶
growth rate (year ⁻¹)	0.1 (0.01~0.2) ⁶⁰	0.1 (0.01~0.2) ⁶ ₀	0.2 (0.1~0.3) ⁶⁰	0.1 (0.01~0.2) ⁶ ₀	0.1 (0.01~0.2) ⁶⁰	0.1 (0.01~0.2) ⁶ ₀	0.1 (0.01~0.2) ⁶ ₀	0.1 (0.01~0.2) ⁶⁸	0.21 (0.11~0.31) ⁷ ₂	0.1 (0.01~0.2) ⁷⁶
Coefficient of variation of	0.1 (-0.01~0.5)									

length at young fish (-)										
Coefficient of variation of length at old fish (-)	0.1 (0.01~0.5)									
Length-weight scaling (kg cm ^{-β})	4.8e-5 (0~3) ⁶⁰	4.8e-5 (0~3) ⁶⁰	4.8e-5 (0~3) ⁶⁰	4.8e-5 (0~3) ⁶⁰	3.7e-5 (0~3) ⁶⁰	4.8e-5 (0~3) ⁶⁰	4.8e-5 (0~3) ⁶⁰	7.5e-05 (0~3) ⁶⁸	2e-05 (0~3) ⁷²	2.3e-5 (0~3) ⁷⁶
Allometric factor (-)	3.3 (2.5~3.5) ⁶⁰	3.3 (2.5~3.5) ⁶⁰	3.3 (2.5~3.5) ⁶⁰	3.3 (2.5~3.5) ⁶⁰	3 (2.5~3.5) ⁶⁰	3.3 (2.5~3.5) ⁶⁰	3.3 (2.5~3.5) ⁶⁰	3.1 (2.5~3.5) ⁶⁸	2.9 (2.5~3.5) ⁷²	3.3 (2.5~3.5) ⁷⁶
Length at 50% maturity (cm)	44 (39~49) ⁶¹	26 (21~31) ⁶¹	34 (29~39) ⁶¹	33 (28~38) ⁶¹	38 (33~43) ⁶²	46 (41~51) ⁶³	40 (35~45) ⁶¹	121 (116~126) ⁶⁹	54.6 (49.6~59.6) ⁷ ₃	20 (15~25) ⁷⁷
Maturity slope (cm ⁻¹)	-0.9 (-1~-0.8) ⁶¹	-0.3 (-0.4~-0.2) ⁶¹	-0.1 (-0.2~0) ⁶¹	-0.1 (-0.2~0) ⁶¹	-0.1 (-0.2~0) ⁶²	-0.1 (-0.2~0) ⁶³	-0.1 (-0.2~0) ⁶¹	-0.4 (-0.5~-0.3) ⁶⁹	-0.4 (-0.5~-0.3) ⁷³	-1.6 (-1.7~-1.5) ⁷⁷
fecundity option	2							2	5	5
Fecundity intercept (eggs/kg)	5e-04 (4.5e-04~5.5e-04) ^{65,66}							2 (-3~7) ⁷⁰	-45 (-50~-40) ⁷⁴	-63 (-68~-58) ⁷⁸

Fecundity slope (eggs/kg ²)	3 (2.9~3.1) ^{65,66}							3 (-2~8) ⁷⁰	125 (120~130) ⁷⁴	223 (218~228) ⁷⁸
Log mean virgin recruitment (-)	8 (6~10) ⁶⁷	9 (7~11) ⁶⁷	9 (7~11) ⁶⁷	8 (6~10) ⁶⁷	9 (7~11) ⁶⁷	8 (6~10) ⁶⁷	9 (7~11) ⁶⁷	7.4 (5.4~9.4) ⁷¹	4 (2~6) ⁷⁵	9 (7~11) ⁷⁹
Steepness (-)	0.5 (0.4~0.6) ⁶⁷	0.5 (0.4~0.6) ⁶⁷	0.5 (0.4~0.6) ⁶⁷	0.5 (0.4~0.6) ⁶⁷	0.5 (0.4~0.6) ⁶⁷	0.5 (0.4~0.6) ⁶⁷	0.5 (0.4~0.6) ⁶⁷	0.5 (0.4~0.6) ⁷¹	0.8 (0.7~0.9) ⁷⁵	0.8 (0.7~0.9) ⁷⁹
reference	60.Fishbase 61.Echeverria, 1988 62.Haigh &Starr, 2008 63.Stanley &Kronlund, 2005 64.Conrath &Knoth, 2013 65.Love, Morris, McCrae, &Colins, 1990 66.Beyer, Sogard, Harvey, &Field, 2015 67.Brand et al., 2007							68.Fishbase 69.C.Schmitt &St-Pierre, 1997 70.Haug &Gulliksen, 1988 71. Brand et al., 2007	72.Fishbase 73.Head et al., 2014 74.Hunter et al., 1989 75.Schirripa et al., 2009	76.Fishbase 77.Pearson &Gunderson , 2003 78.Cooper et al., 2005 79. Brand et al., 2007

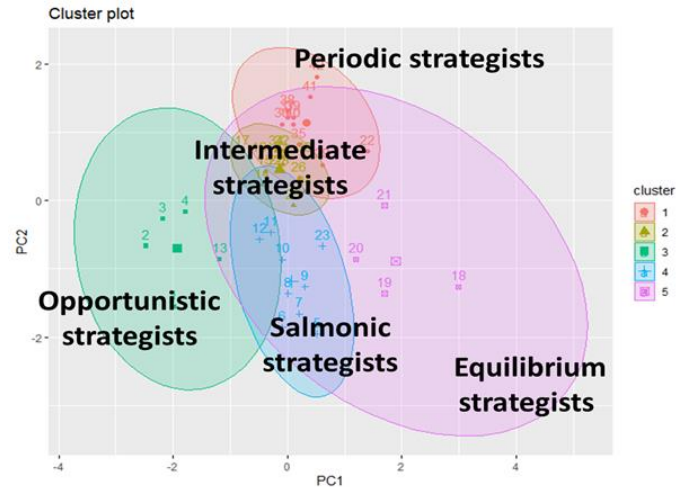


Figure S1. The results of cluster analysis for the 42 fish species in King & McFarlane (2003). The red circle is the periodic strategists, the yellow circle is the intermediate strategists, the green circle is the opportunistic strategists, the blue circle is the salmonic strategists and the purple circle is the equilibrium strategists.

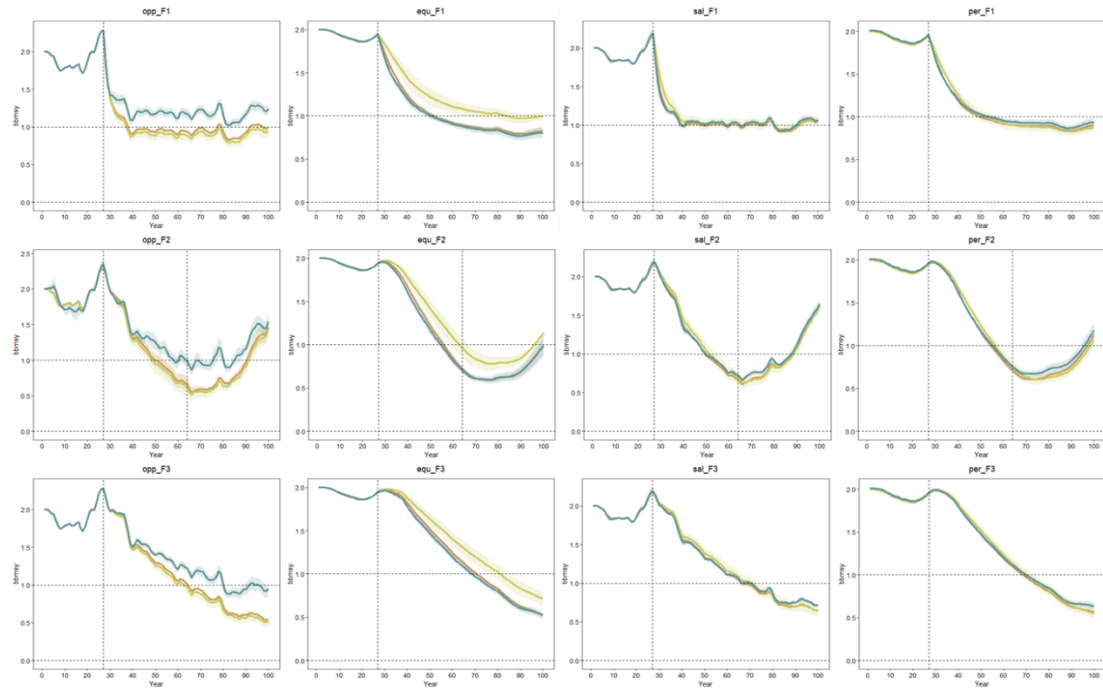


Figure S2. The time series of the simulated B/Bmsy of four life history strategists (OPP, EQU, SAL, PER) in three F-scenarios (F1, F2, F3) and three S- scenarios (S0, S1, S2). The line is the mean BBmsy of all species in one strategists with standard errors are the shaded areas.