**Supporting Information - Dynamic complexity and limits to prediction in marine fisheries.**

**Supplementary Table 1** Results of simplex projection and S-maps for 206 time series of abundance and landings for the California Current System (CCS) and Northeast Shelf System (NES). For indices of abundance, those from the CCS are ichthyoplankton tows by the CalCOFI survey and those from the NES are adult trawls by the Northeast Fisheries Science Center. CV is coefficient of variation of first differenced data, *N* is number of annual data points in a time series, Expl? is whether taxa are exploited (yes) or not, *E* is the embedding dimension calculated by simplex projection, rmax is the highest forecast skill for S-maps, p rmax is the significance level (Pearson’s product moment) of rmax, MAEmin is the minimum error for S-maps, DMAE is the improvement in error as S-maps becomes more nonlinear, p DMAE is the significance level associated with DMAE, NL? is whether dynamics are nonlinear, Size is maximum size for the taxa. Stock code: GB = Georges Bank, GOM = Gulf of Maine, SNEMA = southern New England- Massachusetts.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Location** | **Data Type** | **Taxa (stock)** | **CV** | **N** | **Expl?** | ***E*** | **rmax** | **p rmax** | **MAEmin** | D**MAE** | **p** D**MAE** | **NL?** | **Size**  **(cm)** |
| CCS | abundance | *Engraulis mordax* | 1.2022 | 45 | yes | 3 | 0.5133 | 0.0013 | 0.6694 | 0.0325 | 0.07 | yes | 24.8 |
| CCS | abundance | *Argentina sialis* | 1.2431 | 45 | no | 5 | 0.3018 | 0.0593 | 0.6308 | 0 | 1 | no | 22 |
| CCS | abundance | *Microstoma* spp. | 0.8901 | 45 | no | 9 | 0.5032 | 0.0119 | 0.555 | 0.0003 | 0.448 | no | 21 |
| CCS | abundance | *Sphyraena argentea* | 1.1964 | 45 | yes | 3 | 0.4267 | 0.0074 | 0.7025 | 0.009 | 0.158 | no | 122 |
| CCS | abundance | *Paralepididae* | 0.7033 | 45 | no | 9 | 0.3982 | 0.041 | 1.012 | 0.0164 | 0.338 | no | 21 |
| CCS | abundance | *Melamphaes* spp. | 0.9456 | 45 | no | 4 | 0.2793 | 0.0675 | 0.6899 | 0 | 1 | no | 10 |
| CCS | abundance | *Poromitra* spp. | 1.0241 | 45 | no | 2 | 0.7195 | 0 | 0.58 | 0.0477 | 0.04 | yes | 13 |
| CCS | abundance | *Scopelogadus bispinosus* | 0.8767 | 45 | no | 6 | 0.3488 | 0.0404 | 0.6388 | 0.0006 | 0.452 | no | 11 |
| CCS | abundance | *Bathylagus ochotensis* | 0.9626 | 45 | no | 4 | 0.6584 | 0 | 0.6006 | 0.0252 | 0.122 | no | 16 |
| CCS | abundance | *Bathylagus pacificus* | 0.7394 | 45 | no | 5 | 0.646 | 0.0001 | 0.7356 | 0.3192 | 0 | yes | 25 |
| CCS | abundance | *Bathylagus wesethi* | 0.7782 | 45 | no | 3 | 0.4502 | 0.0049 | 0.7032 | 0.0044 | 0.372 | no | 11 |
| CCS | abundance | *Chromis punctipinnis* | 1.0165 | 45 | yes | 5 | 0.5414 | 0.0015 | 0.4824 | 0 | 1 | no | 30 |
| CCS | abundance | *Hypsoblennius* spp. | 1.0625 | 45 | no | 2 | 0.6672 | 0 | 0.5437 | 0.0362 | 0.058 | yes | 13 |
| CCS | abundance | *Sebastes paucispinis* | 0.7663 | 45 | yes | 2 | 0.6024 | 0.0001 | 0.6628 | 0.0149 | 0.206 | no | 91 |
| CCS | abundance | *Scorpaenichthys marmoratus* | 1.1466 | 45 | yes | 2 | 0.6809 | 0 | 0.5391 | 0.083 | 0.012 | yes | 99 |
| CCS | abundance | *Zaniolepis* spp. | 1.3458 | 45 | yes | 2 | 0.5948 | 0.0001 | 0.4367 | 0.0424 | 0.02 | yes | 25 |
| CCS | abundance | *Sciaenidae* | 1.1835 | 45 | yes | 5 | 0.6094 | 0.0003 | 0.4764 | 0 | 1 | no | 41 |
| CCS | abundance | *Ophidion scrippsae* | 0.9102 | 45 | no | 3 | 0.6172 | 0.0001 | 0.5806 | 0.0106 | 0.25 | no | 28 |
| CCS | abundance | *Cyclothone* spp. | 0.7598 | 45 | no | 3 | 0.4779 | 0.0028 | 0.6361 | 0.0071 | 0.318 | no | 8 |
| CCS | abundance | *Idiacanthus antrostomus* | 0.8042 | 45 | no | 3 | 0.4364 | 0.0063 | 0.7293 | 0 | 1 | no | 7.6 |
| CCS | abundance | *Stomias atriventer* | 0.6559 | 45 | no | 2 | 0.6682 | 0 | 0.6251 | 0.0295 | 0.188 | no | 25 |
| CCS | abundance | *Tactostoma macropus* | 0.9368 | 45 | no | 3 | 0.6951 | 0 | 0.5605 | 0.006 | 0.298 | no | 34.3 |
| CCS | abundance | *Protomyctophum crockeri* | 0.7641 | 45 | no | 9 | 0.5609 | 0.005 | 0.94 | 0.027 | 0.222 | no | 3.7 |
| CCS | abundance | *Hippoglossina stomata* | 0.9519 | 45 | yes | 4 | 0.6229 | 0.0001 | 0.6633 | 0.0981 | 0.02 | yes | 40 |
| CCS | abundance | *Oxylebius pictus* | 0.8522 | 45 | yes | 4 | 0.5707 | 0.0005 | 0.6859 | 0 | 1 | no | 25 |
| CCS | abundance | *Merluccius productus* | 1.9039 | 45 | yes | 2 | 0.9146 | 0 | 0.2333 | 0.2082 | 0 | yes | 91 |
| CCS | abundance | *Paralichthys californicus* | 1.0492 | 45 | yes | 2 | 0.5567 | 0.0003 | 0.6153 | 0.0728 | 0.012 | yes | 152 |
| CCS | abundance | Sternoptychidae | 0.7739 | 45 | no | 4 | 0.6376 | 0.0001 | 0.5777 | 0.0177 | 0.222 | no | 5.9 |
| CCS | abundance | *Diaphus theta* | 0.9093 | 45 | no | 3 | 0.2566 | 0.0781 | 0.7082 | 0 | 1 | no | 11.4 |
| CCS | abundance | *Trachipterus altivelis* | 1.0593 | 45 | no | 5 | 0.5874 | 0.0005 | 0.5323 | 0.0214 | 0.154 | no | 183 |
| CCS | abundance | *Nannobrachium* spp. | 0.7056 | 45 | no | 2 | 0.6762 | 0 | 0.5893 | 0.0279 | 0.196 | no | 11.9 |
| CCS | abundance | *Ceratoscopelus townsendi* | 0.9778 | 45 | no | 2 | 0.5104 | 0.001 | 0.6799 | 0.0147 | 0.184 | no | 18.4 |
| CCS | abundance | *Triphoturus mexicanus* | 0.7943 | 45 | no | 6 | 0.5144 | 0.0036 | 0.8156 | 0.0437 | 0.136 | no | 7 |
| CCS | abundance | *Stenobrachius leucopsarus* | 0.9704 | 45 | no | 3 | 0.6541 | 0 | 0.5654 | 0.0541 | 0.056 | yes | 13 |
| CCS | abundance | *Notoscopelus resplendens* | 1.0657 | 45 | no | 4 | 0.596 | 0.0003 | 0.6324 | 0.0341 | 0.122 | no | 9.5 |
| CCS | abundance | *Notolychnus valdiviae* | 1.0483 | 45 | no | 3 | 0.0301 | 0.435 | 0.7337 | 0 | 1 | no | 6.3 |
| CCS | abundance | *Symbolophorus californiensis* | 0.8116 | 45 | no | 5 | 0.7092 | 0 | 0.555 | 0.0549 | 0.082 | yes | 11 |
| CCS | abundance | *Tarletonbeania crenularis* | 0.9500 | 45 | no | 5 | 0.2993 | 0.0609 | 0.7861 | 0.0095 | 0.25 | no | 12.7 |
| CCS | abundance | *Diogenichthys atlanticus* | 0.7731 | 45 | no | 7 | 0.3643 | 0.04 | 0.7529 | 0.0225 | 0.238 | no | 2.9 |
| CCS | abundance | *Myctophum nitidulum* | 1.1370 | 45 | no | 2 | 0.1757 | 0.1601 | 0.7462 | 0.0343 | 0.052 | yes | 8.3 |
| CCS | abundance | *Hygophum reinhardtii* | 0.9276 | 45 | no | 3 | 0.5062 | 0.0016 | 0.6822 | 0 | 1 | no | 6 |
| CCS | abundance | *Vinciguerria lucetia* | 1.1567 | 45 | no | 3 | 0.6202 | 0.0001 | 0.6248 | 0 | 1 | no | 8 |
| CCS | abundance | *Trachurus symmetricus* | 1.0460 | 45 | yes | 3 | 0.728 | 0 | 0.4999 | 0.089 | 0.016 | yes | 81 |
| CCS | abundance | *Scomber japonicus* | 0.7673 | 45 | yes | 4 | 0.4951 | 0.0027 | 0.5815 | 0.0541 | 0.088 | yes | 60 |
| CCS | abundance | *Icichthys lockingtoni* | 0.8744 | 45 | no | 5 | 0.5365 | 0.0016 | 0.7641 | 0 | 1 | no | 46 |
| CCS | abundance | Myctophidae | 0.9734 | 45 | no | 2 | 0.2592 | 0.0694 | 0.7679 | 0 | 1 | no | 9.6 |
| CCS | abundance | *Cololabis saira* | 0.9298 | 45 | no | 5 | 0.4625 | 0.0066 | 0.5547 | 0 | 1 | no | 40 |
| CCS | abundance | *Chauliodus macouni* | 0.9768 | 45 | no | 3 | 0.4124 | 0.0095 | 0.7013 | 0 | 1 | no | 25.4 |
| CCS | abundance | Scopelarchidae | 0.8141 | 45 | no | 8 | 0.6488 | 0.0005 | 0.5901 | 0.0903 | 0.07 | yes | 23 |
| CCS | abundance | Agonidae | 0.9799 | 45 | no | 4 | 0.5501 | 0.0008 | 0.6933 | 0.0081 | 0.254 | no | 30 |
| CCS | abundance | *Sebastes aurora* | 1.0980 | 45 | yes | 2 | 0.5023 | 0.0012 | 0.5625 | 0.0014 | 0.312 | no | 41 |
| CCS | abundance | *Sebastes jordani* | 0.9021 | 45 | no | 1 | 0.486 | 0.0013 | 0.7257 | 0.0102 | 0.2 | no | 31 |
| CCS | abundance | *Sebastes* spp. | 0.7789 | 45 | yes | 1 | 0.6421 | 0 | 0.6237 | 0.1645 | 0.004 | yes | 50 |
| CCS | abundance | *Paralabrax spp.* | 0.8277 | 45 | yes | 3 | 0.5211 | 0.0011 | 0.5521 | 0.0069 | 0.304 | no | 72 |
| CCS | abundance | *Sardinops sagax* | 1.2945 | 45 | yes | 1 | 0.5563 | 0.0002 | 0.5751 | 0 | 1 | no | 39.5 |
| CCS | abundance | *Aristostomias scintillans* | 0.9618 | 45 | no | 7 | 0.3234 | 0.0616 | 0.7719 | 0 | 1 | no | 23 |
| CCS | abundance | *Tetragonurus cuvieri* | 0.8660 | 45 | no | 6 | 0.5231 | 0.003 | 0.5842 | 0.0016 | 0.422 | no | 70 |
| CCS | abundance | *Leuroglossus stilbius* | 0.8261 | 45 | no | 7 | 0.7925 | 0 | 0.4917 | 0 | 1 | no | 15 |
| CCS | abundance | *Microstomus pacificus* | 0.9803 | 45 | yes | 2 | 0.4529 | 0.0036 | 0.6929 | 0.0573 | 0.034 | yes | 76 |
| CCS | abundance | *Parophrys vetulus* | 0.9793 | 45 | yes | 3 | 0.6064 | 0.0001 | 0.6597 | 0.033 | 0.092 | yes | 57 |
| CCS | abundance | *Lyopsetta exilis* | 0.9421 | 45 | yes | 1 | 0.6461 | 0 | 0.5462 | 0.0984 | 0.012 | yes | 35 |
| CCS | abundance | *Chiasmodon niger* | 1.0687 | 45 | no | 2 | 0.5506 | 0.0004 | 0.6175 | 0.0187 | 0.11 | no | 25 |
| CCS | abundance | *Sebastolobus* spp. | 1.7274 | 45 | yes | 7 | 0.7659 | 0 | 0.2375 | 0.0004 | 0.34 | no | 60 |
| CCS | abundance | *Symphurus atricaudus* | 0.9192 | 45 | yes | 3 | 0.546 | 0.0006 | 0.6301 | 0 | 1 | no | 21 |
| CCS | abundance | *Pleuronichthys verticalis* | 1.4335 | 45 | yes | 6 | 0.1482 | 0.235 | 0.5412 | 0.014 | 0.208 | no | 37 |
| CCS | abundance | *Scopelosaurus* spp. | 0.9900 | 45 | no | 3 | 0.6054 | 0.0001 | 0.6737 | 0.0926 | 0.014 | yes | 29 |
| CCS | abundance | *Nansenia candida* | 0.8838 | 45 | no | 1 | 0.3382 | 0.0218 | 0.7124 | 0 | 1 | no | 22 |
| CCS | landings | *Haliotis* spp. | 0.9266 | 46 | yes | 3 | 0.1903 | 0.1137 | 0.7052 | 0.0122 | 0.154 | no | NA |
| CCS | landings | *Engraulis mordax* | 1.4315 | 56 | yes | 1 | 0.3676 | 0.0031 | 0.5578 | 0.0024 | 0.184 | no | 24.8 |
| CCS | landings | *Sphyraena argentea* | 1.3523 | 56 | yes | 9 | 0.4457 | 0.001 | 0.5375 | 0.2568 | 0 | yes | 122.0 |
| CCS | landings | *Sebastes paucispinis* | 1.1476 | 57 | yes | 4 | 0.381 | 0.0027 | 0.728 | 0.0053 | 0.18 | no | 91.0 |
| CCS | landings | *Sarda chiliensis* | 1.1183 | 56 | yes | 2 | 0.2107 | 0.0649 | 0.7104 | 0.0053 | 0.22 | no | 102.0 |
| CCS | landings | *Scorpaenichthys marmoratus* | 1.4688 | 56 | yes | 5 | 0.1521 | 0.1458 | 0.775 | 0.0056 | 0.18 | no | 99.0 |
| CCS | landings | clams | 1.0370 | 11 | yes | 1 | 0.3258 | 0.1961 | 0.6504 | 0.1941 | 0.152 | no | NA |
| CCS | landings | *Cancer mastiger* | 1.0382 | 56 | yes | 4 | 0.1666 | 0.1213 | 0.7441 | 0.0965 | 0 | no | NA |
| CCS | landings | rock crabs | 0.7147 | 35 | yes | 2 | 0.2881 | 0.0549 | 0.8092 | 0.0084 | 0.262 | no | NA |
| CCS | landings | *Genyonemus lineatus* | 1.5003 | 56 | yes | 6 | 0.3435 | 0.0078 | 0.4359 | 0.0258 | 0.094 | yes | 41.0 |
| CCS | landings | cucumbers | 1.0865 | 29 | yes | 2 | 0.2402 | 0.1186 | 0.7756 | 0 | 1 | no | NA |
| CCS | landings | *Platichthys stellatus +* | 1.3008 | 56 | yes | 7 | 0.3985 | 0.0025 | 0.6795 | 0.0064 | 0.196 | no | 90.0 |
| CCS | landings | *Exocetus* spp. | 0.8954 | 42 | yes | 3 | 0.5664 | 0.0001 | 0.6484 | 0.0661 | 0.018 | yes | 38.0 |
| CCS | landings | Macrouridae | 1.2838 | 16 | yes | 5 | 0.4726 | 0.0839 | 0.7172 | 0.6806 | 0.05 | no | 80.0 |
| CCS | landings | *Merluccius productus* | 0.8101 | 25 | yes | 2 | 0.1861 | 0.2035 | 0.8656 | 0.0172 | 0.246 | no | 91.0 |
| CCS | landings | *Paralichthys californicus* | 0.8634 | 56 | yes | 4 | 0.0388 | 0.3935 | 0.873 | 0 | 1 | no | 152.0 |
| CCS | landings | *Clupea pallasii* | 0.9408 | 33 | yes | 3 | 0.175 | 0.1819 | 0.7591 | 0.0183 | 0.166 | no | 46.0 |
| CCS | landings | *Ophiodon elongatus* | 1.0824 | 56 | yes | 5 | 0.0042 | 0.4885 | 0.8718 | 0 | 1 | no | 131.0 |
| CCS | landings | *Loligo opalescens* | 1.4313 | 46 | yes | 6 | 0.0165 | 0.4603 | 0.9224 | 0.0305 | 0.072 | no | NA |
| CCS | landings | *Trachurus symmetricus* | 1.4094 | 56 | yes | 4 | 0.3695 | 0.0038 | 0.4809 | 0.0139 | 0.078 | yes | 81.0 |
| CCS | landings | *Scomber japonicus* | 1.2396 | 56 | yes | 5 | 0.2759 | 0.0262 | 0.647 | 0 | 1 | no | 60.0 |
| CCS | landings | *Caulolatilus princeps* | 1.6761 | 56 | yes | 9 | 0.3274 | 0.0132 | 0.7609 | 0.1248 | 0 | yes | 102.0 |
| CCS | landings | Octopoda | 1.0853 | 56 | yes | 4 | 0.438 | 0.0007 | 0.6885 | 0.1193 | 0 | yes | NA |
| CCS | landings | Embiotocidae | 2.5166 | 56 | yes | 1 | 0.5986 | 0 | 0.4058 | 0.0542 | 0.024 | yes | 45.0 |
| CCS | landings | *Sebastes jordani* | 3.3128 | 55 | yes | 7 | -0.4233 | 1 | 1.0172 | 0.0092 | 0.09 | no | 31.0 |
| CCS | landings | *Sebastes spp.* | 1.1584 | 56 | yes | 8 | 0.172 | 0.1238 | 0.8897 | 0.0251 | 0.068 | yes | 50.0 |
| CCS | landings | *Anoplopoma fimbria* | 1.4803 | 40 | yes | 2 | 0.4958 | 0.0009 | 0.5482 | 0.0431 | 0.016 | yes | 102.0 |
| CCS | landings | Salmonidae | 0.8125 | 56 | yes | 9 | 0.2949 | 0.0233 | 0.8052 | 0 | 1 | no | 108.5 |
| CCS | landings | *Paralabrax* spp. | NaN | 98 | yes | 1 | NaN | NaN | NaN | NaN | NaN | NaN | 54.6 |
| CCS | landings | *Citharichthys sordidus* | 0.9701 | 56 | yes | 7 | -0.3017 | 1 | 0.9696 | 0.0103 | 0.176 | no | 41.0 |
| CCS | landings | *Sardinops sagax* | 2.2440 | 56 | yes | 7 | 0.5825 | 0 | 0.3572 | 0.0371 | 0.038 | yes | 39.5 |
| CCS | landings | *Scorpaena guttata* | 0.7863 | 56 | yes | 3 | 0.3223 | 0.0099 | 0.8188 | 0.0119 | 0.2 | no | 43.0 |
| CCS | landings | Palinuridae | 0.8317 | 56 | yes | 9 | 0.1055 | 0.2427 | 0.891 | 0 | 1 | no | NA |
| CCS | landings | *Stereolepis gigas* | 1.6439 | 56 | yes | 2 | 0.3315 | 0.0077 | 0.6169 | 0.0011 | 0.262 | no | 250.0 |
| CCS | landings | sharks | 1.2605 | 56 | yes | 6 | 0.0059 | 0.4839 | 0.7789 | 0.0308 | 0.03 | no | 200.0 |
| CCS | landings | *Semicossyphus pulcher* | 1.5885 | 56 | yes | 6 | 0.0579 | 0.3463 | 0.7844 | 0 | 1 | no | 91.0 |
| CCS | landings | *Crangon* *franciscorum* | 1.2958 | 8 | yes | 1 | 0.1067 | 0.4203 | 1.4639 | 0.1887 | 0.178 | no | NA |
| CCS | landings | *Pandalus jordani* | 1.0327 | 37 | yes | 4 | 0.4673 | 0.0035 | 0.7546 | 0.0806 | 0.016 | yes | NA |
| CCS | landings | skates | 1.9095 | 56 | yes | 7 | 0.4506 | 0.0007 | 0.9486 | 0.0421 | 0.036 | yes | 136.5 |
| CCS | landings | smelts | 0.9506 | 56 | yes | 6 | 0.2184 | 0.0658 | 0.8541 | 0 | 1 | no | 37.0 |
| CCS | landings | sole | 0.8620 | 56 | yes | 8 | 0.0798 | 0.2971 | 0.9645 | 0.0015 | 0.36 | no | 55.3 |
| CCS | landings | [*Microstomus pacificus*](http://en.wikipedia.org/wiki/Microstomus_pacificus) | 0.8021 | 50 | yes | 5 | 0.3303 | 0.0143 | 0.7322 | 0.0278 | 0.098 | yes | 76.0 |
| CCS | landings | shrimp | 1.1869 | 26 | yes | 2 | 0.6699 | 0.0002 | 0.6001 | 0.2533 | 0 | yes | NA |
| CCS | landings | *Parophrys vetulus* | 0.8754 | 56 | yes | 9 | 0.1488 | 0.1619 | 0.8228 | 0.1239 | 0.002 | no | 57.0 |
| CCS | landings | swordfish | 1.1958 | 56 | yes | 6 | 0.3718 | 0.0043 | 0.8251 | 0.0425 | 0.024 | yes | 455.0 |
| CCS | landings | *Sebastolobus* spp. | 1.0570 | 30 | yes | 3 | -0.1823 | 0.1863 | 0.7891 | 0.0981 | 0.01 | no | 60.0 |
| CCS | landings | *Thunnus alalunga* | 0.7582 | 56 | yes | 4 | 0.2044 | 0.0751 | 0.8417 | 0.0465 | 0.038 | no | 140.0 |
| CCS | landings | *Thunnus thynnus* | 1.2115 | 56 | yes | 8 | 0.3704 | 0.0052 | 0.6329 | 0.0989 | 0 | yes | 458.0 |
| CCS | landings | *Katsuwonus pelamis* | 2.3138 | 56 | yes | 6 | -0.2515 | 1 | 0.7058 | 0.066 | 0.018 | yes | 110.0 |
| CCS | landings | *Thunnus albacares* | 1.6661 | 29 | yes | 5 | 0.7516 | 0 | 0.4624 | 0.1887 | 0.01 | yes | 239.0 |
| CCS | landings | *Pleuronichthys* spp. | 1.2750 | 56 | yes | 3 | 0.5798 | 0 | 0.452 | 0.017 | 0.082 | yes | 41.5 |
| CCS | landings | urchins | 0.8625 | 33 | yes | 3 | 0.4153 | 0.0125 | 0.7176 | 0.0122 | 0.206 | no | NA |
| CCS | landings | *Seriola lalandi* | 1.0519 | 56 | yes | 4 | 0.4882 | 0.0001 | 0.678 | 0.0514 | 0.016 | yes | 250.0 |
| NES | landings | *Peprilus triacanthus* | 1.3857 | 41 | yes | 1 | 0.3245 | 0.0219 | 0.6017 | 0.0017 | 0.242 | no | 30.3 |
| NES | landings | *Gadus morhua* (GB) | 0.7712 | 45 | yes | 4 | 0.433 | 0.0026 | 0.6403 | 0 | 1 | no | 165.5 |
| NES | landings | *Gadus morhua* (GOM) | 0.9791 | 45 | yes | 4 | 0.1732 | 0.1426 | 0.7804 | 0.0076 | 0.226 | no | 165.5 |
| NES | landings | *Scophthalmus aquosus* | 1.1147 | 33 | yes | 3 | 0.3999 | 0.0158 | 0.7055 | 0.0707 | 0.032 | yes | 48.4 |
| NES | landings | *Scophthalmus aquosus* | 1.3710 | 33 | yes | 3 | 0.1668 | 0.1936 | 0.7676 | 0 | 1 | no | 48.4 |
| NES | landings | *Psuedopleuronectes americanus* (GB) | 0.8997 | 44 | yes | 2 | 0.2778 | 0.0393 | 0.7646 | 0 | 1 | no | 61.8 |
| NES | landings | *P. americanus* (GOM) | 0.9478 | 44 | yes | 3 | 0.0294 | 0.4285 | 0.8155 | 0 | 1 | no | 61.8 |
| NES | landings | *P. americanus* (SNE) | 0.8511 | 44 | yes | 3 | 0.1159 | 0.2382 | 0.7034 | 0 | 1 | no | 61.8 |
| NES | landings | *Glyptocephalus cunoglossus* | 0.8861 | 45 | yes | 10 | 0.4429 | 0.0044 | 0.567 | 0.1516 | 0.008 | yes | 69.2 |
| NES | landings | *Limanda ferruginea* (GOM) | 1.1749 | 45 | yes | 2 | 0.151 | 0.17 | 0.7089 | 0.002 | 0.254 | no | 63.4 |
| NES | landings | *Limanda ferruginea* (SNE) | 1.1715 | 45 | yes | 3 | 0.5808 | 0 | 0.6168 | 0.1698 | 0 | yes | 63.4 |
| NES | landings | *Limanda ferruginea* (GB) | 0.9140 | 45 | yes | 2 | 0.3738 | 0.0074 | 0.7798 | 0.0315 | 0.074 | yes | 63.4 |
| NES | landings | *Melanogrammus aeglefinus* (GB) | 2.4747 | 45 | yes | 2 | 0.7323 | 0 | 0.2273 | 0.2855 | 0 | yes | 105.0 |
| NES | landings | *Melanogrammus aeglefinus* (GOM) | 1.1516 | 45 | yes | 6 | 0.1153 | 0.2454 | 0.7019 | 0.0341 | 0.056 | no | 105.0 |
| NES | landings | *Merluccius billinearis* (GOMNGB) | 1.6659 | 43 | yes | 2 | 0.6689 | 0 | 0.333 | 0.115 | 0 | yes | 74.0 |
| NES | landings | *Merluccius billinearis* (SGBMA) | 1.9046 | 43 | yes | 9 | 0.48 | 0.0024 | 0.1917 | 0 | 1 | no | 74.0 |
| NES | landings | *Urophycis tenuis* | 0.9368 | 44 | yes | 3 | 0.4724 | 0.001 | 0.6545 | 0.1254 | 0.002 | yes | 134.7 |
| NES | landings | *Hippoglossus hippoglossus* | 1.4403 | 45 | yes | 5 | 0.3618 | 0.0118 | 0.4543 | 0.0598 | 0.036 | yes | 470.0 |
| NES | landings | *Clupea harengus* | 1.2743 | 43 | yes | 9 | -0.0606 | 0.3688 | 0.4718 | 0.0603 | 0.034 | no | 44.0 |
| NES | landings | *Scomber scombrus* | 1.3727 | 43 | yes | 7 | 0.5734 | 0.0002 | 0.7002 | 0 | 1 | no | 52.7 |
| NES | landings | *Zoarces americanus* | 1.7819 | 45 | yes | 10 | -0.0762 | 0.3342 | 0.2928 | 0.0033 | 0.252 | no | 105.3 |
| NES | landings | *Hippoglossoides platesspodes* | 0.9176 | 45 | yes | 1 | 0.4684 | 0.0008 | 0.6351 | 0.0026 | 0.27 | no | 82.6 |
| NES | landings | *Pollachius virens* | 0.8001 | 45 | yes | 7 | 0.129 | 0.2233 | 0.8437 | 0.0864 | 0.016 | no | 145.0 |
| NES | landings | *Sebastes fasciatus* | 1.2966 | 45 | yes | 7 | 0.6696 | 0 | 0.4384 | 0.0332 | 0.076 | yes | 37.9 |
| NES | landings | *Stenotomus chrysops* | 0.9533 | 45 | yes | 2 | 0.4614 | 0.0011 | 0.5975 | 0.0994 | 0.004 | yes | 46.0 |
| NES | landings | *Centropristis striata* | 1.2909 | 44 | yes | 7 | 0.6694 | 0 | 0.442 | 0.0281 | 0.092 | yes | 66.0 |
| NES | landings | *Lophius americanus* (GOM) | 1.0803 | 43 | yes | 5 | 0.695 | 0 | 0.5694 | 0.0024 | 0.34 | no | 120.0 |
| NES | landings | *Lophius americanus* (GB) | 1.1232 | 43 | yes | 7 | 0.2692 | 0.0589 | 0.9445 | 0.0732 | 0.014 | no | 120.0 |
| NES | landings | *Lopholatilus chamaeleonticeps* | 1.0208 | 36 | yes | 6 | 0.3042 | 0.0543 | 0.8236 | 0.0266 | 0.15 | no | 125.0 |
| NES | landings | *Pandalus borealis* | 0.9317 | 46 | yes | 9 | 0.2844 | 0.0464 | 0.7459 | 0 | 1 | no | 16.5 |
| NES | landings | *Illex illecebrosus* | 1.1111 | 43 | yes | 1 | 0.277 | 0.0398 | 0.7114 | 0.0109 | 0.128 | no | 31.0 |
| NES | landings | *Placopecten magellanicus* (GB) | 1.2640 | 43 | yes | 3 | 0.3649 | 0.0112 | 0.6479 | 0.0687 | 0.012 | yes | 15.0 |
| NES | landings | *P. magellanicus* (MA) | 1.0168 | 43 | yes | 6 | 0.1718 | 0.1582 | 0.8607 | 0.0465 | 0.04 | no | 15.0 |
| NES | landings | *Bromse bromse* | 1.1569 | 39 | yes | 2 | 0.163 | 0.1711 | 0.7198 | 0.0377 | 0.036 | no | 120.0 |
| NES | landings | *Paralichthys dentatus* | 0.8250 | 45 | yes | 2 | 0.2956 | 0.0287 | 0.7239 | 0.0199 | 0.132 | no | 94.0 |
| NES | landings | skates | 1.0839 | 39 | yes | 5 | 0.4305 | 0.0062 | 0.6976 | 0.0199 | 0.134 | no | 81.9 |
| NES | landings | squids | 1.4740 | 39 | yes | 7 | 0.1941 | 0.1477 | 0.6522 | 0.3018 | 0 | no | 31.0 |
| NES | landings | dogfish | 1.6972 | 39 | yes | 1 | 0.3185 | 0.0273 | 0.5357 | 0.0259 | 0.044 | yes | 160.0 |
| NES | landings | lobster | 1.0196 | 39 | yes | 4 | 0.3103 | 0.037 | 0.8049 | 0.0027 | 0.302 | no | NA |
| NES | landings | *Pomatomus saltatrix* | 1.5360 | 39 | yes | 2 | 0.2076 | 0.1123 | 0.6219 | 0.062 | 0.014 | no | 130.0 |
| NES | landings | *Urophycis chuss* | 2.4517 | 39 | yes | 5 | 0.5171 | 0.001 | 0.195 | 0.1464 | 0.01 | yes | 66.0 |
| NES | abundance | *Peprilus triacanthus* | 0.6509 | 35 | yes | 2 | 0.3176 | 0.0382 | 0.8029 | 0.0198 | 0.234 | no | 30.3 |
| NES | abundance | *Gadus morhua* (GB+southern) | 0.9460 | 48 | yes | 4 | 0.5748 | 0 | 0.5941 | 0.0015 | 0.322 | no | 165.5 |
| NES | abundance | *G. morhua* (GOM) | 1.2737 | 45 | yes | 2 | 0.2663 | 0.0441 | 0.6061 | 0.0534 | 0.01 | yes | 165.5 |
| NES | abundance | *Tautogolabrus adspersus* | 0.8801 | 46 | no | 2 | 0.4445 | 0.002 | 0.6859 | 0.0181 | 0.162 | no | 40.6 |
| NES | abundance | *Scophthalmus aquosus* (GB) | 1.3187 | 33 | yes | 2 | 0.566 | 0.0006 | 0.5116 | 0.0402 | 0.048 | yes | 48.4 |
| NES | abundance | *S. aquosus* (SNE) | 1.2528 | 33 | yes | 2 | 0.1447 | 0.2228 | 0.6701 | 0 | 1 | no | 48.4 |
| NES | abundance | *Psuedopleuronectes americanus* (GB) | 0.7542 | 46 | yes | 2 | 0.5253 | 0.0001 | 0.6958 | 0.0342 | 0.108 | no | 61.8 |
| NES | abundance | *P. americanus* (GOM) | 0.7981 | 30 | yes | 2 | 0.4792 | 0.0057 | 0.575 | 0.0052 | 0.352 | no | 61.8 |
| NES | abundance | *P. americanus* (SNEMA) | 0.8605 | 48 | yes | 3 | 0.3507 | 0.0098 | 0.7252 | 0.0565 | 0.038 | yes | 61.8 |
| NES | abundance | *Glyptocephalus cunoglossus* | 1.0582 | 48 | yes | 1 | 0.3195 | 0.0152 | 0.6636 | 0.0192 | 0.09 | yes | 69.2 |
| NES | abundance | *Limanda ferruginea*(GB) | 1.0874 | 47 | yes | 9 | 0.4146 | 0.0054 | 0.7938 | 0.0143 | 0.174 | no | 63.4 |
| NES | abundance | *L. ferruginea* (CCGOM) | 0.8156 | 23 | yes | 2 | 0.4808 | 0.0159 | 0.7718 | 0.0357 | 0.19 | no | 63.4 |
| NES | abundance | *L. ferruginea* (SNEMA) | 1.1370 | 35 | yes | 6 | 0.3733 | 0.0252 | 0.7276 | 0.1212 | 0.012 | yes | 63.4 |
| NES | abundance | *Melanogrammus aeglefinus* (GOM) | 1.5301 | 47 | yes | 3 | 0.2876 | 0.0307 | 0.433 | 0.0262 | 0.034 | yes | 105.0 |
| NES | abundance | *M. aeglefinus* (GB) | 1.4540 | 45 | yes | 4 | 0.202 | 0.1057 | 0.4923 | 0.082 | 0.004 | no | 105.0 |
| NES | abundance | *Merluccius billinearis* (south) | 0.8343 | 37 | yes | 7 | 0.5259 | 0.0017 | 0.6972 | 0.0297 | 0.14 | no | 74.0 |
| NES | abundance | *M. billinearis* (north) | 0.7967 | 37 | yes | 1 | 0.4401 | 0.0041 | 0.7926 | 0.0149 | 0.21 | no | 74.0 |
| NES | abundance | *Urophycis tenuis* | 0.9810 | 45 | yes | 8 | 0.3429 | 0.0203 | 0.8065 | 0.0278 | 0.118 | no | 134.7 |
| NES | abundance | *Hippoglossus hippoglossus* | 0.8899 | 45 | yes | 6 | 0.6856 | 0 | 0.5509 | 0 | 0.442 | no | 470.0 |
| NES | abundance | *Clupea harengus* | 1.8284 | 46 | yes | 1 | 0.573 | 0 | 0.4634 | 0.0788 | 0 | yes | 44.0 |
| NES | abundance | *Scomber scombrus* | 1.1627 | 41 | yes | 3 | 0.6891 | 0 | 0.5567 | 0.1302 | 0 | yes | 52.7 |
| NES | abundance | *Zoarces americanus* | 0.9745 | 43 | yes | 3 | 0.3098 | 0.0275 | 0.6946 | 0.0184 | 0.1 | no | 105.3 |
| NES | abundance | *Hippoglossoides platesspodes* | 0.9891 | 46 | yes | 4 | 0.0742 | 0.3223 | 0.6415 | 0 | 1 | no | 82.6 |
| NES | abundance | *Pollachius virens* | 1.2484 | 45 | yes | 5 | 0.2903 | 0.0365 | 0.7716 | 0.0598 | 0.008 | yes | 145.0 |
| NES | abundance | *Sebastes fasciatus* | 1.0269 | 47 | yes | 5 | 0.3524 | 0.0119 | 0.5701 | 0.0038 | 0.27 | no | 37.9 |
| NES | abundance | *Myoxocephalus octodecemspinosus* | 0.6987 | 47 | no | 3 | 0.5382 | 0.0001 | 0.7386 | 0.0001 | 0.47 | no | 45.9 |
| NES | abundance | *Stenotomus chrysops* | 0.8489 | 48 | yes | 1 | 0.6281 | 0 | 0.5784 | 0.222 | 0 | yes | 46.0 |
| NES | abundance | *Centropristis striata* | 1.0908 | 43 | yes | 10 | -0.2869 | 1 | 0.9622 | 0 | 1 | no | 66.0 |
| NES | abundance | *Lophius americanus* (south) | 1.3587 | 46 | yes | 2 | 0.4867 | 0.0005 | 0.5043 | 0.0455 | 0.016 | yes | 120.0 |
| NES | abundance | *L. americanus* (north) | 0.7793 | 46 | yes | 2 | 0.3462 | 0.0115 | 0.7236 | 0.0036 | 0.356 | no | 120.0 |
| NES | abundance | *Pandalus borealis* | 0.8884 | 41 | yes | 8 | -0.2124 | 0.1215 | 0.9298 | 0 | 1 | no | 16.5 |
| NES | abundance | *Illex illecebrosus* | 1.5236 | 38 | yes | 1 | 0.3846 | 0.0103 | 0.6108 | 0.0015 | 0.25 | no | 31.0 |
| NES | abundance | *Placopecten magellanicus* (GB) | 1.2103 | 31 | yes | 7 | -0.0198 | 0.4643 | 1.1668 | 0.0089 | 0.282 | no | 15.0 |
| NES | abundance | *P. magellanicus* (MAB) | 1.0480 | 31 | yes | 3 | -0.0298 | 0.4413 | 0.9321 | 0 | 1 | no | 15.0 |
| NES | abundance | *Bromse bromse* | 0.9600 | 48 | yes | 1 | 0.4461 | 0.0009 | 0.6215 | 0 | 1 | no | 120.0 |
| NES | abundance | *Paralichthys dentatus* | 0.8508 | 44 | yes | 1 | 0.3114 | 0.0224 | 0.7288 | 0.0001 | 0.438 | no | 94.0 |
| NES | abundance | *Urophycis regia* | 1.2970 | 39 | no | 1 | 0.6421 | 0 | 0.5822 | 0.0819 | 0.002 | yes | 41.0 |
| NES | abundance | *Phycis chesteri* | 1.7416 | 33 | no | 2 | 0.6788 | 0.0054 | 0.4295 | 0.0006 | 0.4 | no | 42.0 |
| NES | abundance | *Enchelyopus cimbrius* | 0.9700 | 37 | no | 2 | 0.5542 | 0.0105 | 0.6535 | 0.0389 | 0.166 | no | 41.0 |
| NES | abundance | *Citharichthys arctifrons* | 2.4474 | 47 | no | 2 | 0.1941 | 0.1034 | 0.4327 | 0 | 1 | no | 18.0 |
| NES | abundance | *Triglops murrayi* | 1.4408 | 43 | no | 1 | 0.2657 | 0.0615 | 0.604 | 0.0651 | 0.004 | no | 20.0 |
| NES | abundance | *Hemitripterus americanus* | 0.7842 | 47 | no | 7 | 0.5699 | 0.0001 | 0.6864 | 0 | 1 | no | 64.0 |
| NES | abundance | *Prionotus carolinus* | 1.0092 | 33 | no | 1 | 0.1328 | 0.2884 | 0.7619 | 0.0043 | 0.302 | no | 38.0 |
| NES | abundance | *Ammodytes dubius* | 1.3162 | 45 | no | 2 | 0.5685 | 0.0001 | 0.6581 | 0.0522 | 0.016 | yes | 25.0 |
| NES | abundance | *Lepophidium profundorum* | 1.2276 | 46 | no | 1 | 0.7114 | 0 | 0.5076 | 0.124 | 0 | yes | 27.0 |

**Supplementary Table 2** Simplex projection and S-maps results for same-species paired comparisons of abundance and catch for fisheries data in the California Current System (CCS) and Northeast Shelf System (NES). *E* is embedding dimension from simplex projection, rmax is the highest forecast skill possible with S-maps, and NL classifies data as nonlinear (yes) or linear (no). Stock code: GB = Georges Bank, GOM = Gulf of Maine, SNEMA = southern New England- Massachusetts.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **ABUNDANCE** | | | **CATCH** | | |
| **Location** | **Species (stock)** | **E** | **rmax** | **NL?** | **E** | **rmax** | **NL?** |
| CCS | Northern anchovy | 3 | 0.513 | yes | 1 | 0.3676 | no |
| CCS | Pacific barracuda | 3 | 0.426 | no | 9 | 0.4457 | yes |
| CCS | Boccaccio | 2 | 0.602 | no | 4 | 0.3810 | no |
| NES | butterfish | 2 | 0.317 | no | 1 | 0.3245 | no |
| NES | Atlantic cod (GB) | 4 | 0.574 | no | 4 | 0.4330 | no |
| CCS | croakers | 5 | 0.609 | no | 6 | 0.3435 | yes |
| NES | windowpane flounder (GB) | 2 | 0.566 | yes | 3 | 0.3999 | yes |
| NES | winter flounder (GB) | 2 | 0.525 | no | 2 | 0.2778 | no |
| NES | witch flounder | 1 | 0.319 | yes | 10 | 0.4429 | yes |
| NES | yellowtail flounder (GB) | 9 | 0.414 | no | 2 | 0.3738 | yes |
| NES | yellowtail flounder (SNEMA) | 6 | 0.373 | yes | 3 | 0.5808 | yes |
| NES | silver hake (South) | 7 | 0.525 | no | 9 | 0.4800 | no |
| NES | silver hake (North) | 1 | 0.440 | no | 2 | 0.6689 | yes |
| NES | white hake (GBGOM) | 8 | 0.342 | no | 3 | 0.4724 | yes |
| NES | Atlantic halibut | 6 | 0.685 | no | 5 | 0.3618 | yes |
| NES | Atlantic mackerel | 3 | 0.689 | yes | 7 | 0.5734 | no |
| CCS | Jack mackerel | 3 | 0.728 | yes | 4 | 0.3695 | yes |
| CCS | Pacific mackerel | 4 | 0.495 | yes | 5 | 0.2759 | no |
| NES | Acadian redfish | 5 | 0.352 | no | 7 | 0.6696 | yes |
| CCS | Pacific sardine | 1 | 0.556 | no | 7 | 0.5825 | yes |
| CCS | Dover sole | 2 | 0.452 | yes | 5 | 0.3303 | yes |
| NES | scup | 1 | 0.628 | yes | 2 | 0.4614 | yes |
| NES | monkfish (North) | 2 | 0.346 | no | 5 | 0.6950 | no |
| NES | shortfin squid | 1 | 0.384 | no | 1 | 0.2770 | no |
| NES | summer flounder | 1 | 0.311 | no | 2 | 0.2956 | no |