Table 1. Model performance metrics for Spring Chinook salmon by index, season, and lag. For Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE), lower values indicate better predictive ability, whereas for the Kling-Gupta Efficiency (KGE), higher values are better. **Bolded** scores indicate the best fit for each combination of index, season, and lag, denoted by shading.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | MAE | | RMSE | | KGE | |
| Index | Season | Lag 2 | Lag 3 | Lag 2 | Lag 3 | Lag 2 | Lag 3 |
| CMISST | aut | 0.73 | 0.68 | 0.90 | 0.90 | 0.30 | 0.30 |
|  | spr | **0.58** | 0.66 | **0.76** | 0.94 | **0.52** | 0.20 |
|  | sum | 0.69 | 0.70 | 0.89 | 0.96 | 0.32 | 0.15 |
|  | win | 0.62 | 0.68 | 0.86 | 0.94 | 0.37 | 0.16 |
| CMISSH | aut | 0.64 | 0.68 | **0.79** | 0.90 | **0.48** | 0.28 |
|  | spr | 0.64 | 0.66 | 0.84 | 0.91 | 0.41 | 0.29 |
|  | sum | 0.67 | 0.66 | 0.85 | 0.90 | 0.39 | 0.28 |
|  | win | **0.60** | 0.67 | 0.79 | 0.93 | 0.47 | 0.23 |
| PDO | aut | 0.78 | 0.71 | 0.96 | 0.93 | 0.07 | 0.17 |
|  | spr | **0.68** | 0.70 | **0.84** | 0.98 | **0.38** | -0.03 |
|  | sum | 0.69 | 0.71 | 0.87 | 0.96 | 0.32 | 0.03 |
|  | win | 0.74 | 0.74 | 0.98 | 1.02 | -0.07 | -0.37 |
| ONI | aut | **0.74** | 0.76 | 0.99 | 1.03 | -0.12 | -0.44 |
|  | spr | 0.74 | 0.78 | **0.92** | 1.00 | **0.20** | -0.10 |
|  | sum | 0.74 | 0.78 | 0.97 | 1.03 | -0.02 | -0.42 |
|  | win | 0.77 | 0.76 | 1.01 | 1.02 | -0.18 | -0.20 |
| NPGO | aut | 0.64 | 0.74 | 0.84 | 0.96 | **0.39** | 0.03 |
|  | spr | **0.62** | 0.72 | **0.82** | 0.94 | 0.42 | 0.13 |
|  | sum | 0.65 | 0.70 | 0.83 | 0.93 | 0.40 | 0.15 |
|  | win | 0.65 | 0.73 | 0.84 | 0.97 | 0.39 | -0.02 |
| SSTarc | aut | 0.73 | 0.72 | 0.97 | 0.96 | 0.01 | 0.04 |
|  | spr | **0.65** | 0.72 | **0.86** | 0.97 | **0.33** | -0.01 |
|  | sum | 0.75 | 0.77 | 0.98 | 1.02 | -0.08 | -0.35 |
|  | win | 0.67 | 0.71 | 0.94 | 0.98 | 0.14 | -0.04 |

Table 2. Model performance metrics for Fall Chinook salmon by index, season, and lag. For Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE), lower values indicate better predictive ability, whereas for the Kling-Gupta Efficiency (KGE), higher values are better. **Bolded** scores indicate the best fit for each combination of index, season, and lag, denoted by shading.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | MAE | | RMSE | | KGE | |
| Index | Season | Lag 2 | Lag 3 | Lag 2 | Lag 3 | Lag 2 | Lag 3 |
| CMISST | aut | 0.73 | 0.66 | 0.92 | 0.84 | 0.21 | 0.40 |
|  | spr | 0.65 | 0.61 | 0.81 | 0.80 | 0.44 | 0.46 |
|  | sum | 0.68 | **0.60** | 0.86 | **0.78** | 0.38 | **0.48** |
|  | win | 0.64 | 0.65 | 0.81 | 0.86 | 0.45 | 0.34 |
| CMISSH | aut | 0.57 | 0.54 | 0.71 | **0.66** | 0.59 | **0.64** |
|  | spr | 0.56 | 0.56 | 0.70 | 0.70 | 0.59 | 0.60 |
|  | sum | 0.57 | 0.58 | 0.69 | 0.72 | 0.60 | 0.58 |
|  | win | **0.52** | 0.52 | 0.67 | 0.69 | 0.63 | 0.62 |
| PDO | aut | 0.78 | 0.68 | 0.96 | 0.89 | 0.05 | 0.26 |
|  | spr | **0.62** | 0.68 | 0.85 | 0.90 | 0.35 | 0.24 |
|  | sum | 0.72 | 0.60 | 0.86 | **0.76** | 0.32 | **0.51** |
|  | win | 0.72 | 0.78 | 0.93 | 0.98 | 0.15 | -0.04 |
| ONI | aut | 0.86 | 0.74 | 1.02 | 0.95 | -0.52 | 0.07 |
|  | spr | 0.75 | **0.73** | 0.94 | 0.95 | 0.11 | 0.08 |
|  | sum | 0.85 | 0.73 | 1.02 | **0.95** | -0.42 | 0.08 |
|  | win | 0.73 | 0.81 | 0.93 | 1.01 | **0.14** | -0.21 |
| NPGO | aut | 0.85 | 0.80 | 1.01 | 1.00 | -0.24 | -0.15 |
|  | spr | 0.77 | **0.75** | **0.96** | 0.97 | **0.04** | 0.02 |
|  | sum | 0.80 | 0.77 | 0.97 | 0.98 | 0.02 | -0.03 |
|  | win | 0.79 | 0.77 | 0.97 | 0.97 | -0.04 | -0.02 |
| SSTarc | aut | 0.87 | 0.83 | 1.03 | 1.00 | -0.64 | -0.17 |
|  | spr | 0.81 | **0.80** | 0.99 | **0.98** | -0.11 | -0.04 |
|  | sum | 0.87 | 0.86 | 1.03 | 1.02 | -0.88 | -0.33 |
|  | win | 0.80 | 0.80 | 0.98 | 0.99 | **-0.01** | -0.10 |

Table 3. Model performance metrics for Steelhead trout by index, season, and lag. For Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE), lower values indicate better predictive ability, whereas for the Kling-Gupta Efficiency (KGE), higher values are better. **Bolded** scores indicate the best fit for each combination of index, season, and lag, denoted by shading.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | MAE | | RMSE | | KGE | |
| Index | Season | Lag 2 | Lag 3 | Lag 2 | Lag 3 | Lag 2 | Lag 3 |
| CMISST | aut | 0.65 | **0.51** | 0.77 | **0.67** | 0.50 | **0.64** |
|  | spr | 0.59 | 0.60 | 0.73 | 0.75 | 0.55 | 0.54 |
|  | sum | 0.66 | 0.56 | 0.79 | 0.73 | 0.46 | 0.56 |
|  | win | 0.58 | 0.62 | 0.74 | 0.78 | 0.56 | 0.50 |
| CMISSH | aut | 0.70 | 0.66 | 0.88 | 0.83 | 0.33 | 0.40 |
|  | spr | 0.62 | 0.61 | 0.82 | **0.77** | 0.41 | **0.50** |
|  | sum | 0.61 | **0.61** | 0.79 | 0.79 | 0.44 | 0.46 |
|  | win | 0.63 | 0.65 | 0.86 | 0.85 | 0.35 | 0.40 |
| PDO | aut | 0.83 | 0.81 | 1.03 | 1.01 | -0.50 | -0.31 |
|  | spr | **0.80** | 0.81 | **1.01** | 1.02 | **-0.25** | -0.43 |
|  | sum | 0.84 | 0.80 | 1.02 | 1.01 | -0.58 | -0.39 |
|  | win | 0.83 | 0.83 | 1.02 | 1.04 | -0.45 | -1.09 |
| ONI | aut | 0.84 | 0.83 | 1.03 | 1.02 | -0.60 | -0.32 |
|  | spr | 0.80 | **0.75** | 0.99 | **0.99** | **-0.07** | -0.10 |
|  | sum | 0.84 | 0.82 | 1.03 | 1.01 | -0.60 | -0.29 |
|  | win | 0.82 | 0.79 | 1.00 | 1.04 | -0.17 | -0.39 |
| NPGO | aut | 0.66 | 0.69 | 0.80 | 0.89 | 0.45 | 0.24 |
|  | spr | 0.62 | 0.69 | 0.80 | 0.88 | 0.45 | 0.27 |
|  | sum | **0.58** | 0.65 | **0.75** | 0.84 | **0.53** | 0.37 |
|  | win | 0.68 | 0.73 | 0.86 | 0.94 | 0.32 | 0.12 |
| SSTarc | aut | 0.63 | **0.58** | 0.79 | **0.72** | 0.48 | **0.58** |
|  | spr | 0.60 | 0.67 | 0.76 | 0.83 | 0.51 | 0.39 |
|  | sum | 0.70 | 0.65 | 0.84 | 0.83 | 0.37 | 0.40 |
|  | win | 0.65 | 0.71 | 0.80 | 0.90 | 0.46 | 0.24 |

|  |
| --- |
|  |
| Figure S1. Correlation coefficients between natural logged salmon counts and environmental indices and among indices for spring Chinook salmon, fall Chinook salmon, and steelhead. CMI indices were generated using the best dataset (SST or SSH), season, and lag for each stock. Other indices used those same season and lag values to ensure comparability. |