Coastal Ecosystem Model Validation Results

- Generated: 2025-11-20 07:59:05
- Validation approach: Spatial sampling with 500 iterations
- Tile-based train/test split: 80%/20%
- Random Forest parameters: 800 trees
- Seagrass probability threshold: 70%
- Validation mode: Probability
- Probability threshold for inclusion: ≥50.0%

Sampling Method

Spatial Stratification: Training and test sets are separated by tiles (32km grid) to reduce spatial autocorrelation bias. Each iteration randomly assigns tiles to either training (80%) or testing (20%) sets.

Ecosystem Class Mapping

Original class_l2	Ecosystem Class	Description
2, 41, 9	2	Tidal flat/Mudflat
3	3	Mangrove
5, 52	4	Saltmarsh
9 (refined)	5	Seagrass (identified within tidal flats)
11	6	Salt flat

Region: 7

All Data

Overall Accuracy (Median [95% interval])

Stage	Accuracy
Ecosystem Level	0.950 [0.892, 0.981]
Final (with Seagrass)	0.944 [0.888, 0.977]

Iterations summarised: 300

Evaluation Coverage (Median [95% interval])

Stage	Evaluated samples	Coverage
Ecosystem	5556.0 [3392.1, 9592.5]	99.8% [98.7%, 100.0%]
Final	5560.5 [3392.1, 9596.1]	99.8% [98.8%, 100.0%]

Test samples per iteration: 5567.0 [3409.7, 9606.0]

Per-Class Accuracy (Final Model)

Class	User's Accuracy	Producer's Accuracy	F1 Score
Class 0	0.934 [0.804, 0.986]	0.968 [0.852, 0.996]	0.938 ± 0.033
			0.987 ±

Class	User's Accuracy	Producer's Accuracy	F1 Score
Class 1	1.000 [0.947, 1.000]	0.994 [0.916, 1.000]	0.015
Tidal flat	0.947 [0.786, 1.000]	0.964 [0.654, 1.000]	0.923 ± 0.083
Saltmarsh	0.926 [0.729, 0.996]	0.894 [0.684, 0.975]	0.888 ± 0.064
Seagrass	0.969 [0.519, 1.000]	0.927 [0.764, 1.000]	0.915 ± 0.088

Year-specific Summaries

Year 2021

Stage	Accuracy
Ecosystem Level	0.949 [0.882, 0.980]
Final (with Seagrass)	0.941 [0.878, 0.976]

Coverage (Median [95% interval])

Stage	Evaluated samples	Coverage
Ecosystem	2780.0 [1690.7, 4803.1]	99.9% [98.7%, 100.0%]
Final	2780.0 [1690.7, 4803.1]	99.9% [98.7%, 100.0%]

Test samples per iteration: 2791.0 [1704.8, 4807.7]

Per-class Accuracy (Final Model)

Class	User's Accuracy	Producer's Accuracy	F1 Score
Class 0	0.933 [0.790, 0.989]	0.967 [0.848, 0.995]	0.936 ± 0.037
Class 1	1.000 [0.948, 1.000]	0.997 [0.922, 1.000]	0.987 ± 0.014
Tidal flat	0.944 [0.754, 1.000]	0.958 [0.668, 1.000]	0.918 ± 0.083
Saltmarsh	0.930 [0.702, 0.995]	0.885 [0.654, 0.981]	0.882 ± 0.070
Seagrass	0.963 [0.461, 1.000]	0.921 [0.747, 1.000]	0.903 ± 0.101

Year 2022

Stage	Accuracy
Ecosystem Level	0.951 [0.898, 0.984]
Final (with Seagrass)	0.946 [0.888, 0.979]

Coverage (Median [95% interval])

Stage	Evaluated samples	Coverage
Ecosystem	2772.5 [1701.5, 4786.0]	99.7% [98.1%, 100.0%]
Final	2772.5 [1701.5,	99.8% [98.6%,

Stage	4790.1] Evaluated samples	100.0%] Coverage

Test samples per iteration: 2778.0 [1704.8, 4800.1]

Per-class Accuracy (Final Model)

Class	User's Accuracy	Producer's Accuracy	F1 Score
Class 0	0.937 [0.807, 0.989]	0.969 [0.852, 0.998]	0.941 ± 0.032
Class 1	1.000 [0.946, 1.000]	0.995 [0.908, 1.000]	0.987 ± 0.016
Tidal flat	0.956 [0.803, 1.000]	0.968 [0.644, 1.000]	0.928 ± 0.086
Saltmarsh	0.928 [0.748, 0.998]	0.903 [0.704, 0.980]	0.894 ± 0.064
Seagrass	0.984 [0.603, 1.000]	0.932 [0.768, 1.000]	0.927 ± 0.079

Region: 6

All Data

Overall Accuracy (Median [95% interval])

Stage	Accuracy
Ecosystem Level	0.954 [0.923, 0.977]
Final (with Seagrass)	0.946 [0.914, 0.970]

Iterations summarised: 300

Evaluation Coverage (Median [95% interval])

Stage	Evaluated samples	Coverage
Ecosystem	45380.5 [32248.5, 57066.1]	99.0% [98.0%, 99.6%]
Final	45408.5 [32259.5, 57126.7]	99.1% [98.2%, 99.6%]

Test samples per iteration: 45915.0 [32590.4, 57856.4]

Per-Class Accuracy (Final Model)

Class	User's Accuracy	Producer's Accuracy	F1 Score
Class 0	0.957 [0.896, 0.986]	0.990 [0.974, 0.997]	0.970 ± 0.012
Class 1	0.981 [0.955, 0.999]	0.960 [0.886, 0.998]	0.967 ± 0.016
Tidal flat	0.865 [0.701, 0.956]	0.923 [0.791, 0.987]	0.881 ± 0.039
Mangrove	0.949 [0.843, 0.993]	0.951 [0.813, 0.982]	0.937 ± 0.034
Saltmarsh	0.919 [0.816, 0.968]	0.786 [0.584, 0.908]	0.836 ± 0.054

Class	User's Accuracy	Producer's Accuracy	F1 Score
Seagrass	0.954 [0.859, 0.984]	0.941 [0.874, 0.977]	0.932 ± 0.022
Salt flat	0.992 [0.000, 1.000]	0.701 [0.000, 1.000]	0.670 ± 0.336

Year-specific Summaries

Year 2021

Stage	Accuracy
Ecosystem Level	0.955 [0.922, 0.977]
Final (with Seagrass)	0.947 [0.915, 0.970]

Coverage (Median [95% interval])

Stage	Evaluated samples	Coverage
Ecosystem	22709.0 [16153.5, 28594.6]	99.1% [98.0%, 99.6%]
Final	22718.0 [16160.9, 28628.1]	99.2% [98.2%, 99.6%]

Test samples per iteration: 22973.5 [16301.6, 28941.5]

Per-class Accuracy (Final Model)

Class	User's Accuracy	Producer's Accuracy	F1 Score
Class 0	0.958 [0.897, 0.988]	0.990 [0.973, 0.997]	0.971 ± 0.013
Class 1	0.984 [0.957, 1.000]	0.950 [0.874, 0.996]	0.964 ± 0.018
Tidal flat	0.861 [0.707, 0.963]	0.927 [0.793, 0.988]	0.884 ± 0.042
Mangrove	0.964 [0.855, 0.998]	0.940 [0.785, 0.978]	0.936 ± 0.037
Saltmarsh	0.916 [0.809, 0.968]	0.795 [0.604, 0.920]	0.841 ± 0.054
Seagrass	0.932 [0.851, 0.983]	0.948 [0.885, 0.983]	0.935 ± 0.022
Salt flat	0.985 [0.000, 1.000]	0.746 [0.000, 1.000]	0.695 ± 0.339

Year 2022

Stage	Accuracy
Ecosystem Level	0.954 [0.922, 0.978]
Final (with Seagrass)	0.945 [0.914, 0.970]

Coverage (Median [95% interval])

Stage	Evaluated samples	Coverage
Ecosystem	22665.5 [16095.0, 28472.5]	98.9% [97.9%, 99.6%]

Stage	Evaluated samples	Coverage
Final	22678.0 [16098.7, 28500.4]	99.0% [98.1%, 99.6%]

Test samples per iteration: 22941.5 [16288.8, 28914.9]

Per-class Accuracy (Final Model)

Class	User's Accuracy	Producer's Accuracy	F1 Score
Class 0	0.955 [0.896, 0.985]	0.989 [0.975, 0.996]	0.969 ± 0.013
Class 1	0.979 [0.951, 0.999]	0.969 [0.894, 1.000]	0.971 ± 0.016
Tidal flat	0.857 [0.706, 0.964]	0.921 [0.787, 0.987]	0.879 ± 0.040
Mangrove	0.936 [0.825, 0.992]	0.961 [0.843, 0.987]	0.938 ± 0.034
Saltmarsh	0.922 [0.819, 0.972]	0.775 [0.574, 0.898]	0.831 ± 0.056
Seagrass	0.937 [0.849, 0.988]	0.935 [0.852, 0.977]	0.930 ± 0.025
Salt flat	1.000 [0.000, 1.000]	0.681 [0.000, 1.000]	0.636 ± 0.360

Region: 5

All Data

Overall Accuracy (Median [95% interval])

Stage	Accuracy
Ecosystem Level	0.977 [0.948, 0.993]
Final (with Seagrass)	0.973 [0.939, 0.993]

Iterations summarised: 300

Evaluation Coverage (Median [95% interval])

Stage	Evaluated samples	Coverage
Ecosystem	21110.5 [12263.4, 32612.0]	99.6% [99.0%, 99.9%]
Final	21126.5 [12271.1, 32620.8]	99.6% [99.1%, 99.9%]

Test samples per iteration: 21228.0 [12389.9, 32731.2]

Per-Class Accuracy (Final Model)

Class	User's Accuracy	Producer's Accuracy	F1 Score
Class 0	0.985 [0.954, 0.997]	0.998 [0.994, 1.000]	0.990 ± 0.006
Class 1	0.978 [0.812, 1.000]	0.956 [0.841, 1.000]	0.947 ± 0.040
			0.740 ±

Class	User's Accuracy	Producer's Accuracy	F1 Score
Tidal flat	0.858 [0.000, 1.000]	0.873 [0.000, 1.000]	0.264
Mangrove	0.992 [0.000, 1.000]	0.897 [0.000, 1.000]	0.824 ± 0.284
Saltmarsh	0.858 [0.608, 0.975]	0.632 [0.294, 0.904]	0.699 ± 0.120
Seagrass	0.867 [0.104, 1.000]	0.896 [0.306, 1.000]	0.779 ± 0.201
Salt flat	0.000 [0.000, 1.000]	0.000 [0.000, 1.000]	0.144 ± 0.297

Year-specific Summaries

Year 2021

Stage	Accuracy
Ecosystem Level	0.977 [0.947, 0.994]
Final (with Seagrass)	0.973 [0.939, 0.994]

Coverage (Median [95% interval])

Stage	Evaluated samples	Coverage
Ecosystem	10589.0 [6185.8, 16362.0]	99.7% [99.1%, 99.9%]
Final	10589.0 [6186.8, 16364.6]	99.7% [99.2%, 99.9%]

Test samples per iteration: 10635.5 [6218.0, 16417.3]

Per-class Accuracy (Final Model)

Class	User's Accuracy	Producer's Accuracy	F1 Score
Class 0	0.985 [0.953, 0.997]	0.998 [0.994, 1.000]	0.990 ± 0.006
Class 1	0.980 [0.819, 1.000]	0.962 [0.851, 1.000]	0.950 ± 0.040
Tidal flat	0.863 [0.000, 1.000]	0.857 [0.000, 1.000]	0.738 ± 0.264
Mangrove	1.000 [0.000, 1.000]	0.895 [0.000, 1.000]	0.817 ± 0.286
Saltmarsh	0.862 [0.617, 0.981]	0.629 [0.296, 0.898]	0.698 ± 0.120
Seagrass	0.884 [0.097, 1.000]	0.902 [0.313, 1.000]	0.791 ± 0.203
Salt flat	0.000 [0.000, 1.000]	0.000 [0.000, 1.000]	0.128 ± 0.297

Year 2022

Stage	Accuracy
Ecosystem Level	0.977 [0.950, 0.994]
Final (with Seagrass)	0.972 [0.939, 0.993]

Coverage (Median [95% interval])

Stage	Evaluated samples	Coverage
Ecosystem	10493.0 [6109.6, 16253.4]	99.5% [98.7%, 99.9%]
Final	10497.0 [6115.9, 16259.0]	99.5% [98.8%, 99.9%]

Test samples per iteration: 10570.0 [6168.1, 16313.9]

Per-class Accuracy (Final Model)

Class	User's Accuracy	Producer's Accuracy	F1 Score
Class 0	0.985 [0.954, 0.998]	0.997 [0.993, 1.000]	0.990 ± 0.006
Class 1	0.978 [0.805, 1.000]	0.949 [0.820, 1.000]	0.945 ± 0.042
Tidal flat	0.847 [0.000, 1.000]	0.898 [0.000, 1.000]	0.740 ± 0.266
Mangrove	0.987 [0.000, 1.000]	0.900 [0.000, 1.000]	0.831 ± 0.286
Saltmarsh	0.864 [0.613, 0.972]	0.631 [0.268, 0.905]	0.699 ± 0.129
Seagrass	0.850 [0.110, 1.000]	0.875 [0.291, 1.000]	0.768 ± 0.203
Salt flat	0.000 [0.000, 1.000]	0.000 [0.000, 1.000]	0.159 ± 0.305

Region: 2

All Data

Overall Accuracy (Median [95% interval])

Stage	Accuracy
Ecosystem Level	0.949 [0.919, 0.972]
Final (with Seagrass)	0.913 [0.877, 0.943]

Iterations summarised: 300

Evaluation Coverage (Median [95% interval])

Stage	Evaluated samples	Coverage
Ecosystem	23288.0 [17085.5, 29963.2]	98.6% [97.8%, 99.3%]
Final	23289.5 [17091.2, 29973.8]	98.7% [97.8%, 99.3%]

Test samples per iteration: 23582.5 [17327.7, 30291.5]

Per-Class Accuracy (Final Model)

Class	User's Accuracy	Producer's Accuracy	F1 Score

Class	User's Accuracy	Producer's Accuracy	F1 Score
Class 0	0.924 [0.848, 0.976]	0.976 [0.914, 0.995]	0.946 ± 0.018
Class 1	0.983 [0.938, 0.999]	0.993 [0.969, 1.000]	0.985 ± 0.011
Tidal flat	0.780 [0.641, 0.909]	0.928 [0.839, 0.980]	0.843 ± 0.044
Mangrove	0.971 [0.933, 0.995]	0.978 [0.934, 0.993]	0.971 ± 0.012
Saltmarsh	0.808 [0.537, 0.951]	0.573 [0.417, 0.777]	0.661 ± 0.069
Seagrass	0.883 [0.746, 0.969]	0.668 [0.433, 0.827]	0.742 ± 0.076
Salt flat	0.977 [0.888, 1.000]	0.981 [0.926, 1.000]	0.971 ± 0.020

Year-specific Summaries

Year 2021

Stage	Accuracy
Ecosystem Level	0.949 [0.920, 0.972]
Final (with Seagrass)	0.915 [0.880, 0.944]

Coverage (Median [95% interval])

Stage	Evaluated samples	Coverage
Ecosystem	11649.0 [8556.9, 15010.8]	98.7% [97.8%, 99.4%]
Final	11649.0 [8560.5, 15015.6]	98.8% [97.9%, 99.4%]

Test samples per iteration: 11795.0 [8669.7, 15150.5]

Per-class Accuracy (Final Model)

Class	User's Accuracy	Producer's Accuracy	F1 Score
Class 0	0.920 [0.840, 0.975]	0.977 [0.932, 0.995]	0.945 ± 0.018
Class 1	0.987 [0.937, 1.000]	0.994 [0.969, 1.000]	0.986 ± 0.012
Tidal flat	0.800 [0.655, 0.925]	0.922 [0.816, 0.977]	0.850 ± 0.043
Mangrove	0.977 [0.941, 0.997]	0.974 [0.927, 0.992]	0.972 ± 0.012
Saltmarsh	0.807 [0.587, 0.948]	0.571 [0.407, 0.782]	0.661 ± 0.069
Seagrass	0.870 [0.741, 0.962]	0.693 [0.458, 0.867]	0.762 ± 0.073
Salt flat	0.976 [0.875, 1.000]	0.979 [0.931, 1.000]	0.971 ± 0.021

Year 2022

Stage	Accuracy
Ecosystem Level	0.949 [0.917, 0.973]
Final (with Seagrass)	0.911 [0.871, 0.945]

Coverage (Median [95% interval])

Stage	Evaluated samples	Coverage
Ecosystem	11639.0 [8528.6, 14966.4]	98.6% [97.7%, 99.3%]
Final	11640.5 [8530.7, 14970.2]	98.6% [97.7%, 99.3%]

Test samples per iteration: 11787.5 [8658.0, 15141.0]

Per-class Accuracy (Final Model)

Class	User's Accuracy	Producer's Accuracy	F1 Score
Class 0	0.927 [0.858, 0.979]	0.976 [0.896, 0.995]	0.947 ± 0.018
Class 1	0.981 [0.938, 0.999]	0.994 [0.966, 1.000]	0.984 ± 0.011
Tidal flat	0.765 [0.612, 0.904]	0.936 [0.849, 0.990]	0.836 ± 0.047
Mangrove	0.965 [0.923, 0.994]	0.983 [0.938, 0.997]	0.971 ± 0.013
Saltmarsh	0.811 [0.511, 0.953]	0.570 [0.416, 0.785]	0.660 ± 0.078
Seagrass	0.894 [0.753, 0.980]	0.634 [0.381, 0.806]	0.720 ± 0.086
Salt flat	0.976 [0.892, 1.000]	0.980 [0.915, 1.000]	0.971 ± 0.019

Region: 4

All Data

Overall Accuracy (Median [95% interval])

Stage	Accuracy
Ecosystem Level	0.949 [0.917, 0.980]
Final (with Seagrass)	0.933 [0.902, 0.968]

Iterations summarised: 300

Evaluation Coverage (Median [95% interval])

Stage	Evaluated samples	Coverage
Ecosystem	10069.5 [5949.0, 15296.0]	98.7% [97.0%, 99.7%]
Final	10069.5 [5949.0, 15296.0]	98.7% [97.0%, 99.7%]

Test samples per iteration: 10223.0 [6005.1, 15541.2]

Per-Class Accuracy (Final Model)

Class	User's Accuracy	Producer's Accuracy	F1 Score
Class 0	0.967 [0.915, 0.994]	0.980 [0.946, 0.998]	0.971 ± 0.014
Class 1	0.978 [0.835, 1.000]	0.899 [0.622, 1.000]	0.917 ± 0.065
Tidal flat	0.845 [0.671, 0.970]	0.982 [0.930, 1.000]	0.902 ± 0.046
Mangrove	0.993 [0.907, 1.000]	0.990 [0.941, 1.000]	0.984 ± 0.015
Saltmarsh	0.864 [0.582, 0.980]	0.805 [0.501, 0.951]	0.809 ± 0.091
Seagrass	0.929 [0.066, 1.000]	0.768 [0.059, 1.000]	0.747 ± 0.226
Salt flat	0.919 [0.719, 0.996]	0.907 [0.778, 0.999]	0.902 ± 0.046

Year-specific Summaries

Year 2021

Stage	Accuracy
Ecosystem Level	0.947 [0.912, 0.979]
Final (with Seagrass)	0.932 [0.899, 0.970]

Coverage (Median [95% interval])

Stage	Evaluated samples	Coverage
Ecosystem	5050.0 [2984.9, 7667.2]	98.8% [97.4%, 99.8%]
Final	5050.0 [2984.9, 7667.2]	98.8% [97.4%, 99.8%]

Test samples per iteration: 5111.5 [3002.6, 7770.6]

Per-class Accuracy (Final Model)

Class	User's Accuracy	Producer's Accuracy	F1 Score
Class 0	0.966 [0.913, 0.994]	0.980 [0.943, 0.998]	0.970 ± 0.014
Class 1	0.981 [0.853, 1.000]	0.887 [0.612, 1.000]	0.914 ± 0.069
Tidal flat	0.841 [0.651, 0.977]	0.981 [0.924, 1.000]	0.899 ± 0.048
Mangrove	0.993 [0.915, 1.000]	0.988 [0.937, 1.000]	0.984 ± 0.014
Saltmarsh	0.854 [0.579, 0.979]	0.821 [0.517, 0.962]	0.811 ± 0.090
Seagrass	0.934 [0.065, 1.000]	0.778 [0.065, 1.000]	0.753 ±

Class	User's Accuracy	Producer's Accuracy	0.222 F1 Score
Salt flat	0.923 [0.725, 1.000]	0.885 [0.741, 0.997]	0.894 ± 0.051

Year 2022

Stage	Accuracy
Ecosystem Level	0.950 [0.919, 0.981]
Final (with Seagrass)	0.936 [0.904, 0.969]

Coverage (Median [95% interval])

Stage	Evaluated samples	Coverage
Ecosystem	5026.0 [2964.0, 7638.8]	98.5% [96.4%, 99.7%]
Final	5026.0 [2964.0, 7638.8]	98.5% [96.4%, 99.7%]

Test samples per iteration: 5111.5 [3002.6, 7770.6]

Per-class Accuracy (Final Model)

Class	User's Accuracy	Producer's Accuracy	F1 Score
Class 0	0.969 [0.917, 0.995]	0.981 [0.943, 0.999]	0.972 ± 0.014
Class 1	0.976 [0.825, 1.000]	0.904 [0.628, 1.000]	0.921 ± 0.062
Tidal flat	0.847 [0.668, 0.970]	0.983 [0.934, 1.000]	0.904 ± 0.045
Mangrove	0.993 [0.900, 1.000]	0.990 [0.950, 1.000]	0.984 ± 0.016
Saltmarsh	0.875 [0.602, 0.991]	0.790 [0.481, 0.944]	0.807 ± 0.096
Seagrass	0.930 [0.067, 1.000]	0.753 [0.050, 1.000]	0.740 ± 0.231
Salt flat	0.913 [0.718, 0.994]	0.930 [0.814, 1.000]	0.910 ± 0.044

Region: 1

All Data

Overall Accuracy (Median [95% interval])

Stage	Accuracy
Ecosystem Level	0.950 [0.910, 0.973]
Final (with Seagrass)	0.946 [0.906, 0.969]

Iterations summarised: 300

Evaluation Coverage (Median [95% interval])

Stage	Evaluated samples	Coverage
Ecosystem	21984.0 [14370.8, 31180.0]	98.9% [96.3%, 99.6%]
Final	21984.0 [14370.8, 31180.0]	98.9% [96.3%, 99.6%]

Test samples per iteration: 22374.0 [14506.5, 32233.0]

Per-Class Accuracy (Final Model)

Class	User's Accuracy	Producer's Accuracy	F1 Score
Class 0	0.943 [0.856, 0.980]	0.986 [0.949, 0.997]	0.959 ± 0.017
Class 1	0.971 [0.904, 1.000]	0.950 [0.806, 1.000]	0.953 ± 0.032
Tidal flat	0.874 [0.671, 0.979]	0.947 [0.859, 0.986]	0.898 ± 0.051
Mangrove	0.989 [0.960, 0.999]	0.982 [0.963, 0.995]	0.984 ± 0.007
Saltmarsh	0.909 [0.512, 0.989]	0.634 [0.348, 0.821]	0.716 ± 0.113
Seagrass	0.000 [0.000, 0.933]	0.000 [0.000, 0.033]	0.007 ± 0.046
Salt flat	0.983 [0.904, 0.999]	0.994 [0.959, 1.000]	0.981 ± 0.015

Year-specific Summaries

Year 2021

Stage	Accuracy
Ecosystem Level	0.952 [0.914, 0.973]
Final (with Seagrass)	0.949 [0.909, 0.971]

Coverage (Median [95% interval])

Stage	Evaluated samples	Coverage
Ecosystem	11027.5 [7184.9, 15793.0]	99.0% [98.0%, 99.7%]
Final	11027.5 [7184.9, 15793.0]	99.0% [98.0%, 99.7%]

Test samples per iteration: 11187.0 [7253.2, 16116.5]

Per-class Accuracy (Final Model)

Class	User's Accuracy	Producer's Accuracy	F1 Score
Class 0	0.946 [0.862, 0.980]	0.985 [0.955, 0.998]	0.960 ± 0.016
Class 1	0.972 [0.909, 1.000]	0.952 [0.808, 1.000]	0.954 ± 0.032

Class	User's Accuracy	Producer's Accuracy	F1 Score
Tidal flat	0.878 [0.668, 0.979]	0.951 [0.866, 0.988]	0.900 ± 0.052
Mangrove	0.993 [0.968, 1.000]	0.979 [0.959, 0.997]	0.984 ± 0.007
Saltmarsh	0.892 [0.518, 0.991]	0.661 [0.358, 0.849]	0.728 ± 0.117
Seagrass	0.000 [0.000, 0.000]	0.000 [0.000, 0.000]	0.003 ± 0.028
Salt flat	0.985 [0.937, 1.000]	0.992 [0.955, 1.000]	0.984 ± 0.010

Year 2022

Stage	Accuracy
Ecosystem Level	0.948 [0.904, 0.972]
Final (with Seagrass)	0.945 [0.901, 0.968]

Coverage (Median [95% interval])

Stage	Evaluated samples	Coverage
Ecosystem	10959.0 [7185.9, 15573.1]	98.9% [94.4%, 99.6%]
Final	10959.0 [7185.9, 15573.1]	98.9% [94.4%, 99.6%]

Test samples per iteration: 11187.0 [7253.2, 16116.5]

Per-class Accuracy (Final Model)

Class	User's Accuracy	Producer's Accuracy	F1 Score
Class 0	0.940 [0.849, 0.980]	0.987 [0.944, 0.997]	0.957 ± 0.017
Class 1	0.969 [0.896, 1.000]	0.951 [0.806, 1.000]	0.951 ± 0.032
Tidal flat	0.875 [0.672, 0.980]	0.943 [0.843, 0.987]	0.896 ± 0.051
Mangrove	0.985 [0.951, 0.999]	0.985 [0.967, 0.996]	0.983 ± 0.008
Saltmarsh	0.923 [0.500, 0.992]	0.609 [0.339, 0.791]	0.703 ± 0.111
Seagrass	0.000 [0.000, 1.000]	0.000 [0.000, 0.066]	0.010 ± 0.065
Salt flat	0.983 [0.855, 1.000]	0.996 [0.964, 1.000]	0.978 ± 0.023

Region: 3

All Data

Overall Accuracy (Median [95% interval])

Stage	Accuracy

Stage	Accuracy
Ecosystem Level	0.923 [0.856, 0.958]
Final (with Seagrass)	0.878 [0.794, 0.928]

Iterations summarised: 300

Evaluation Coverage (Median [95% interval])

Stage	Evaluated samples	Coverage
Ecosystem	10168.0 [6627.1, 14946.7]	99.3% [98.0%, 99.7%]
Final	10171.0 [6632.2, 14956.5]	99.3% [98.0%, 99.7%]

Test samples per iteration: 10221.0 [6674.9, 15140.9]

Per-Class Accuracy (Final Model)

Class	User's Accuracy	Producer's Accuracy	F1 Score
Class 0	0.895 [0.657, 0.971]	0.956 [0.799, 0.991]	0.904 ± 0.048
Class 1	0.949 [0.736, 1.000]	0.867 [0.680, 0.997]	0.886 ± 0.055
Tidal flat	0.620 [0.393, 0.843]	0.870 [0.711, 0.977]	0.709 ± 0.084
Mangrove	0.989 [0.961, 1.000]	0.990 [0.973, 1.000]	0.988 ± 0.006
Saltmarsh	0.904 [0.455, 0.983]	0.764 [0.605, 0.913]	0.794 ± 0.084
Seagrass	0.891 [0.664, 0.983]	0.685 [0.296, 0.897]	0.741 ± 0.124
Salt flat	0.970 [0.894, 0.999]	0.980 [0.917, 1.000]	0.967 ± 0.020

Year-specific Summaries

Year 2021

Stage	Accuracy
Ecosystem Level	0.926 [0.871, 0.958]
Final (with Seagrass)	0.883 [0.793, 0.930]

Coverage (Median [95% interval])

Stage	Evaluated samples	Coverage
Ecosystem	5084.5 [3318.8, 7483.2]	99.3% [97.9%, 99.9%]
Final	5087.5 [3319.8, 7489.1]	99.4% [97.9%, 99.9%]

Test samples per iteration: 5110.5 [3337.4, 7570.4]

Per-class Accuracy (Final Model)

Class	User's Accuracy	Producer's Accuracy	F1 Score
Class 0	0.904 [0.656, 0.981]	0.955 [0.829, 0.990]	0.910 ± 0.050
Class 1	0.932 [0.685, 1.000]	0.863 [0.676, 1.000]	0.880 ± 0.058
Tidal flat	0.618 [0.379, 0.855]	0.869 [0.698, 0.979]	0.709 ± 0.089
Mangrove	0.990 [0.963, 1.000]	0.986 [0.969, 1.000]	0.987 ± 0.007
Saltmarsh	0.894 [0.526, 0.986]	0.777 [0.585, 0.931]	0.810 ± 0.078
Seagrass	0.906 [0.680, 1.000]	0.669 [0.267, 0.904]	0.736 ± 0.132
Salt flat	0.968 [0.882, 1.000]	0.985 [0.926, 1.000]	0.969 ± 0.020

Year 2022

Stage	Accuracy
Ecosystem Level	0.919 [0.845, 0.961]
Final (with Seagrass)	0.875 [0.785, 0.926]

Coverage (Median [95% interval])

Stage	Evaluated samples	Coverage
Ecosystem	5087.5 [3316.7, 7463.6]	99.2% [97.9%, 99.8%]
Final	5087.5 [3320.8, 7467.6]	99.2% [97.9%, 99.8%]

Test samples per iteration: 5110.5 [3337.4, 7570.4]

Per-class Accuracy (Final Model)

Class	User's Accuracy	Producer's Accuracy	F1 Score
Class 0	0.888 [0.654, 0.969]	0.963 [0.741, 0.998]	0.899 ± 0.050
Class 1	0.966 [0.775, 1.000]	0.853 [0.665, 0.997]	0.893 ± 0.056
Tidal flat	0.622 [0.400, 0.834]	0.867 [0.694, 0.975]	0.710 ± 0.082
Mangrove	0.988 [0.944, 1.000]	0.993 [0.976, 1.000]	0.989 ± 0.007
Saltmarsh	0.916 [0.411, 0.994]	0.752 [0.576, 0.903]	0.777 ± 0.096
Seagrass	0.883 [0.606, 0.990]	0.696 [0.302, 0.915]	0.745 ± 0.123
Salt flat	0.972 [0.891, 1.000]	0.973 [0.902, 1.000]	0.965 ± 0.021

Methodology Notes

- **User's Accuracy**: The probability that a pixel classified as a given class actually belongs to that class (precision)
- **Producer's Accuracy**: The probability that a pixel of a given class is correctly classified (recall)
- **F1 Score**: Harmonic mean of user's and producer's accuracy
- **Ecosystem Level**: Accuracy before seagrass refinement
- **Final Level**: Accuracy after applying seagrass model to refine tidal flat predictions
- **Spatial Stratification**: Reduces optimistic bias from spatial autocorrelation by ensuring train/test separation