# Covariate Models

## Width

| effect | component | group | term | estimate | std.error | conf.low | conf.high |
| --- | --- | --- | --- | --- | --- | --- | --- |
| fixed | cond | NA | (Intercept) | 43.05 | 7.94 | 27.22 | 58.80 |
| fixed | cond | NA | tierT3 | 8.58 | 7.67 | -6.31 | 23.94 |
| ran\_pars | cond | site | sd\_\_(Intercept) | 14.72 | 3.29 | 9.60 | 22.51 |
| ran\_pars | cond | year | sd\_\_(Intercept) | 7.77 | 8.04 | 0.29 | 29.76 |
| ran\_pars | cond | year:season | sd\_\_(Intercept) | 3.45 | 3.17 | 0.13 | 11.55 |
| ran\_pars | cond | Residual | sd\_\_Observation | 20.57 | 1.22 | 18.17 | 22.98 |

## Emergent Height

| effect | component | group | term | estimate | std.error | conf.low | conf.high |
| --- | --- | --- | --- | --- | --- | --- | --- |
| fixed | cond | NA | (Intercept) | 3.41 | 0.45 | 2.28 | 4.18 |
| fixed | cond | NA | hu\_(Intercept) | 0.97 | 0.18 | 0.61 | 1.33 |
| fixed | cond | NA | tierT3 | -0.29 | 0.13 | -0.56 | -0.03 |
| fixed | cond | NA | hu\_tierT3 | -1.23 | 0.24 | -1.71 | -0.76 |
| ran\_pars | cond | site | sd\_\_(Intercept) | 0.18 | 0.08 | 0.03 | 0.35 |
| ran\_pars | cond | year | sd\_\_(Intercept) | 0.44 | 0.59 | 0.01 | 2.14 |
| ran\_pars | cond | year:season | sd\_\_(Intercept) | 0.37 | 0.23 | 0.13 | 0.96 |
| ran\_pars | cond | Residual | sd\_\_Observation | 0.43 | 0.03 | 0.37 | 0.49 |

## Shaded Area

| effect | component | group | term | estimate | std.error | conf.low | conf.high |
| --- | --- | --- | --- | --- | --- | --- | --- |
| fixed | cond | NA | (Intercept) | -0.37 | 0.50 | -1.34 | 0.69 |
| fixed | cond | NA | phi\_(Intercept) | 0.85 | 0.11 | 0.64 | 1.05 |
| fixed | cond | NA | zoi\_(Intercept) | -2.63 | 0.33 | -3.32 | -2.03 |
| fixed | cond | NA | coi\_(Intercept) | 0.14 | 0.67 | -1.17 | 1.47 |
| fixed | cond | NA | tierT3 | -0.29 | 0.34 | -0.97 | 0.37 |
| fixed | cond | NA | phi\_tierT3 | 0.46 | 0.16 | 0.15 | 0.78 |
| fixed | cond | NA | zoi\_tierT3 | 1.04 | 0.39 | 0.31 | 1.82 |
| fixed | cond | NA | coi\_tierT3 | -3.52 | 1.22 | -6.16 | -1.38 |
| ran\_pars | cond | site | sd\_\_(Intercept) | 0.63 | 0.15 | 0.40 | 0.98 |
| ran\_pars | cond | year | sd\_\_(Intercept) | 0.58 | 0.64 | 0.03 | 2.35 |
| ran\_pars | cond | year:season | sd\_\_(Intercept) | 0.24 | 0.22 | 0.01 | 0.78 |

## pH

| effect | component | group | term | estimate | std.error | conf.low | conf.high |
| --- | --- | --- | --- | --- | --- | --- | --- |
| fixed | cond | NA | (Intercept) | 6.34 | 1.21 | 3.94 | 8.85 |
| fixed | cond | NA | tierT3 | -0.30 | 0.17 | -0.65 | 0.03 |
| ran\_pars | cond | site | sd\_\_(Intercept) | 0.29 | 0.08 | 0.17 | 0.48 |
| ran\_pars | cond | year | sd\_\_(Intercept) | 2.29 | 1.22 | 0.75 | 5.39 |
| ran\_pars | cond | year:season | sd\_\_(Intercept) | 0.40 | 0.39 | 0.07 | 1.50 |
| ran\_pars | cond | Residual | sd\_\_Observation | 0.60 | 0.05 | 0.50 | 0.69 |

## Salinity

| effect | component | group | term | estimate | std.error | conf.low | conf.high |
| --- | --- | --- | --- | --- | --- | --- | --- |
| fixed | cond | NA | (Intercept) | 0.43 | 0.13 | 0.20 | 0.64 |
| fixed | cond | NA | tierT3 | -0.01 | 0.07 | -0.15 | 0.12 |
| ran\_pars | cond | site | sd\_\_(Intercept) | 0.13 | 0.03 | 0.09 | 0.20 |
| ran\_pars | cond | year | sd\_\_(Intercept) | 0.12 | 0.22 | 0.01 | 0.70 |
| ran\_pars | cond | year:season | sd\_\_(Intercept) | 0.02 | 0.02 | 0.00 | 0.06 |
| ran\_pars | cond | Residual | sd\_\_Observation | 0.08 | 0.01 | 0.06 | 0.09 |

## Floating Cover

| effect | component | group | term | estimate | std.error | conf.low | conf.high |
| --- | --- | --- | --- | --- | --- | --- | --- |
| fixed | cond | NA | (Intercept) | -0.02 | 0.80 | -1.63 | 1.64 |
| fixed | cond | NA | phi\_(Intercept) | 0.68 | 0.16 | 0.35 | 0.99 |
| fixed | cond | NA | zoi\_(Intercept) | 0.19 | 0.17 | -0.14 | 0.52 |
| fixed | cond | NA | coi\_(Intercept) | -2.72 | 0.47 | -3.73 | -1.89 |
| fixed | cond | NA | tierT3 | -0.98 | 0.32 | -1.64 | -0.37 |
| fixed | cond | NA | phi\_tierT3 | 0.85 | 0.22 | 0.42 | 1.29 |
| fixed | cond | NA | zoi\_tierT3 | -0.19 | 0.22 | -0.63 | 0.25 |
| fixed | cond | NA | coi\_tierT3 | -0.59 | 0.75 | -2.10 | 0.83 |
| ran\_pars | cond | site | sd\_\_(Intercept) | 0.49 | 0.19 | 0.14 | 0.91 |
| ran\_pars | cond | year | sd\_\_(Intercept) | 1.05 | 0.91 | 0.06 | 3.41 |
| ran\_pars | cond | year:season | sd\_\_(Intercept) | 0.70 | 0.54 | 0.06 | 2.05 |

## Bank Hieght

| effect | component | group | term | estimate | std.error | conf.low | conf.high |
| --- | --- | --- | --- | --- | --- | --- | --- |
| fixed | cond | NA | (Intercept) | 4.44 | 0.47 | 3.53 | 5.35 |
| fixed | cond | NA | hu\_(Intercept) | -0.58 | 0.17 | -0.92 | -0.25 |
| fixed | cond | NA | tierT3 | 0.03 | 0.09 | -0.14 | 0.20 |
| fixed | cond | NA | hu\_tierT3 | -1.10 | 0.27 | -1.64 | -0.58 |
| ran\_pars | cond | site | sd\_\_(Intercept) | 0.14 | 0.04 | 0.06 | 0.24 |
| ran\_pars | cond | year | sd\_\_(Intercept) | 0.54 | 0.60 | 0.03 | 2.23 |
| ran\_pars | cond | year:season | sd\_\_(Intercept) | 0.20 | 0.15 | 0.05 | 0.60 |
| ran\_pars | cond | Residual | sd\_\_Observation | 0.34 | 0.02 | 0.31 | 0.38 |

## Bank Cover

| effect | component | group | term | estimate | std.error | conf.low | conf.high |
| --- | --- | --- | --- | --- | --- | --- | --- |
| fixed | cond | NA | (Intercept) | -1.61 | 0.82 | -3.09 | 0.30 |
| fixed | cond | NA | phi\_(Intercept) | 1.52 | 0.16 | 1.20 | 1.82 |
| fixed | cond | NA | zoi\_(Intercept) | -0.55 | 0.17 | -0.89 | -0.22 |
| fixed | cond | NA | coi\_(Intercept) | -3.97 | 1.02 | -6.38 | -2.38 |
| fixed | cond | NA | tierT3 | -0.46 | 0.23 | -0.92 | -0.01 |
| fixed | cond | NA | phi\_tierT3 | 1.41 | 0.20 | 1.03 | 1.80 |
| fixed | cond | NA | zoi\_tierT3 | -1.13 | 0.27 | -1.67 | -0.60 |
| fixed | cond | NA | coi\_tierT3 | -1.14 | 2.38 | -6.79 | 2.66 |
| ran\_pars | cond | site | sd\_\_(Intercept) | 0.37 | 0.10 | 0.20 | 0.60 |
| ran\_pars | cond | year | sd\_\_(Intercept) | 1.23 | 0.92 | 0.32 | 3.67 |
| ran\_pars | cond | year:season | sd\_\_(Intercept) | 0.15 | 0.19 | 0.00 | 0.66 |

## Emergent Height

| effect | component | group | term | estimate | std.error | conf.low | conf.high |
| --- | --- | --- | --- | --- | --- | --- | --- |
| fixed | cond | NA | (Intercept) | -1.93 | 0.55 | -2.89 | -0.73 |
| fixed | cond | NA | phi\_(Intercept) | 1.68 | 0.29 | 1.10 | 2.22 |
| fixed | cond | NA | zoi\_(Intercept) | 1.00 | 0.19 | 0.64 | 1.37 |
| fixed | cond | NA | coi\_(Intercept) | -6.84 | 2.36 | -12.89 | -3.79 |
| fixed | cond | NA | tierT3 | -0.61 | 0.32 | -1.23 | 0.04 |
| fixed | cond | NA | phi\_tierT3 | 0.90 | 0.32 | 0.28 | 1.54 |
| fixed | cond | NA | zoi\_tierT3 | -1.26 | 0.24 | -1.74 | -0.79 |
| fixed | cond | NA | coi\_tierT3 | 0.75 | 3.17 | -5.48 | 7.53 |
| ran\_pars | cond | site | sd\_\_(Intercept) | 0.38 | 0.18 | 0.05 | 0.78 |
| ran\_pars | cond | year | sd\_\_(Intercept) | 0.53 | 0.67 | 0.02 | 2.37 |
| ran\_pars | cond | year:season | sd\_\_(Intercept) | 0.19 | 0.19 | 0.01 | 0.68 |

## Turbidity

| effect | component | group | term | estimate | std.error | conf.low | conf.high |
| --- | --- | --- | --- | --- | --- | --- | --- |
| fixed | cond | NA | (Intercept) | 0.56 | 0.16 | 0.27 | 0.84 |
| fixed | cond | NA | tierT3 | -0.02 | 0.08 | -0.18 | 0.15 |
| ran\_pars | cond | site | sd\_\_(Intercept) | 0.17 | 0.04 | 0.11 | 0.25 |
| ran\_pars | cond | year | sd\_\_(Intercept) | 0.15 | 0.25 | 0.01 | 0.84 |
| ran\_pars | cond | year:season | sd\_\_(Intercept) | 0.02 | 0.02 | 0.00 | 0.07 |
| ran\_pars | cond | Residual | sd\_\_Observation | 0.10 | 0.01 | 0.08 | 0.11 |

## Water Temperature

| effect | component | group | term | estimate | std.error | conf.low | conf.high |
| --- | --- | --- | --- | --- | --- | --- | --- |
| fixed | cond | NA | (Intercept) | 16.67 | 1.56 | 13.54 | 19.77 |
| fixed | cond | NA | tierT3 | 0.82 | 0.71 | -0.59 | 2.23 |
| ran\_pars | cond | site | sd\_\_(Intercept) | 1.38 | 0.30 | 0.92 | 2.08 |
| ran\_pars | cond | year | sd\_\_(Intercept) | 1.60 | 1.54 | 0.05 | 5.53 |
| ran\_pars | cond | year:season | sd\_\_(Intercept) | 2.92 | 1.08 | 1.53 | 5.65 |
| ran\_pars | cond | Residual | sd\_\_Observation | 1.55 | 0.11 | 1.34 | 1.78 |