GBF Enterococci GAMM

Model 1 Modified: Using generalized additive models (GAMs)

In addition to the original model of variables modeling Enterococci, GAMs are more flexible in that they can include non-linear relationships to let the data "speak for itself".

The following output is to be used in addition to the previous model, but also takes location directly into account and does not hold data constant given the sampling date.

```
## % latex table generated in R 3.3.3 by xtable 1.8-2 package
## % Sat Mar 17 09:14:02 2018
## \begin{table}[ht]
## \centering
## \begin{tabular}{lrrrr}
##    \hline
## A. parametric coefficients & Estimate & Std. Error & t-value & p-value \\
##   (Intercept) & 3.0747 & 0.4186 & 7.3456 & $<$ 0.0001 \\
##   TideFalling & 0.3535 & 0.1732 & 2.0407 & 0.0413 \\
##   TideSlack & 0.1643 & 0.2056 & 0.7993 & 0.4241 \\
##   TideRising & -0.0738 & 0.1706 & -0.4328 & 0.6652 \\
##   TideHigh & 0.5265 & 0.1945 & 2.7065 & 0.0068 \\
##   Site\_DescriptionClear Lake @ 18 Waterford Oak Lane & -0.4109 & 0.6134 & -0.6699 & 0.5029 \\
##   Site\_DescriptionClear Lake @ Bal Harbor Marina & 0.3150 & 0.5563 & 0.5663 & 0.5712 \\
##   Site\_DescriptionClear Lake @ Blue Dolphin Yachting Center & -0.0448 & 0.4972 & -0.0901 & 0.9282 \
##   Site\_DescriptionClear Lake @ Clear Lake Park Pier & 0.4986 & 0.4725 & 1.0552 & 0.2913 \\
##   Site\_DescriptionClear Lake @ Clear Lake Shores & 0.3009 & 0.4651 & 0.6468 & 0.5177 \\
##   Site\_DescriptionClear Lake @ Jarboe Bayou Park & 1.0894 & 0.4659 & 2.3382 & 0.0194 \\
##   Site\_DescriptionClear Lake @ Lakewood Yacht Club & 0.2413 & 0.4874 & 0.4952 & 0.6205 \\
##   Site\_DescriptionClear Lake @ Marina Del Sol & 0.2394 & 0.5521 & 0.4336 & 0.6646 \\
##   Site\_DescriptionClear Lake @ Nassau Bay Upper Bay Road & 1.3848 & 0.4934 & 2.8067 & 0.0050 \\
##   Site\_DescriptionClear Lake @ Nassau Bay Yacht Club & 1.3372 & 0.4938 & 2.7077 & 0.0068 \\
##   Site\_DescriptionClear Lake @ Portofino Harbor Marina & -1.0320 & 0.9919 & -1.0405 & 0.2981 \\
##   Site\_DescriptionClear Lake @ Sea Cove Ct & -0.2268 & 0.6201 & -0.3658 & 0.7145 \\
##   Site\_DescriptionClear Lake @ South Shore Harbor & -2.1646 & 1.8647 & -1.1608 & 0.2457 \\
##   Site\_DescriptionClear Lake @ Waterford Harbor Marina & -1.1052 & 0.6625 & -1.6683 & 0.0953 \\
##   Site\_DescriptionClear Lake @ Watergate Yachting Center & -0.3864 & 0.4710 & -0.8204 & 0.4120 \\
##   Site\_DescriptionGalveston Bay @ 1109 6th St. San Leon & -0.1589 & 0.4397 & -0.3614 & 0.7178 \\
##   Site\_DescriptionGalveston Bay @ Houston Yacht Club & -2.1765 & 1.1875 & -1.8328 & 0.0668 \\
##   Site\_DescriptionGalveston Bay @ Pier 21 & 3.9582 & 0.8581 & 4.6129 & $<$ 0.0001 \\
##   Site\_DescriptionGalveston Bay @ Pine Gully Park & 1.0044 & 0.5152 & 1.9495 & 0.0512 \\
##   Site\_DescriptionGalveston Bay @ Seascape Pier & 0.5746 & 0.4741 & 1.2118 & 0.2256 \\
##   Site\_DescriptionGalveston Bay @ Shoreacres Pier & -1.0757 & 0.5053 & -2.1288 & 0.0333 \\
##   Site\_DescriptionGalveston Bay @ Starboard Lane & -1.1212 & 1.1871 & -0.9445 & 0.3449 \\
##   Site\_DescriptionGalveston Bay @ Sunset Cove & -0.6403 & 0.4974 & -1.2874 & 0.1980 \\
##   Site\_DescriptionGalveston Bay @ Texas City Dike & -1.0137 & 0.4537 & -2.2343 & 0.0255 \\
##   Site\_DescriptionGalveston Bay @ Todville Road & 0.5274 & 0.5849 & 0.9017 & 0.3672 \\
##   Site\_DescriptionGalveston Bay @ Topwater Grill & 0.3634 & 0.4648 & 0.7819 & 0.4343 \\
##   Site\_DescriptionJones Bay @ Bayou Vista & 0.9807 & 0.4792 & 2.0467 & 0.0407 \\
##   Site\_DescriptionJones Bay @ Tiki Tom's RV Park & 0.8705 & 0.5337 & 1.6309 & 0.1029 \\
##   Site\_DescriptionMoses Lake @ Texas City Prairie Preserve & 0.4551 & 0.4328 & 1.0515 & 0.2930 \\
##   Site\_DescriptionOffatt's Bayou @ Sea Star Base Galveston & 0.7273 & 0.5476 & 1.3282 & 0.1841 \\
##   Site\_DescriptionWest Bay @ Eckert Bayou & 2.3946 & 0.5859 & 4.0874 & $<$ 0.0001 \\
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##   Site\_DescriptionWest Bay @ Jamaica Beach & 1.9428 & 0.7329 & 2.6509 & 0.0080 \\
##   Site\_DescriptionWest Bay @ Oak Bayou & -0.2376 & 0.4579 & -0.5189 & 0.6039 \\
##   Site\_DescriptionWest Bay @ Pirate's Cove & -0.7450 & 0.7052 & -1.0565 & 0.2908 \\
##   Site\_DescriptionWest Bay @ Sportsman Road & 0.0037 & 0.6359 & 0.0059 & 0.9953 \\
##   Site\_DescriptionWest Bay @ Sweetwater Lake & 1.2687 & 0.9653 & 1.3142 & 0.1888 \\
##   Site\_DescriptionWest Bay @ Sweetwater Preserve & 1.7459 & 0.5245 & 3.3286 & 0.0009 \\
##    \hline
## B. smooth terms & edf & Ref.df & F-value & p-value \\
##   s(Transparency) & 1.0025 & 1.0050 & 10.8718 & 0.0010 \\
##   s(Rain\_Accum) & 5.6078 & 6.6915 & 272.0568 & $<$ 0.0001 \\
##   s(Water\_Temp) & 4.5517 & 5.6165 & 61.4723 & $<$ 0.0001 \\
##   s(Avg\_DO) & 5.5200 & 6.6940 & 39.8573 & $<$ 0.0001 \\
##   s(Salinity) & 7.2474 & 8.2557 & 95.2199 & $<$ 0.0001 \\
##    \hline
## \end{tabular}
## \caption{ }
## \label{tab.gam}
## \end{table}
```
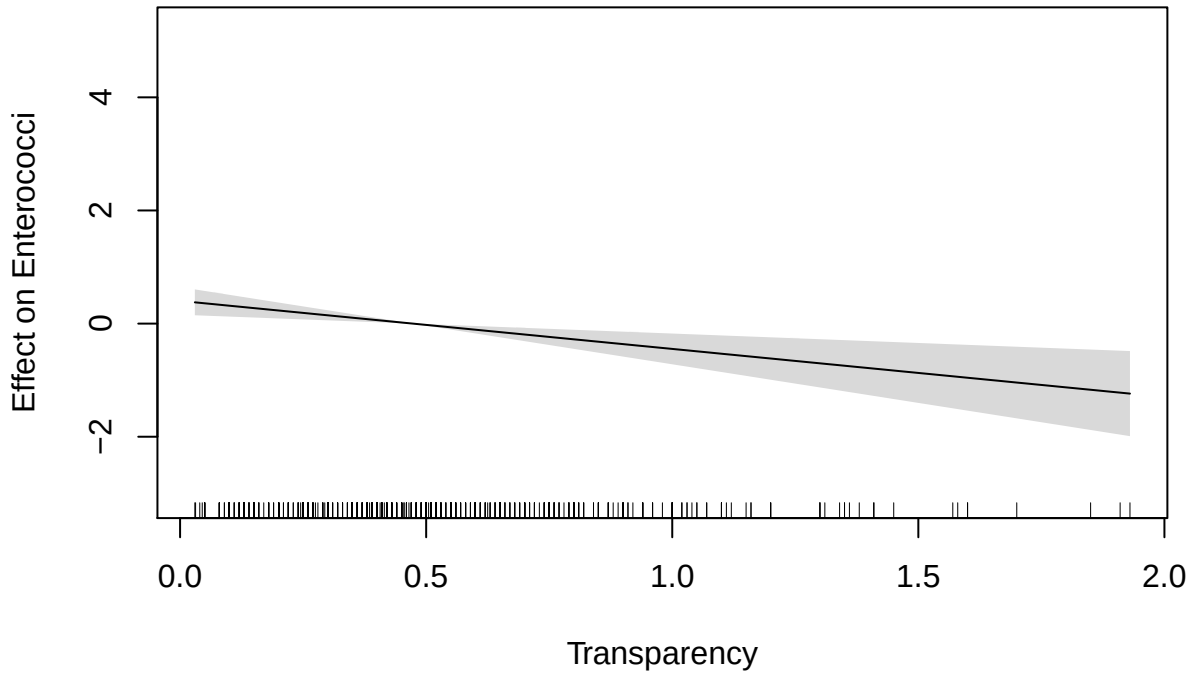
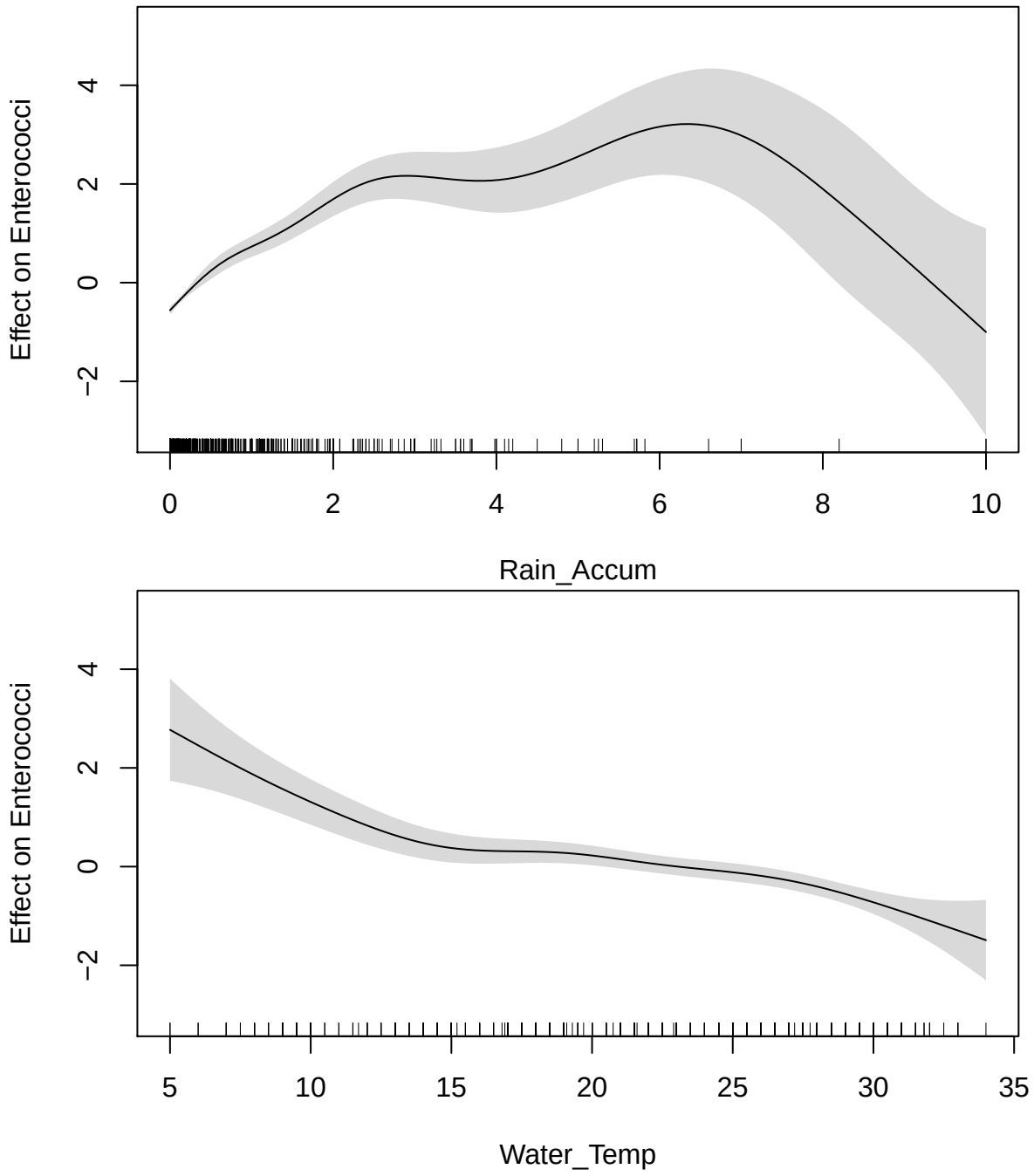
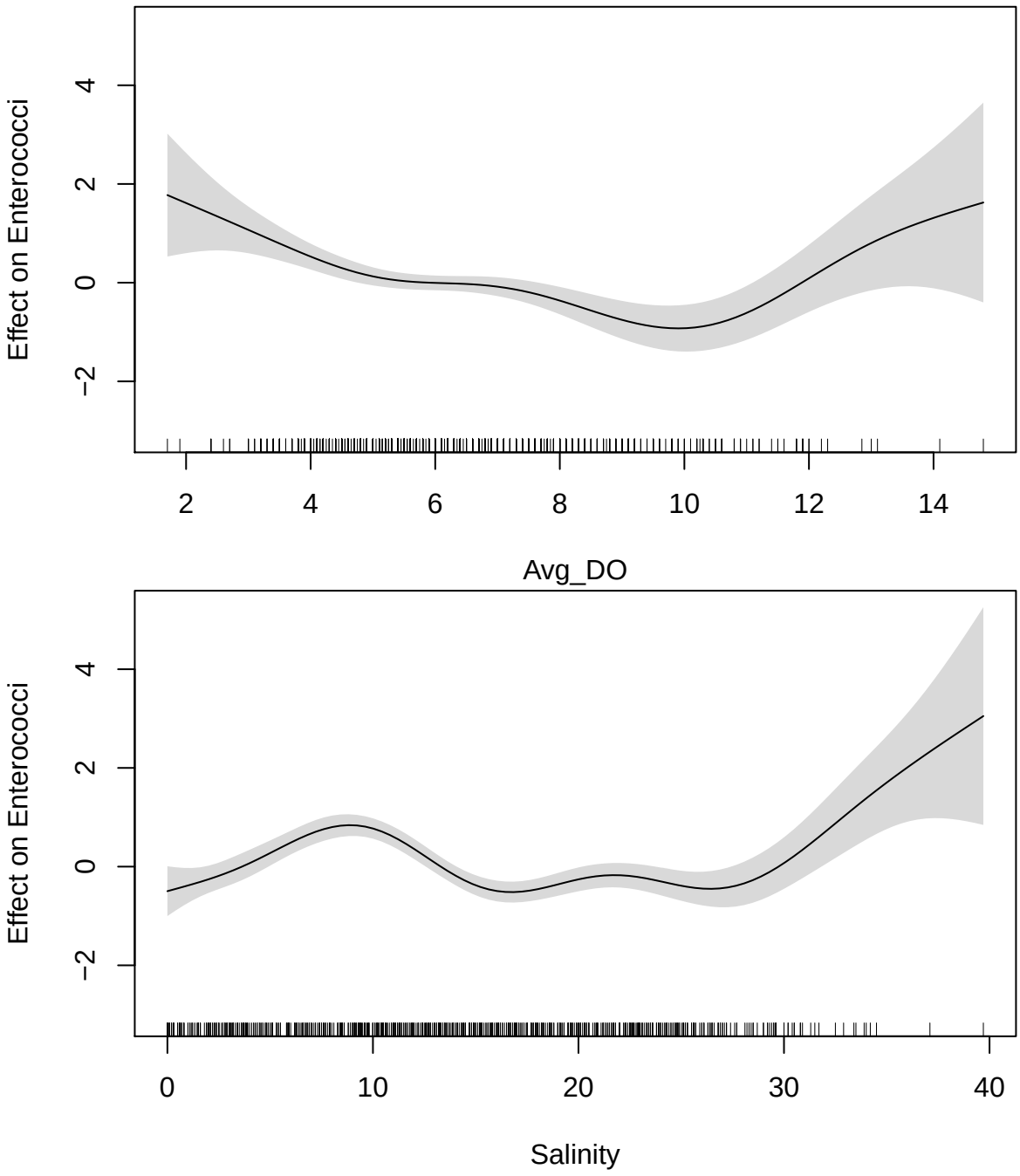

Plots for effects of smoothed variables on *Enterococcus*




Effect on Enterococci
4
2
0
−2
0
2
4
6
8
10
Rain_Accum
Effect on Enterococci
4
2
0
−2
5
10
15
20
25
30
35
Water_Temp


Effect on Enterococci
4
2
0
−2
2
4
6
8
10
12
14
Avg_DO
Effect on Enterococci
4
2
0
−2
0
10
20
30
40
Salinity