Flow-Stream Health Relationships Results

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Flow-Ecology Relationships

- The relationships enables you to evaluate the actual impact on the basin's health and compare multiple scenarios quickly
- Four flow-ecology metrics are used as performance measures to compare results form each planning scenario
  - **Mean Daily Flow (MA1)**
  - **Base Flow Index (ML17)**
  - **Duration of Low Flow (DL16)**
  - **Timing of Low Flow (TL1)**
- These were chosen based on relevance to water withdrawal and drought management; strength of relationship and distribution (most stream classes and basin area represented); and calculable from SWAM output

Key to Understanding the Results of the Surface Water Modeling Scenarios:

- Various **Performance measures** are provided, including:
  - Ecological health/risk (at certain nodes)

Mean daily flow (MA1): EDO10 NORTH FORK

Scenario	Current	Predicted	% change	Bio Metric	Change in Bio	SE
UIF	723.21	741.43	2.5%	Richness	1.9%	15
HD 2070	723.21	709.94	-1.8%	Richness	-1.4%	15
Full	723.21	622.04	-14.0%	Richness	-10.4%	15
BAU	723.21	721.48	-0.2%	Richness	-0.2%	15

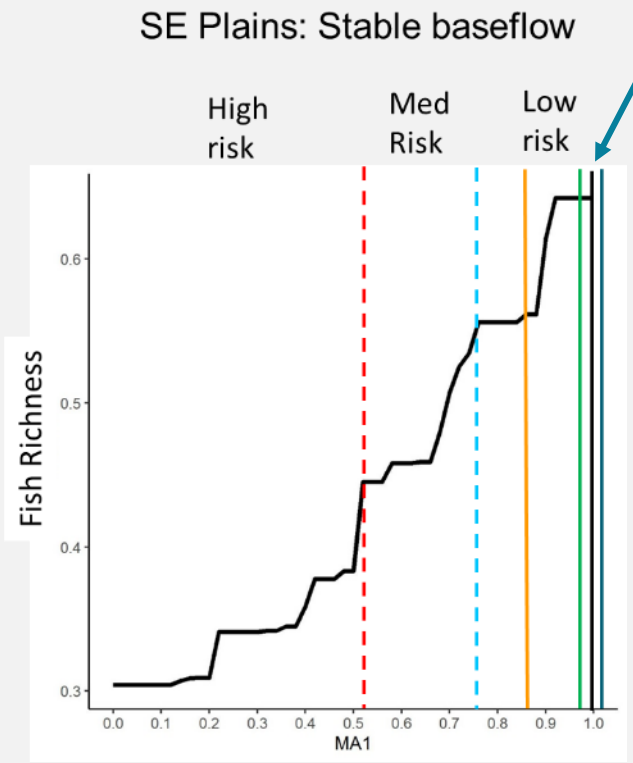
Standard Error

Current Use Scenario Mean Daily Flow

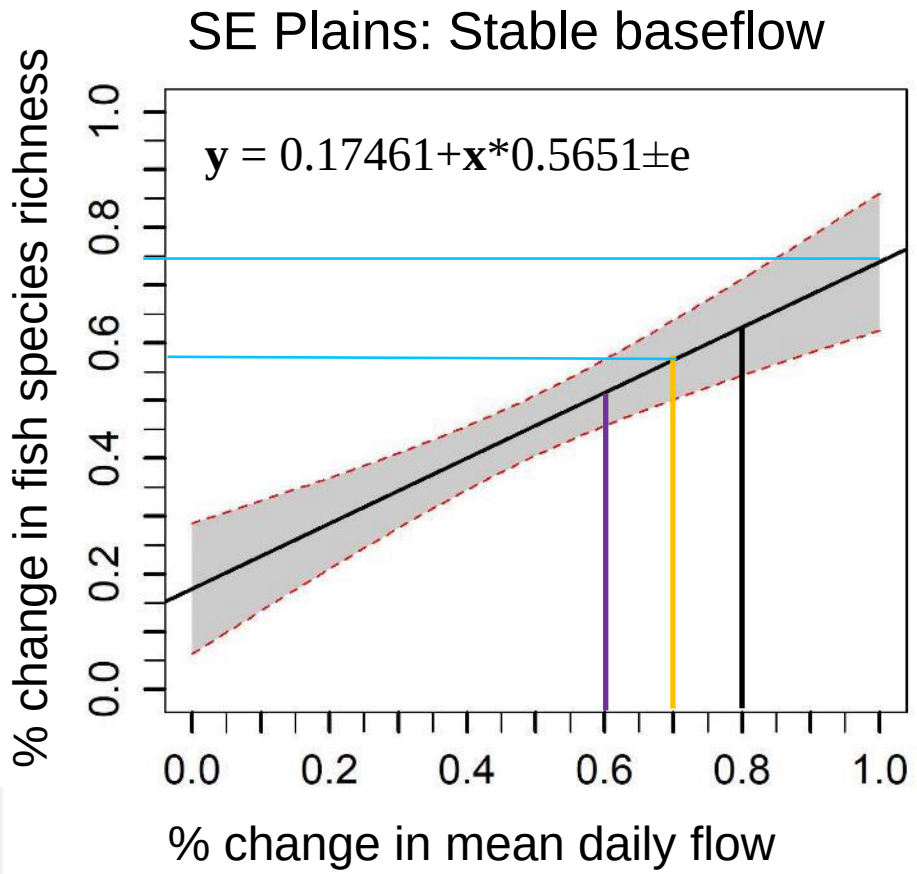
Scenario Mean Daily Flows

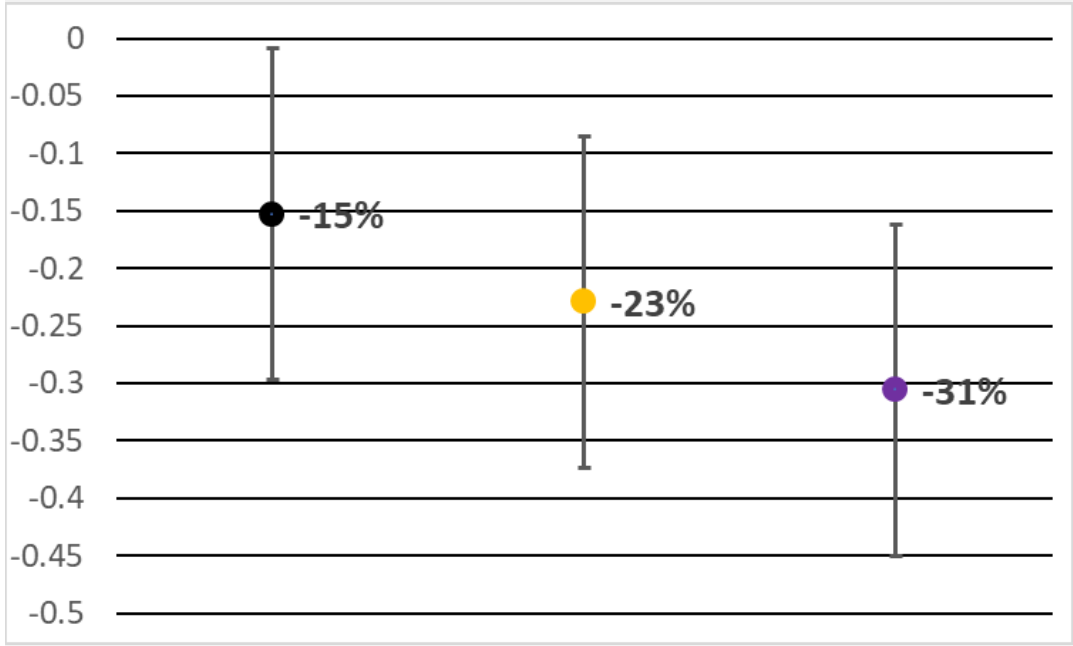
% Changes for each scenario are relative to the Current Use Scenario

Colored lines correspond to scenario results shown in the table



Dashed red and blue lines separate the low medium and high risk zones





Scenario	Current	Predicted	% change	Bio Metric	Change in Bio	SE
BAU	100	80	-20%	Richness	-15%	15
HD 2070	100	70	-30%	Richness	-23%	15
Full	100	60	-40%	Richness	-31%	15

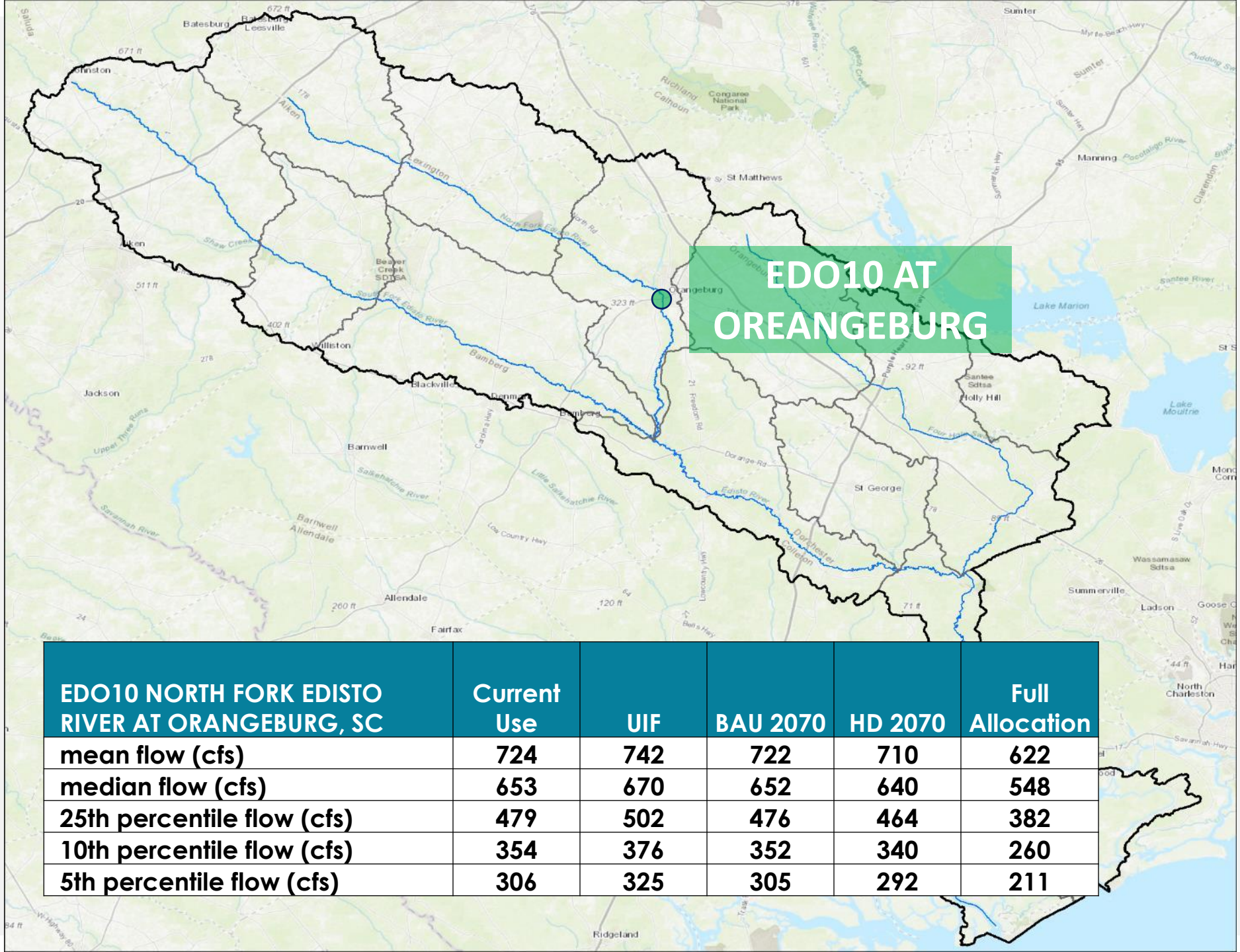
- Tolerant
- M-O inde

EDO10

HUC 10 Outlet

USGS Gage

Other Strategic Nodes



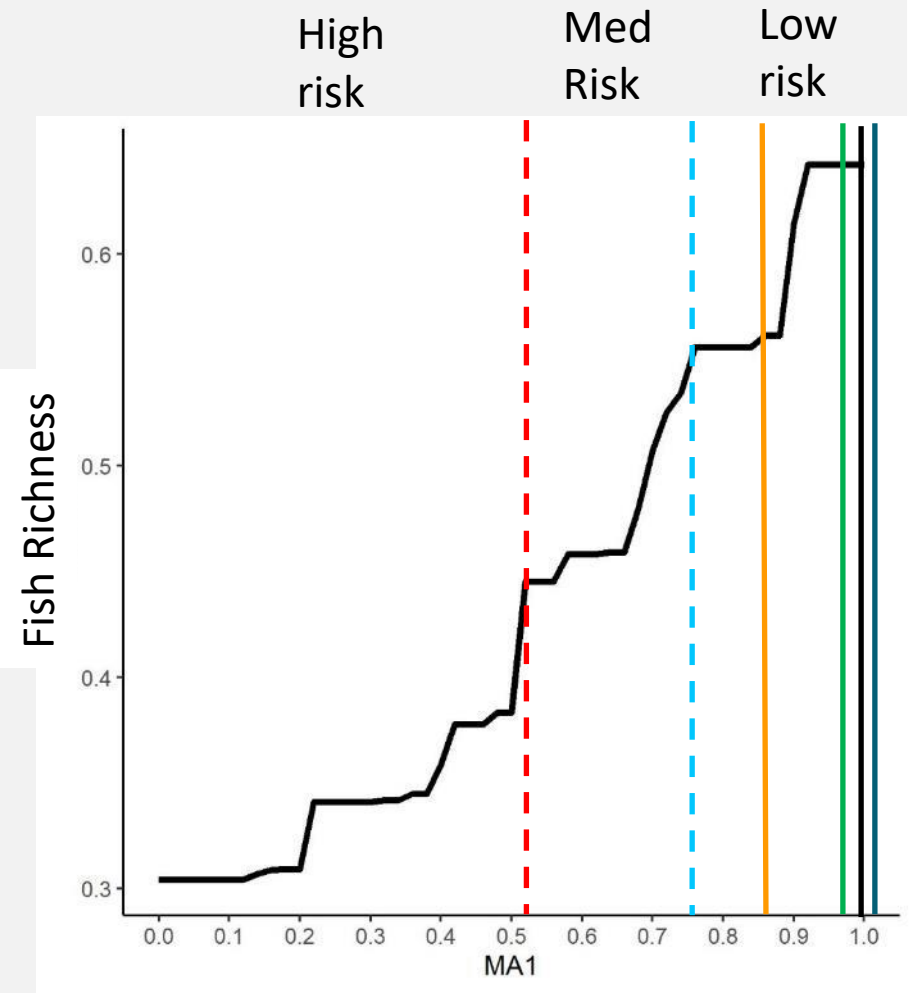
Flow Performance Measures

EDO10 NORTH FORK EDISTO RIVER AT ORANGEBURG, SC	Current Use	UIF	BAU 2070	HD 2070	Full Allocation
mean flow (cfs)	724	742	722	710	622
median flow (cfs)	653	670	652	640	548
25th percentile flow (cfs)	479	502	476	464	382
10th percentile flow (cfs)	354	376	352	340	260
5th percentile flow (cfs)	306	325	305	292	211

Mean daily flow (MA1): EDO10 NORTH FORK

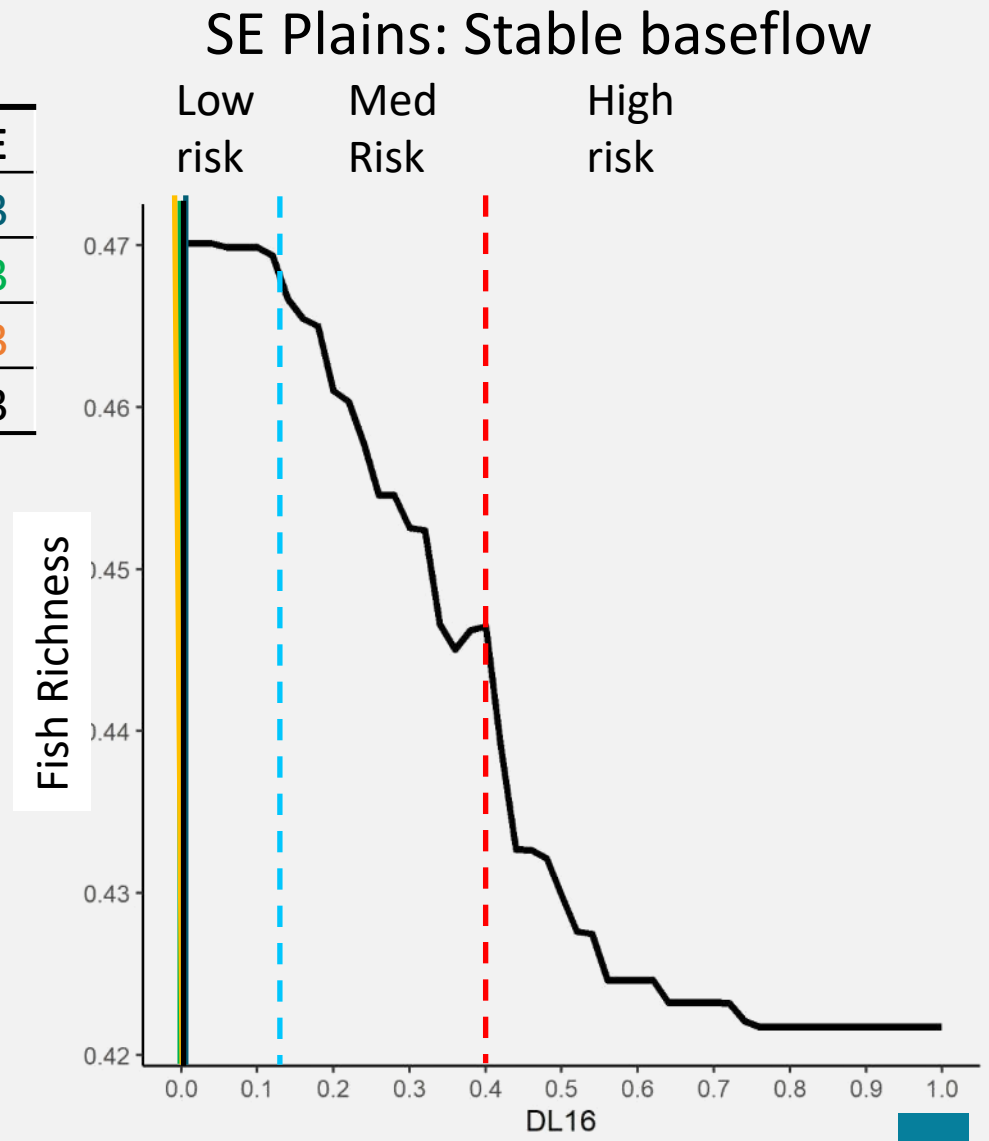
Scenario	Current	Predicted	% change	Bio Metric	Change in Bio	SE
UIF	723.21	741.43	2.5%	Richness	1.9%	15
HD 2070	723.21	709.94	-1.8%	Richness	-1.4%	15
Full	723.21	622.04	-14.0%	Richness	-10.4%	15
BAU	723.21	721.48	-0.2%	Richness	-0.2%	15

SE Plains: Stable baseflow



Duration of low flow (DL16): EDO10 NORTH FORK

Scenario	Current	Predicted	% change	Bio Metric	Change in Bio	SE
UIF	11.88	11.17	-6.0%	Richness	4.2%	13
HD 2070	11.88	11.54	-2.9%	Richness	2.0%	13
Full	11.88	11.15	-6.1%	Richness	4.3%	13
BAU	11.88	11.39	-4.1	Richness	2.9%	13



Timing of low flow (TL1): EDO10 NORTH FORK

SE Plains: Stable baseflow

Scenario	Current	Predicted	% change	Bio Metric	Change in Bio	SE
UIF	225	227	0.9%	Richness	-0.7%	15
HD 2070	225	223	-0.9%	Richness	0.7%	15
Full	225	226	1.8%	Richness	-1.4%	15
BAU	225	223	-0.4%	Richness	0.4%	15

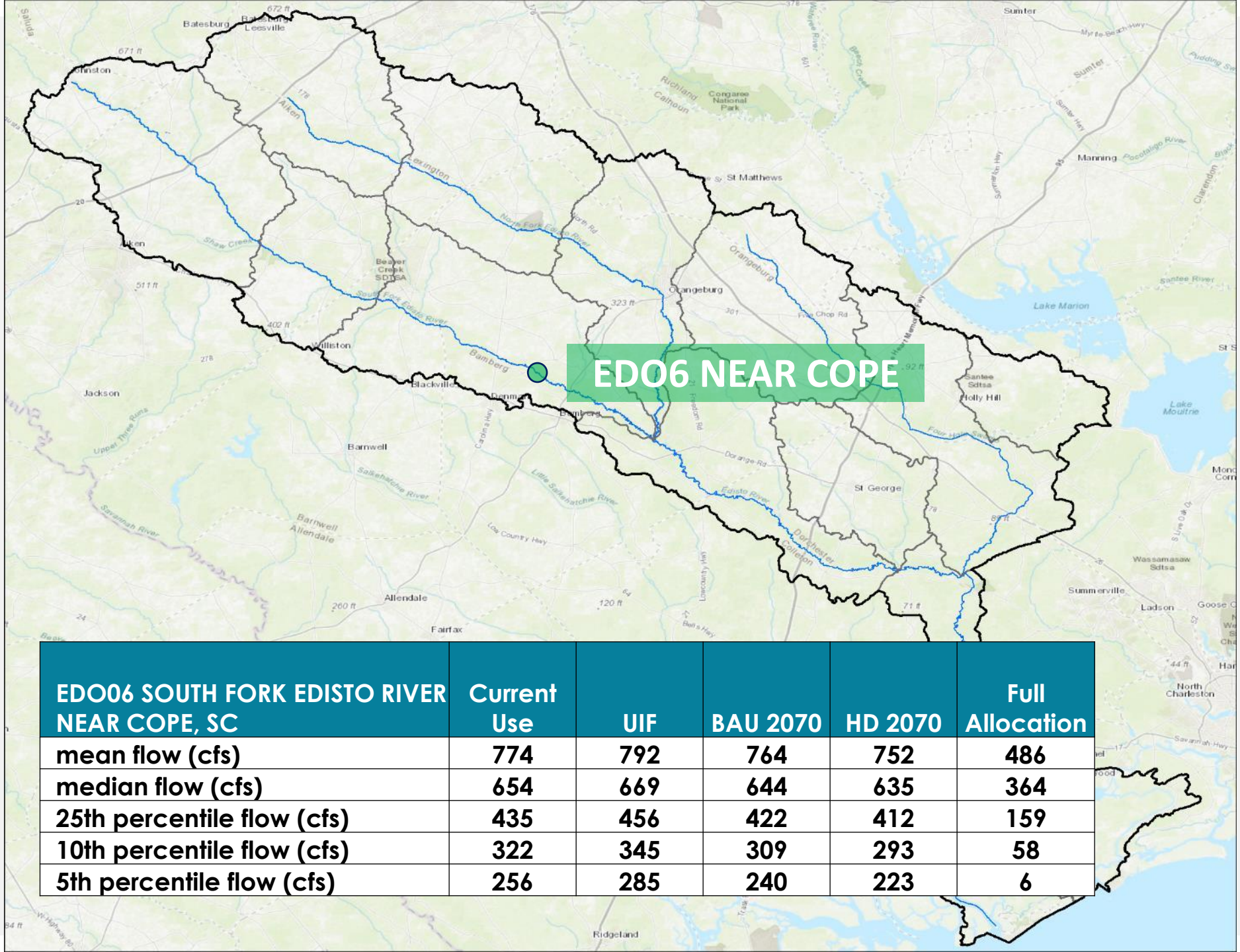
Risk plot for timing of low flow not generated

EDO6

HUC 10 Outlet

USGS Gage

Other Strategic Nodes



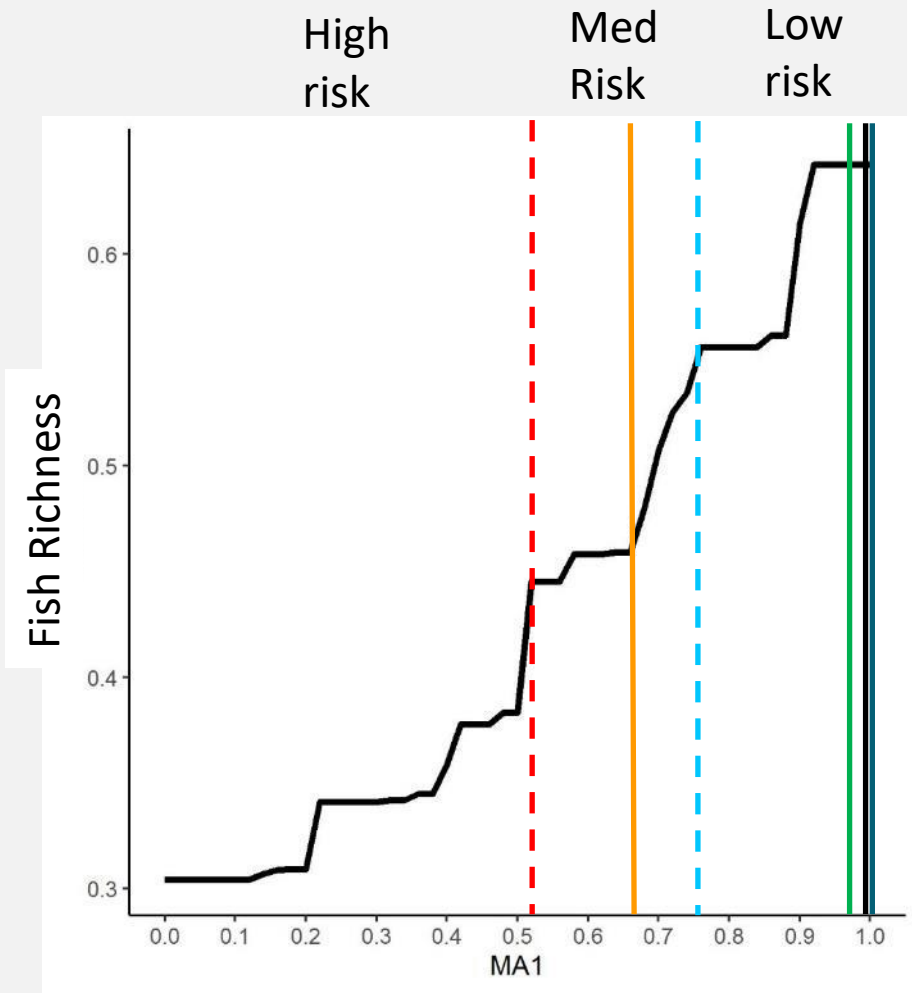
Flow Performance Measures

EDO06 SOUTH FORK EDISTO RIVER NEAR COPE, SC	Current Use	UIF	BAU 2070	HD 2070	Full Allocation
mean flow (cfs)	774	792	764	752	486
median flow (cfs)	654	669	644	635	364
25th percentile flow (cfs)	435	456	422	412	159
10th percentile flow (cfs)	322	345	309	293	58
5th percentile flow (cfs)	256	285	240	223	6

Mean daily flow (MA1): EDO06 SOUTH FORK

Scenario	Current	Predicted	% change	Bio Metric	Change in Bio	SE
UIF	772.96	791.43	2.4%	Richness	1.8%	15
HD 2070	772.96	750.83	-2.9%	Richness	-2.2%	15
Full	772.96	488.10	-36.9%	Richness	-28.2%	15
BAU	772.96	763.10	-1.3%	Richness	-1.0%	15

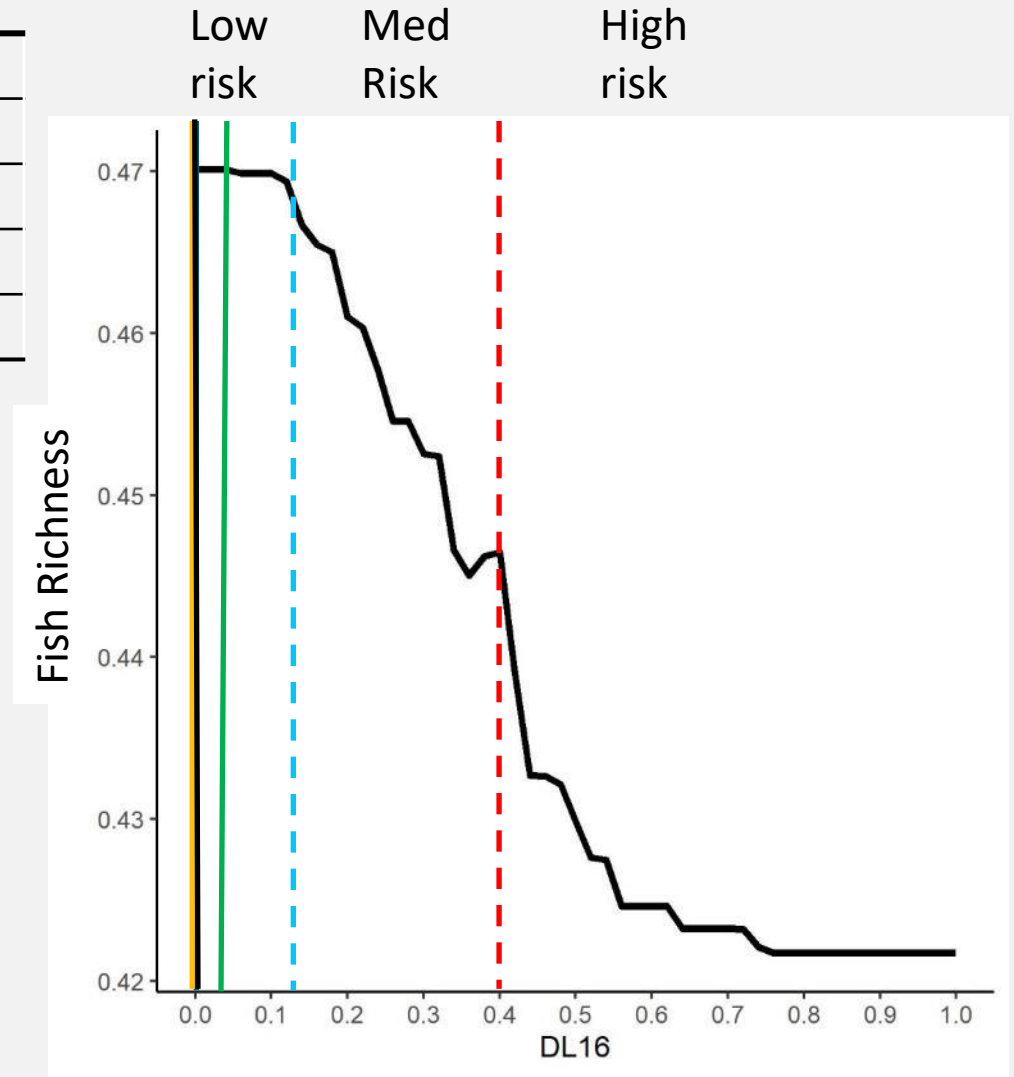
SE Plains: Stable baseflow



Duration of low flow (DL16): EDO06 SOUTH FORK

SE Plains: Stable baseflow

Scenario	Current	Predicted	% change	Bio Metric	Change in Bio	SE
UIF	12.08	11.83	-2.1%	Richness	1.5%	13
HD 2070	12.08	12.35	2.2%	Richness	-1.6%	13
Full	12.08	11.67	-3.4%	Richness	2.4%	13
BAU	12.08	12.14	0.5%	Richness	-0.4%	13



Timing of low flow (TL1):EDO06 SOUTH FORK

SE Plains: Stable baseflow

Scenario	Current	Predicted	% change	Bio Metric	Change in Bio	SE
UIF	219	228	4.1%	M-O index	-3.3%	15
HD 2070	219	209	-4.6%	M-O index	3.7%	15
Full	219	229	4.6%	M-O index	-3.7%	15
BAU	219	210	-4.1%	M-O index	3.3%	15

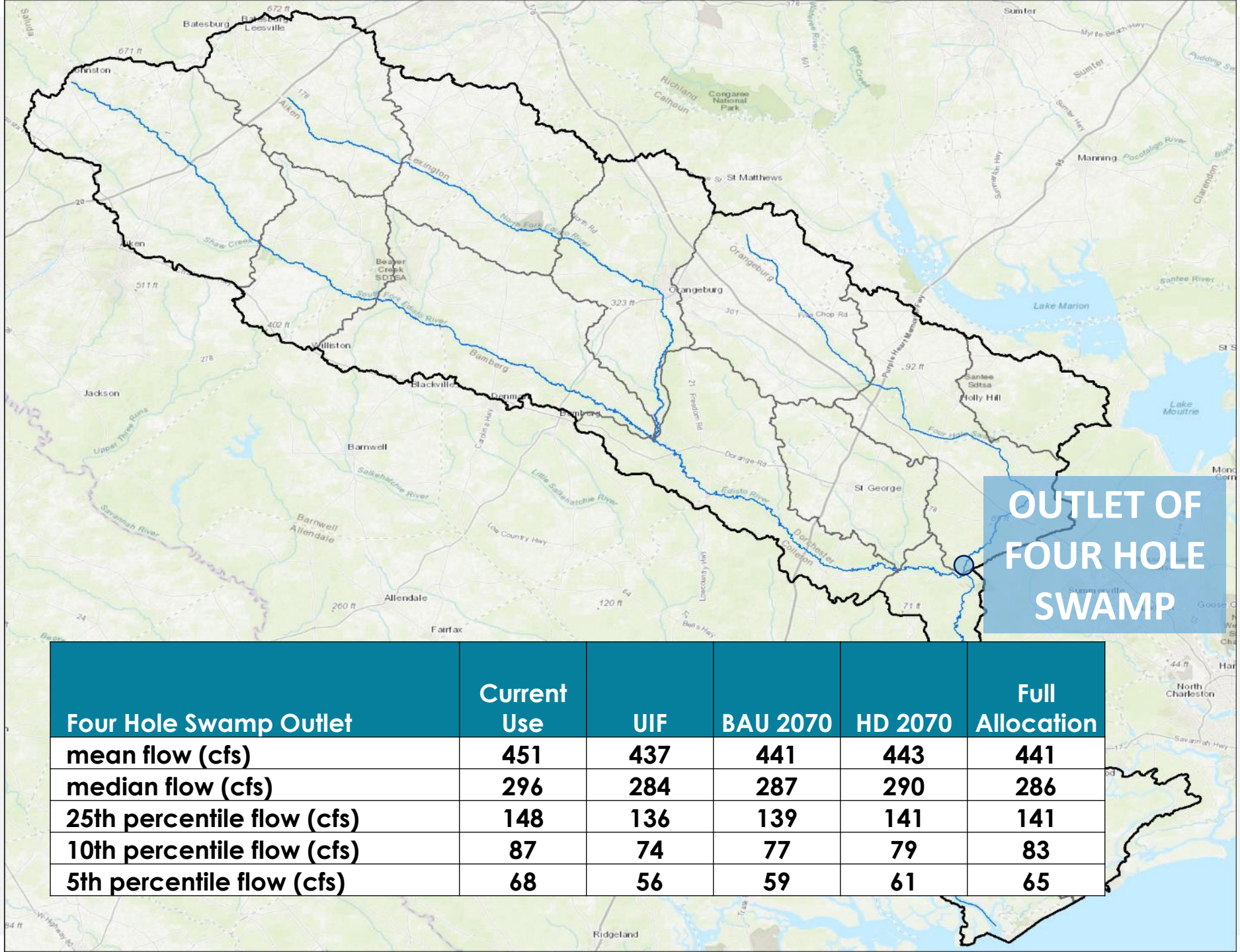
Risk plot for timing of low flow not generated

Outlet of Four Hole Swamp

HUC 10 Outlet

USGS Gage

Other Strategic Nodes

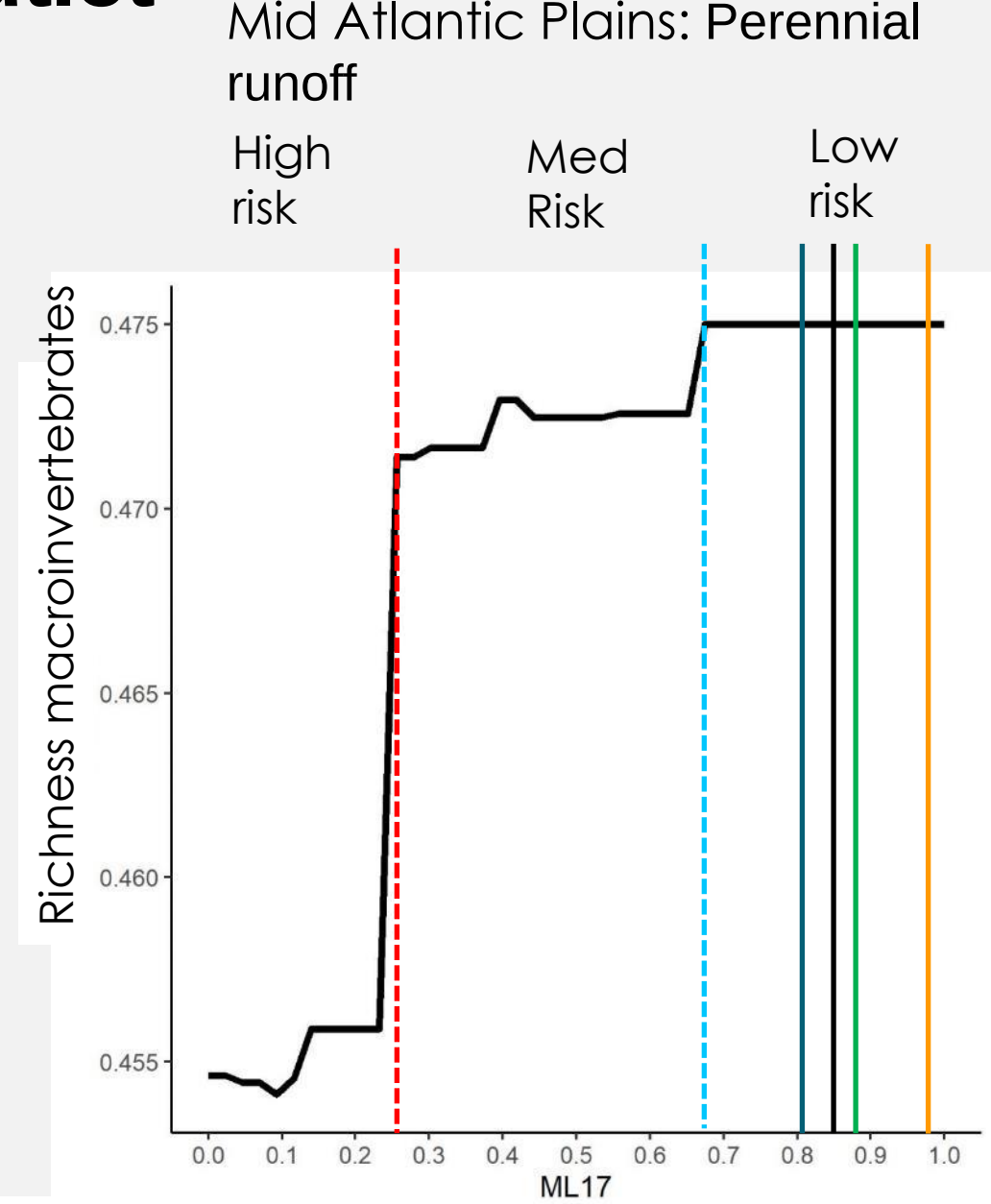


Flow Performance Measures

Four Hole Swamp Outlet	Current Use	UIF	BAU 2070	HD 2070	Full Allocation
mean flow (cfs)	451	437	441	443	441
median flow (cfs)	296	284	287	290	286
25th percentile flow (cfs)	148	136	139	141	141
10th percentile flow (cfs)	87	74	77	79	83
5th percentile flow (cfs)	68	56	59	61	65

Base flow (ML17): Four Hole Outlet

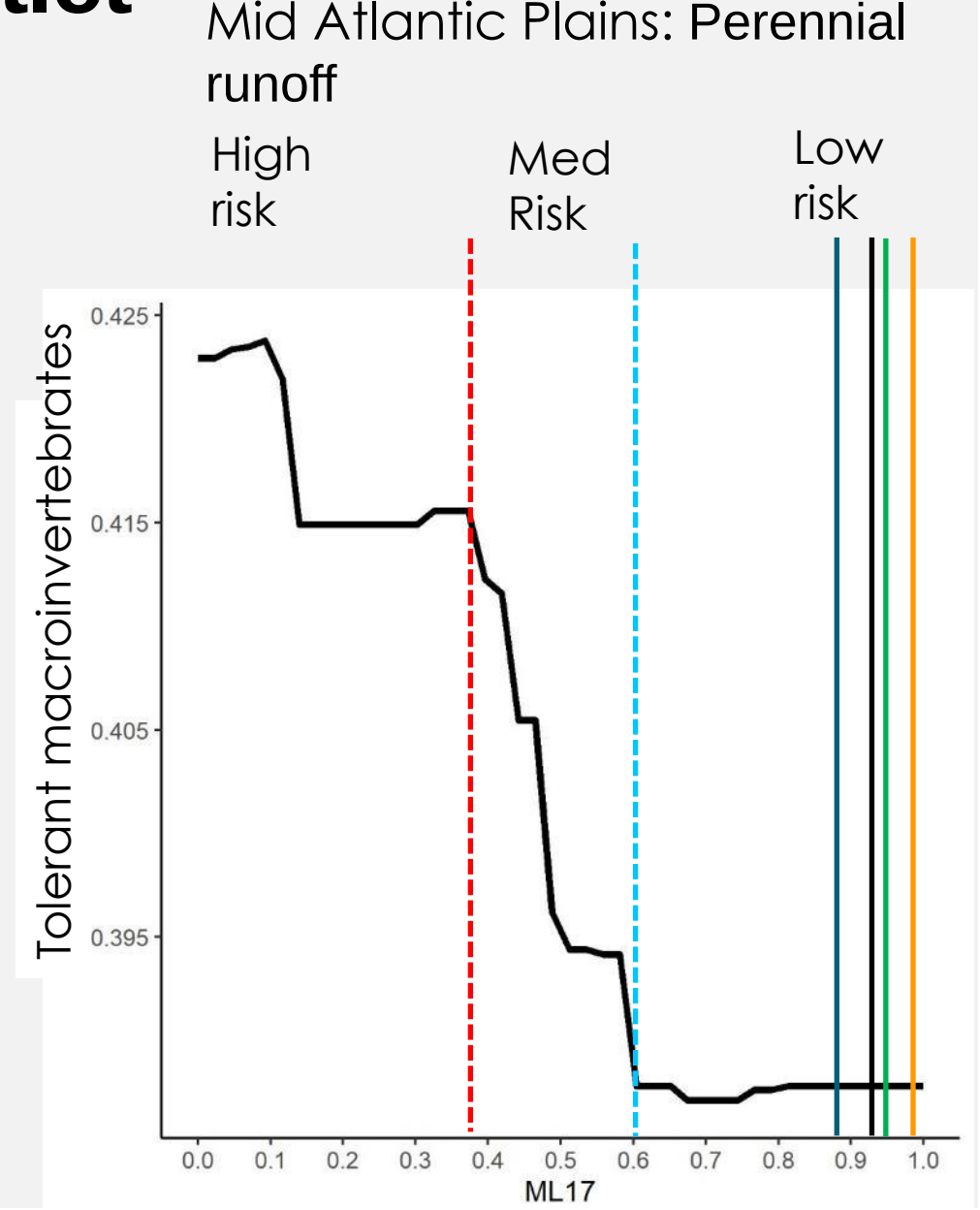
Scenario	Current	Predicted	% change	Bio Metric	Change in Bio	SE
UIF	0.177	0.142	-19.8%	Richness	-11.8%	10
HD 2070	0.177	0.157	-11.3%	Richness	-6.7%	10
Full	0.177	0.174	-1.7%	Richness	-1.0%	10
BAU	0.177	0.152	-14.1%	Richness	-8.4%	10



Flow-Ecology Performance Measures

Base flow (ML17): Four Hole Outlet

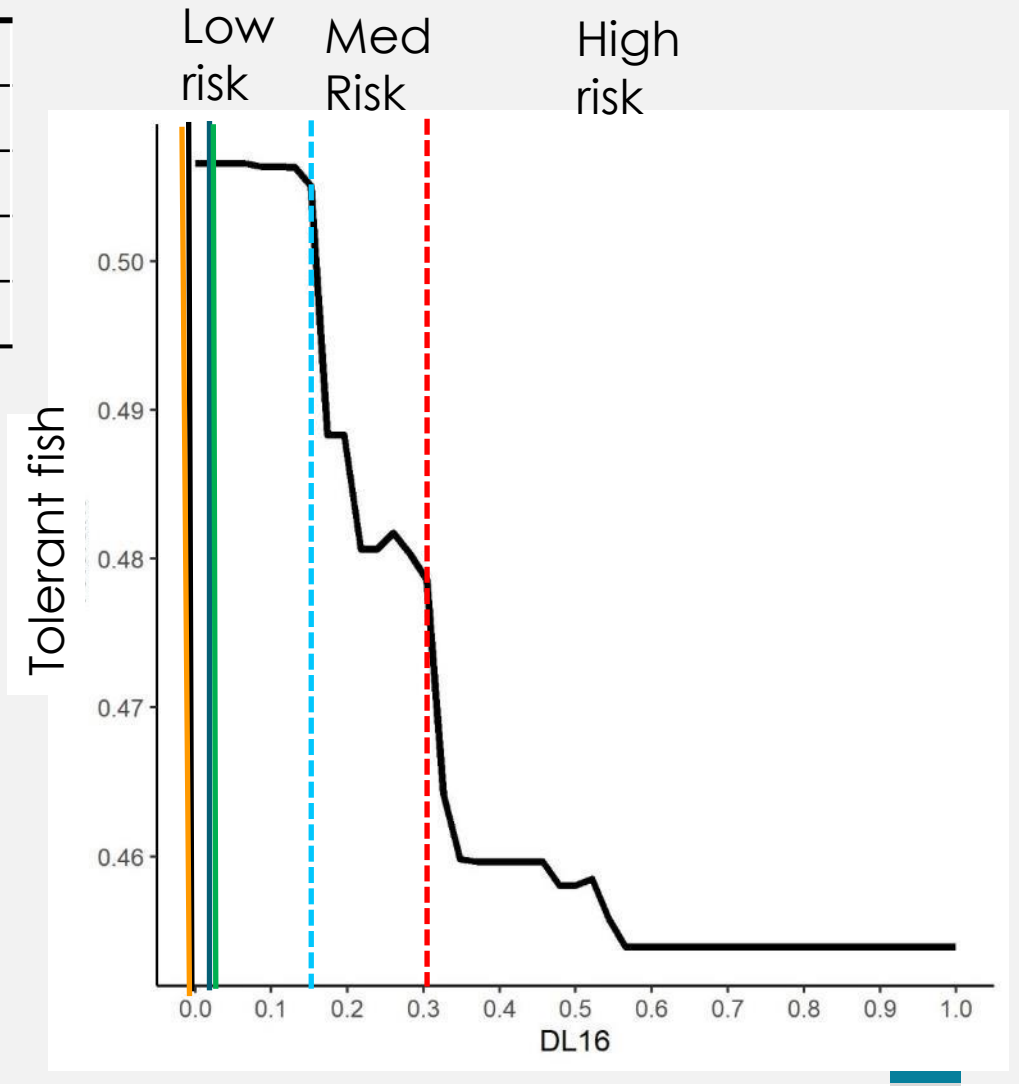
Scenario	Current	Predicted	% change	Bio Metric	Change in Bio	SE
UIF	0.177	0.142	-19.8%	Tolerant	11.4%	8.6
HD 2070	0.177	0.157	-11.3%	Tolerant	6.5%	8.6
Full	0.177	0.174	-1.7%	Tolerant	1.0%	8.6
BAU	0.177	0.125	-14.1%	Tolerant	8.1%	8.6



Flow-Ecology Performance Measures

Duration of low flow (DL16): Four Hole Outlet

Scenario	Current	Predicted	% change	Bio Metric	Change in Bio	SE
UIF	11.70	11.88	1.5%	Tolerant	-1.3%	19
HD 2070	11.70	11.92	1.9%	Tolerant	-1.6%	19
Full	11.70	11.38	-2.7%	Tolerant	2.2%	19
BAU	11.70	11.9	-1.9%	Tolerant	-1.6%	19



Timing of low flow (TL1): Four Hole Outlet

Scenario	Current	Predicted	% change	Bio Metric	Change in Bio	SE
UIF	236	237	0.4%	Tolerant	-0.3%	16
HD 2070	236	230	-0.4%	Tolerant	0.3%	16
Full	236	237	0.4%	Tolerant	-0.3%	16
BAU	236	235	-0.4%	Tolerant	0.3%	16

Mid Atlantic Plains: Perennial runoff

Risk plot for timing of low flow not generated

Summary

- In general, the study did not find high flow alteration for the selected nodes for the different planning scenarios, except for some metrics in the Fully Permitted and Registered (Full Allocation) Scenario.
- The study only evaluated four metrics and therefore does not rule out potential ecological health impacts resulting from other flow-related changes.

Discussion

1. What does the RBC see as the surface water issues in the basin?
2. Does the RBC want to identify:
   a. Reaches of Interest?
   b. Surface Water Conditions?