Oyster Activities and Restoration Initiatives within Louisiana

AOC Model Variables & Relationships

December 21, 2021

Alternative Oyster Culture (AOC) Model

- Proposed AOC model would consist of two components: **oyster viability** and **commercial viability**
- The components would be combined as noted below on the basis that both components are essential and are equally important

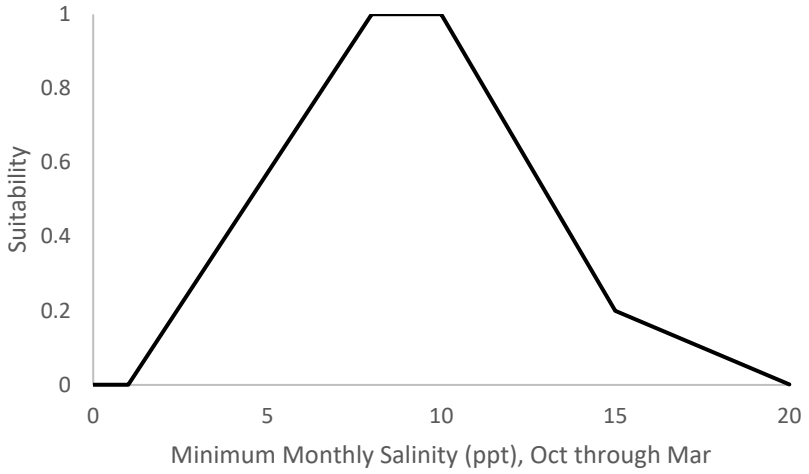
$$HSI = (SI_{OV} \times SI_{CV})^{1/2}$$

Oyster Viability

- The **oyster viability** component includes the following variables:
  - Minimum monthly mean salinity (SI_{MS})
    - Two relationships are used: one for cool months, October through March, and one for warm months, April through September
    - Cool and warm month SI values are combined geometrically
      - $SI_{MS} = (SI_{MS\ (cool)} \times SI_{MS\ (warm)})^{1/2}$
  - Mean annual salinity (SI_{AS})
  - The above variables are combined according to the equation below:

$$SI_{OV} = (SI_{MS} \times SI_{AS})^{½}$$

SI_{MS} = Minimum Monthly Mean Salinity



$SI_{MS\ (cool)}$ = 0.0, when $V_{MS\ (cool)} \leq 1$

$(0.1429 * V_{MS\ (cool)}) - 0.1429$, when $1 < V_{MS\ (cool)} < 8$

1.0, when $8 \leq V_{MS\ (cool)} < 10$

$(-0.16 * V_{MS\ (cool)}) + 2.6$, when $10 \leq V_{MS\ (cool)} < 15$

$(-0.04 * V_{MS\ (cool)}) + 0.8$, when $15 \leq V_{MS\ (cool)} < 20$

0.001, when $V_{MS\ (cool)} > 20$

$SI_{MS\ (warm)}$ = 0.0, when $V_{MS\ (warm)} \leq 2$

$(0.1668 * V_{MS\ (warm)}) - 0.33$, when $2 < V_{MS\ (warm)} < 8$

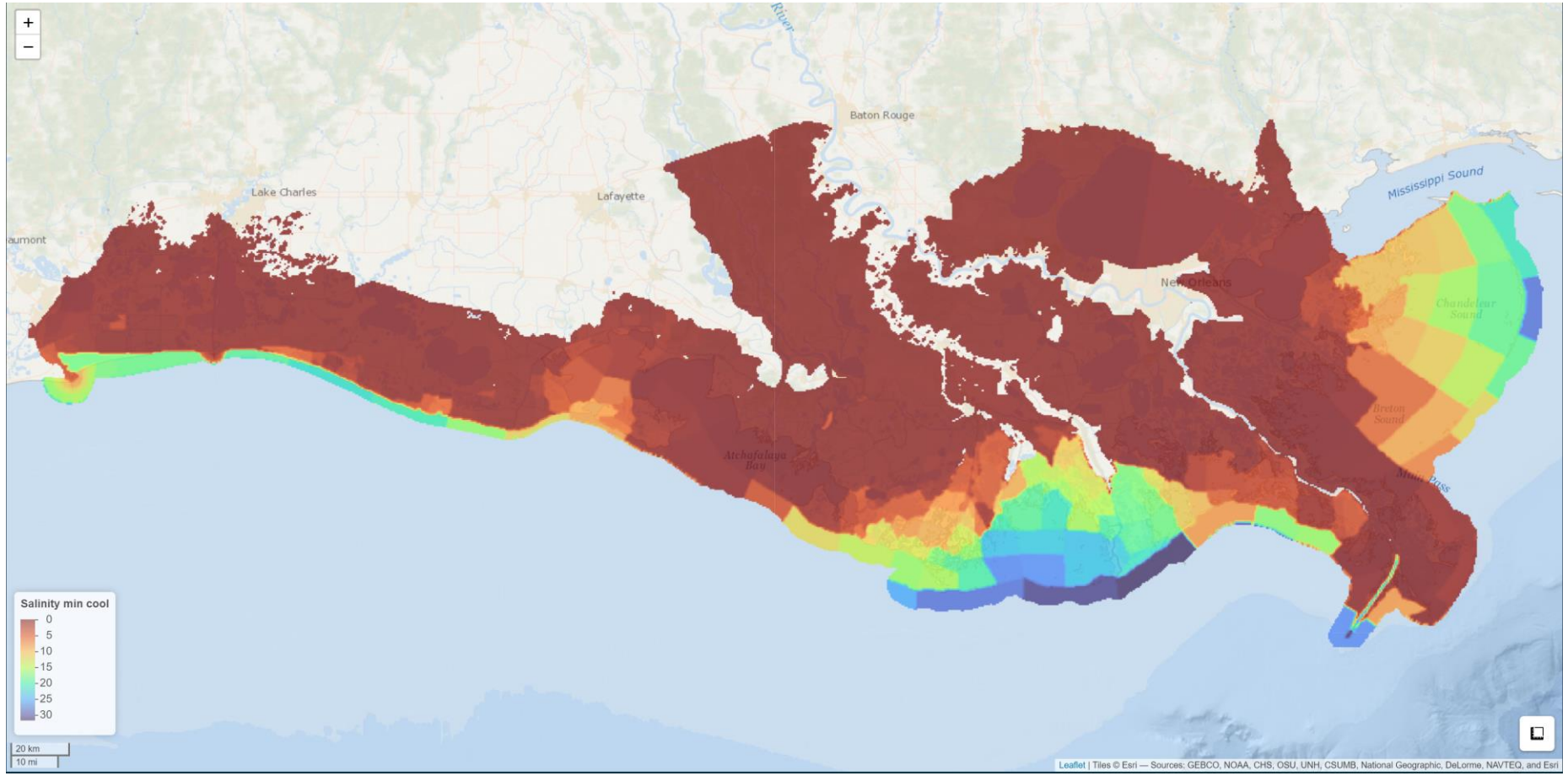
1.0, when $8 \leq V_{MS\ (warm)} < 10$

$(-0.16 * V_{MS\ (warm)}) + 2.6$, when $10 \leq V_{MS\ (warm)} < 15$

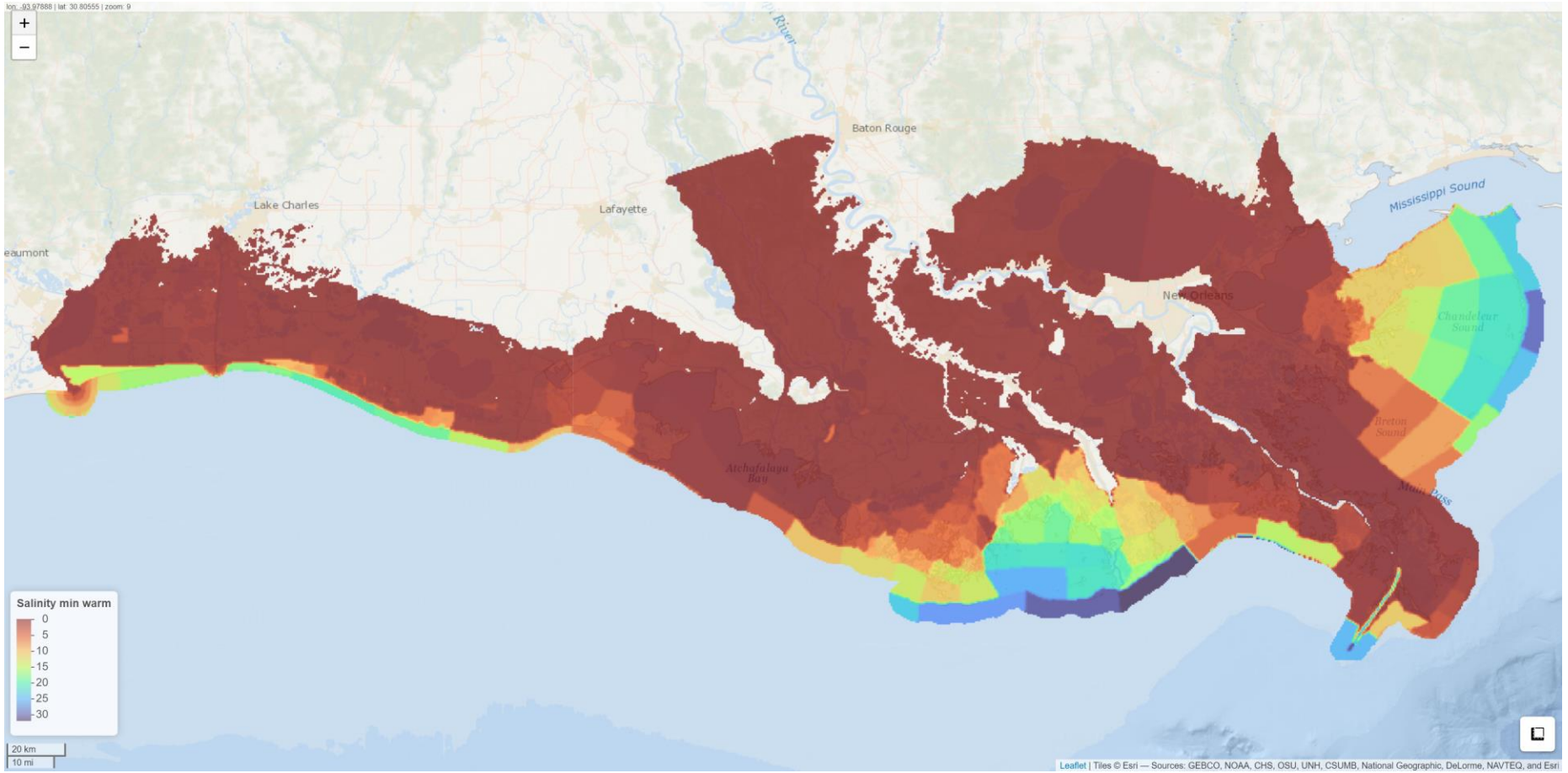
$(-0.04 * V_{MS\ (warm)}) + 0.8$, when $15 \leq V_{MS\ (warm)} < 20$

0.001, when $V_{MS\ (warm)} > 20$

Raw Data: Minimum Monthly Mean Salinity - Cool Months

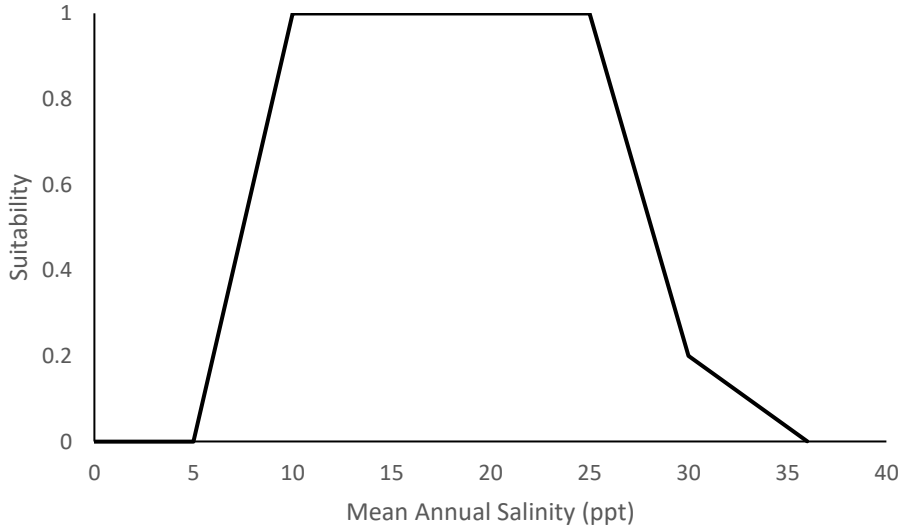


Raw Data: Minimum Monthly Mean Salinity - Warm Months

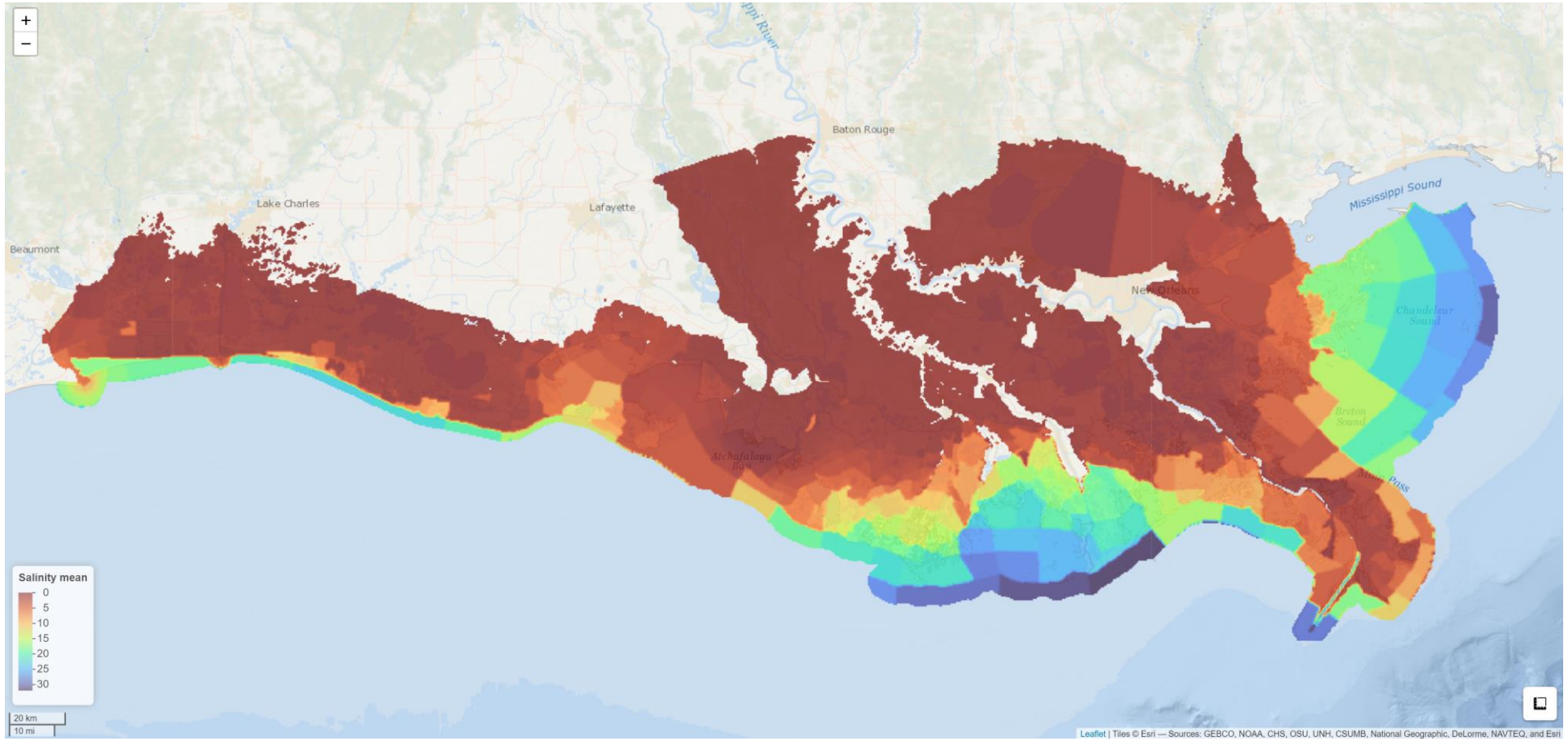


SI_{AS} = Mean Annual Salinity

SI_{AS} = 0.0, when $V_{AS} < 5$
$(0.2*V_{AS}) – 1.0$, when $5 \leq V_{AS} < 10$
1.0, when $10 \leq V_{AS} \leq 25$
$(-0.16*V_{AS}) + 5$, for $25 < V_{AS} \leq 30$
$(-0.0332 *V_{AS}) + 1.195$, for $30 < V_{AS} \leq 36$
0.001, when $V_{AS} > 36$



Raw Data: Mean Annual Salinity



Commercial Viability

- The **commercial viability** component takes two separate forms depending on water depth
  - Shallow water operations – assumes smaller boats without refrigeration capability

$$SI_{CV} = (SI_{F(shallow)} \times SI_{Sed} \times SI_{Dist})^{1/3}$$

  - Deeper water operations – assumes larger boats with refrigeration capability

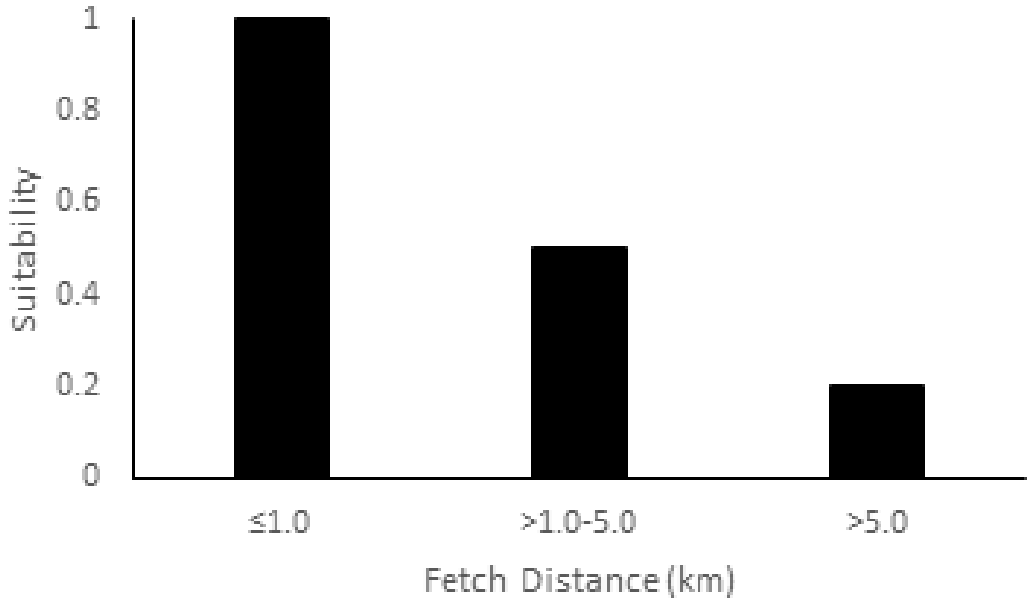
$$SI_{CV} = (SI_{F(deep)} \times SI_{Sed})^{1/2}$$

Fetch – Shallow Water

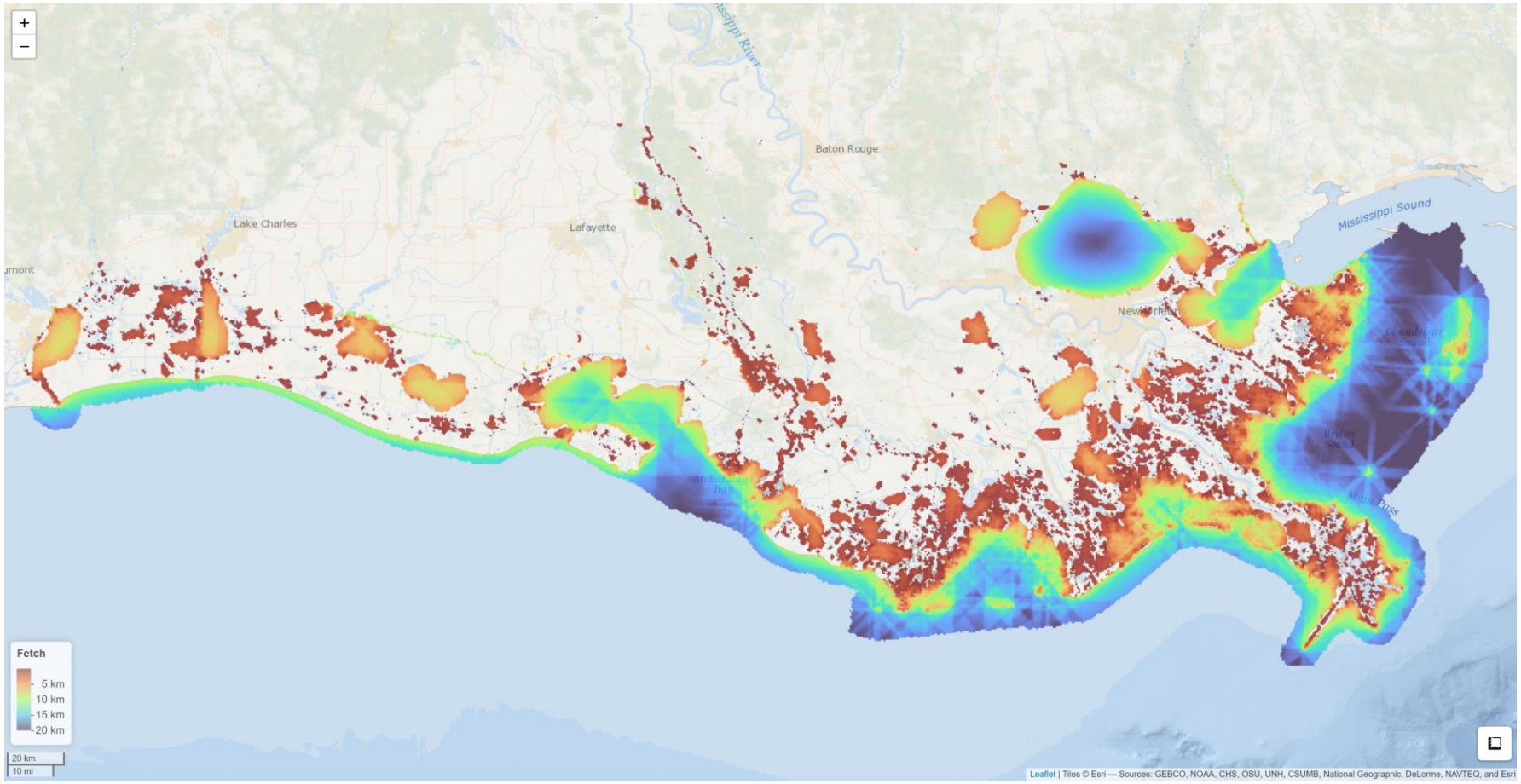
$SI_{F\ (shallow)}$ = 1.0 when fetch is ≤1km

0.5 when 1.0 < $V_{F\ (shallow)}$ ≤ 5.0

0.2 when $V_{F\ (shallow)}$ > 5km



Raw Data: Fetch

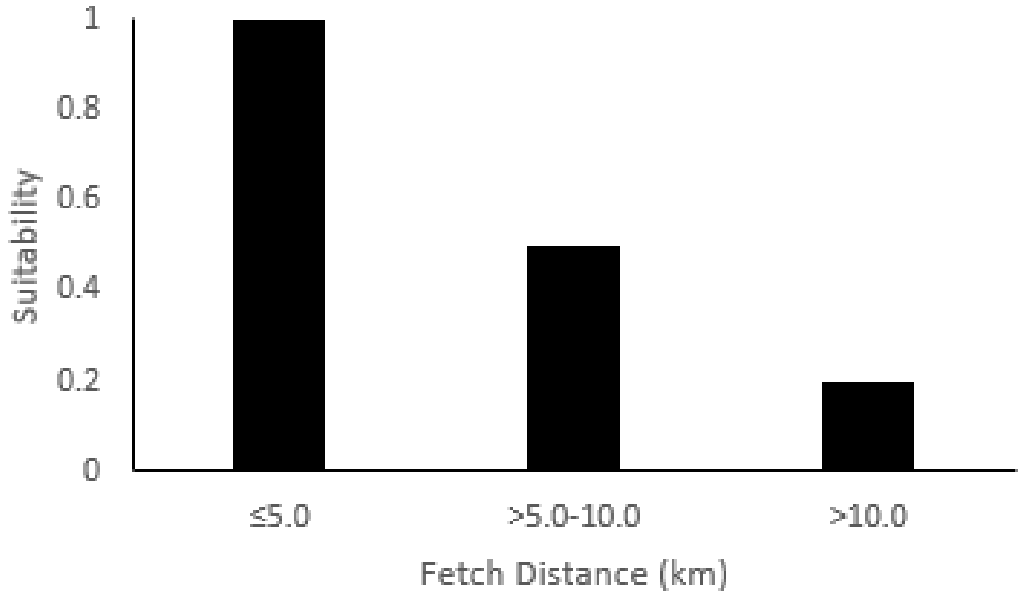


Fetch – Deep Water

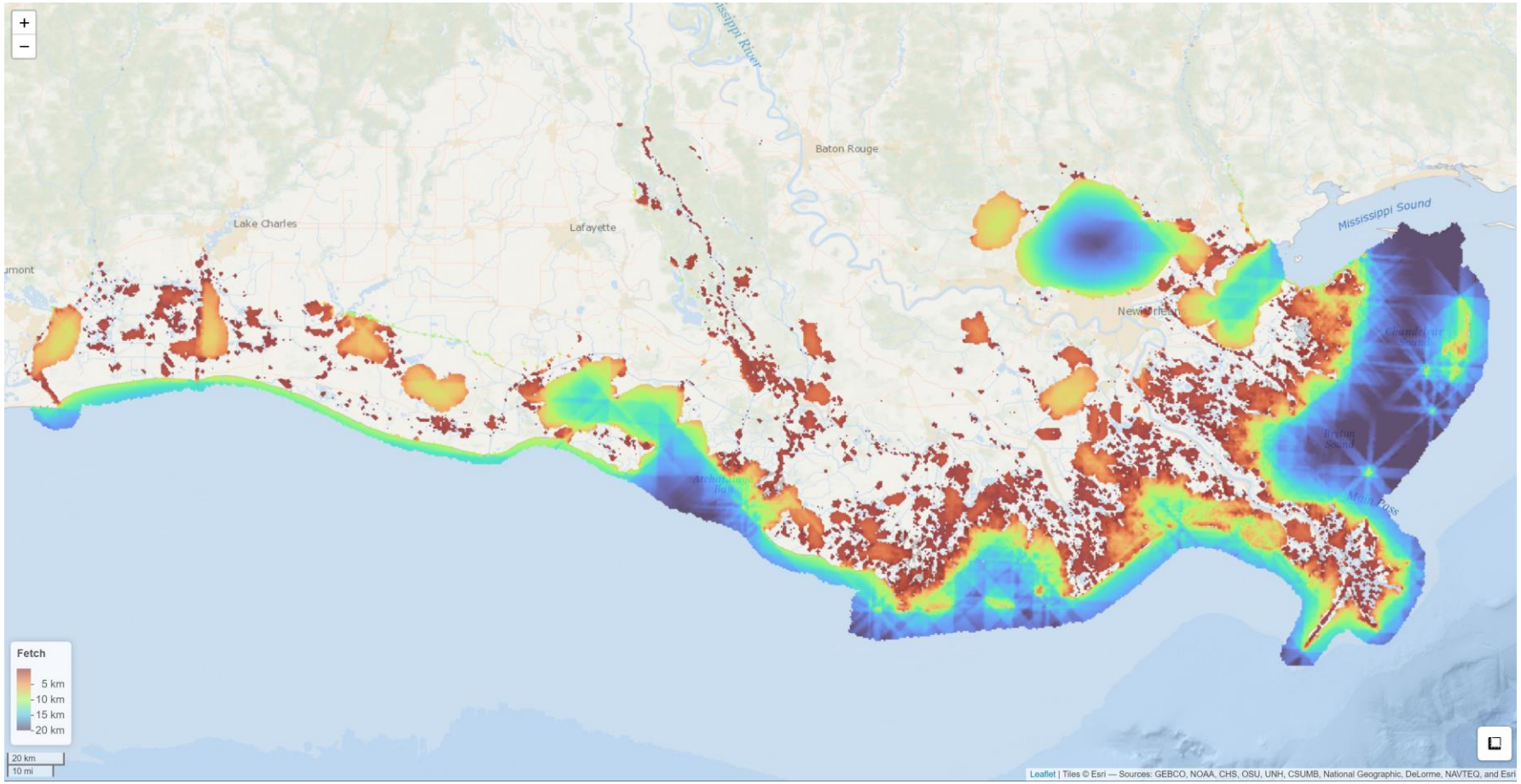
$SI_{F\ (deep)}$ = 1.0 when fetch is ≤5km

0.5 when 5.0 < $V_{F\ (deep)}$ ≤ 10.0

0.2 when $V_{F\ (deep)}$ >10km



Raw Data: Fetch

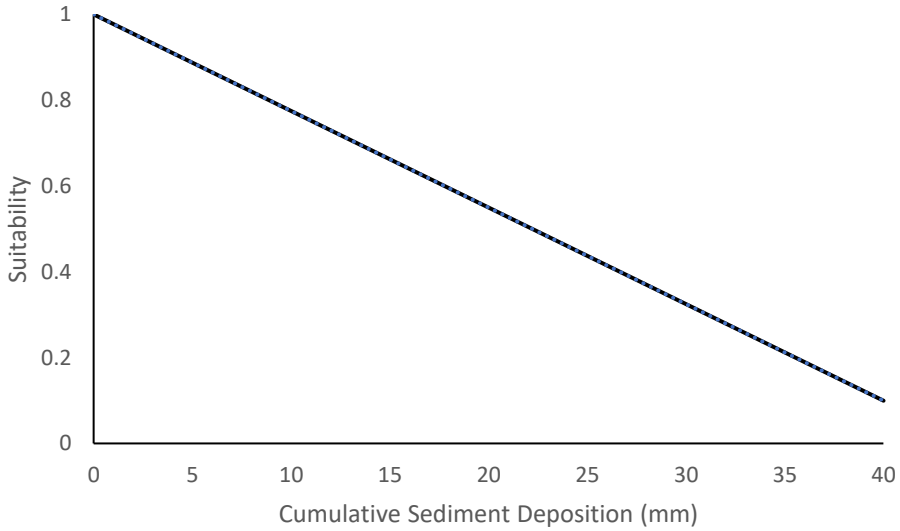


Cumulative Sediment Deposition

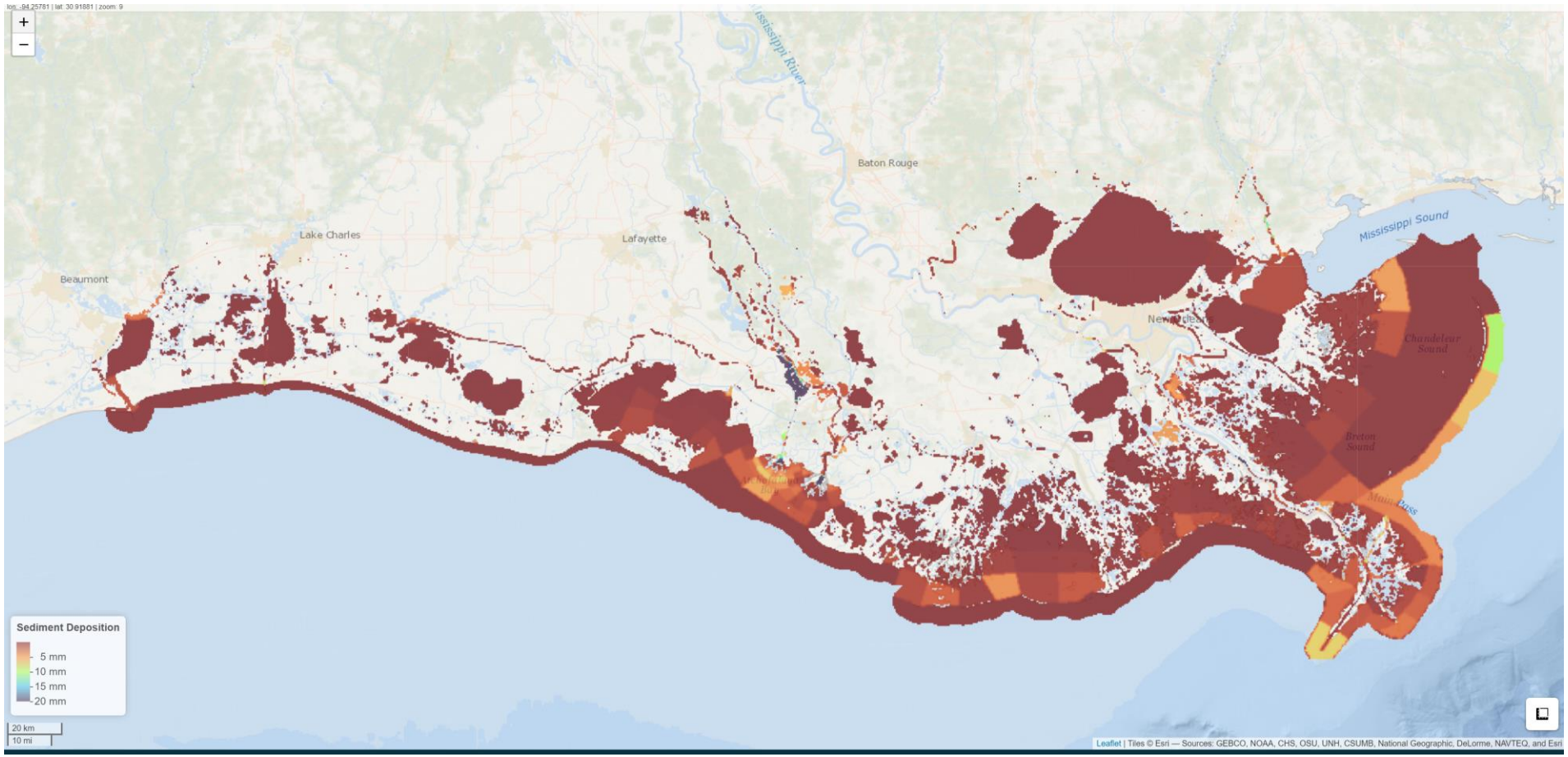
SI_{Sed} = 1.0, when V_{Sed} =0

(-0.0225 *V_{Sed}) + 1 when 0 ≤ V_{Sed} < 40

0.1, when V_{Sed} ≥ 40



Raw Data: Cumulative Sediment Deposition



Distance to Roads

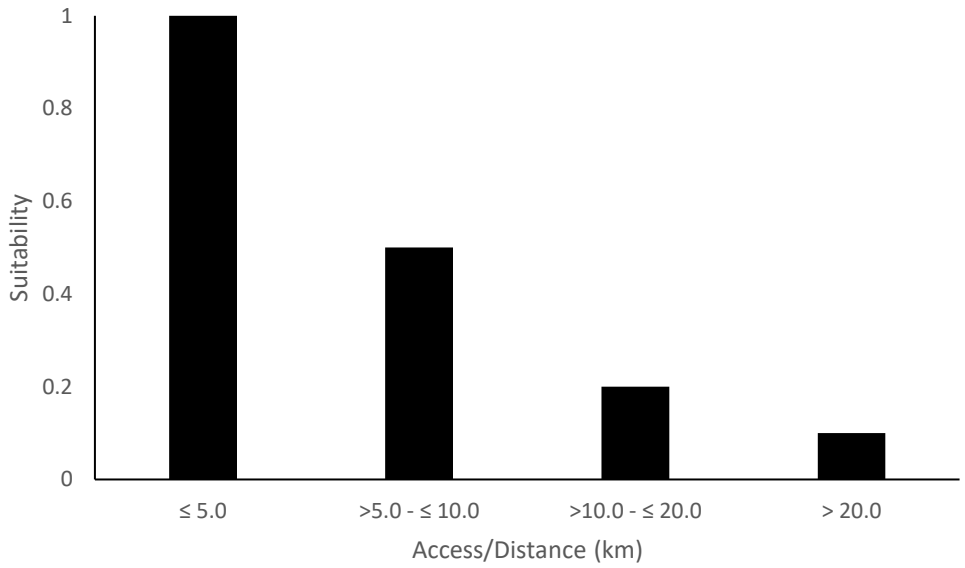
For shallow water operations only. Shallow water is defined as water depths of 2-5 feet.

SI_{Dist} = 1.0 when distance is ≤ 5.0 km

0.5 when $5.0 < V_{Dist} \leq 10.0$

0.2 when $10.0 < V_{Dist} \leq 20.0$

0.1 when $20.0 < V_{Dist}$



Raw Data: Distance to Roads