Suitability Indices for Tree Islands

- I. Drought Index as a function of
  - cumulative drought days
  - depth of water table below ground

- II. Flood index as a function of
  - cumulative flood days (> 2 ft ponding)

- III. Tree Island Suitability Index
  - Min(DI)*Min(FI)

Cumulative Drought Duration

Defined as number of sequential days with water depths below ground surface

$CDD(t) = 0$, *if* $WD(t) > 0$;

$CDD(t) = 1 + CDD(t\text{-}1)$, *if* $WD(t) < 0$.

Daily Drought Index on day t, $DDI(t)$, is then defined as:

$DDI(t) = 1$ *if* $WD(t) > 0$.

$$DDI(t) = \frac{1.0 - 0.0035 \cdot CDD(t)}{1.0 + 0.010 \cdot e^{-4.6 \cdot WD(t)}} \quad \text{if } WD(t) < 0$$

Annual Minimum Drought Index

The minimum value of DDI(t) in any year is an indication of the maximum fire risk that tree islands would experience during that year.

And

N-year Mean Annual Minimum Drought Index

$$= \sum_{i=0}^{N} minDDI(i)/\ N$$

Continuous Flood Index DFI (t)

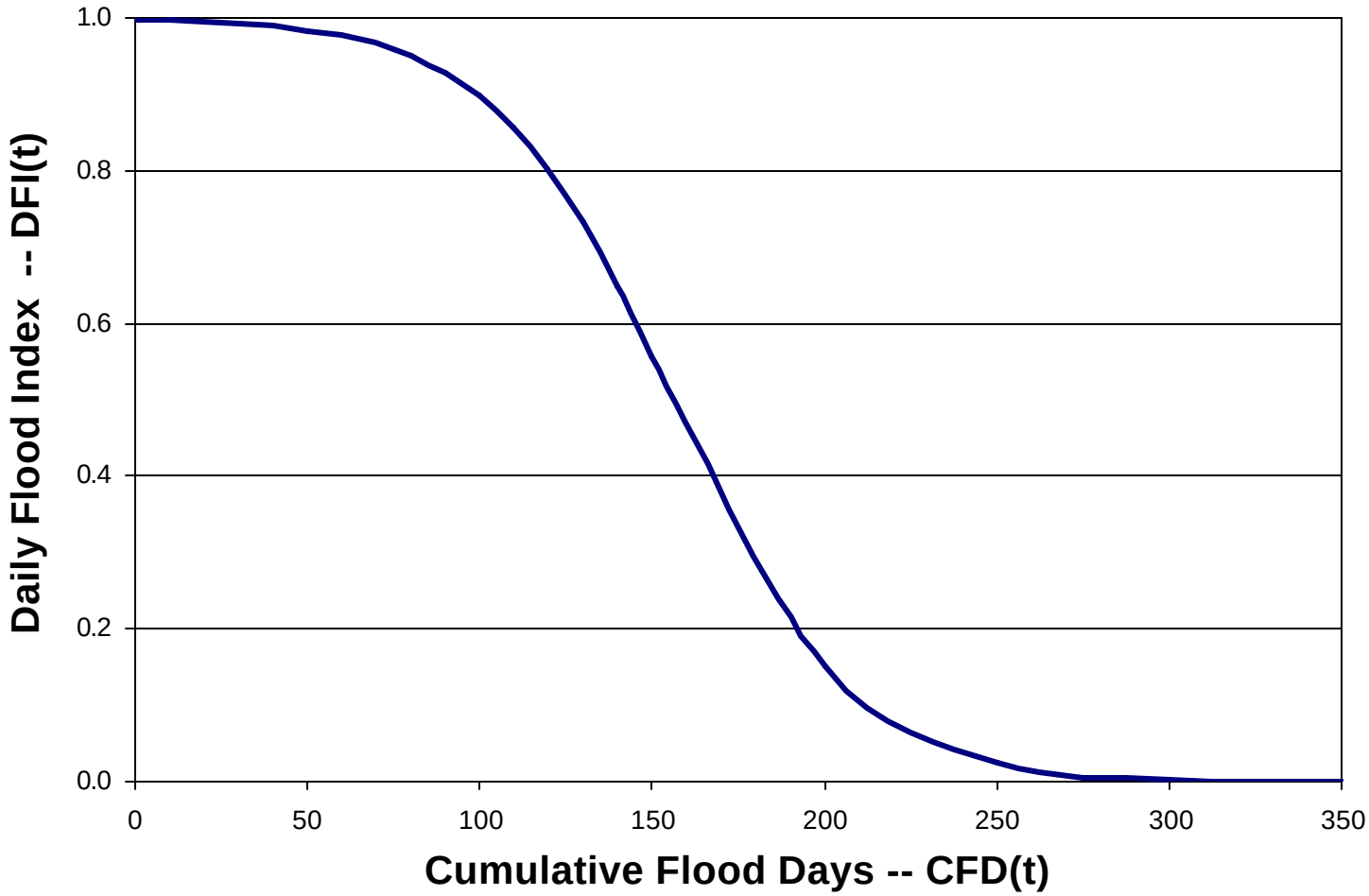
Is a function of Cumulative Flood Days

- Incremented if water depth > 2.0 ft
  CFD(t) = CFD(t-1) + 1.0,

- Decremented until zero if water depth is < 2.0 ft
  CFD(t) = CFD(t-1) – 0.5

$$DFI(t) = 1.0 / (1.0 + 0.0023 \cdot e^{0.039 \cdot CFD(t)})$$

Relationship between DFI (t) and CFD(t)



$$DFI(t) = 1.0 / (1.0 + 0.0023 \cdot e^{0.039 \cdot CFD(t)})$$

Annual Minimum Flood Index

The minimum value of DFI(t) in any year is an indication of the maximum flood stress that tree islands would experience during that year.

And

N-year Mean Annual Minimum Flood Index

$$= \sum_{i=0}^{N} minDFI(i)/\ N$$

Annual Tree Island Suitability Index

Defined as the product of the minimum value of DDI(t) in any year and the minimum value of DFI(t) in the same year,

I.e. TISI(I) = minDDI(*i*)*minDFI(*i*)

N-year Mean Annual Tree Island Suitability Index

$$= \sum_{i=0}^{N} TISI(i) / N$$

Indicator Regions and SFWMM grid cells Applicable for Tree Island Suitability