

ATLSS SESI MODEL: WHITE-TAILED DEER Breeding Potential Index (BPI)

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**Provides a relative estimate of potential white-tailed deer
production for any given year**



White-Tailed Deer SESI Model: Breeding Potential Index

Underlying ecological basis for model:

- **Urban areas are not good habitat.**
- **Reproductive season is between January 1 and May 31. Ponded water can act as impediment to fawning and foraging. Elevated water levels can make beds uninhabitable and can drown fawns.**
- **The hydroperiod during the preceding year affects quality of forage. If hydroperiod is too short, forage quality is reduced. If hydroperiod is too long, forage is inaccessible.**

White-Tailed Deer SESI Model: Breeding Potential Index

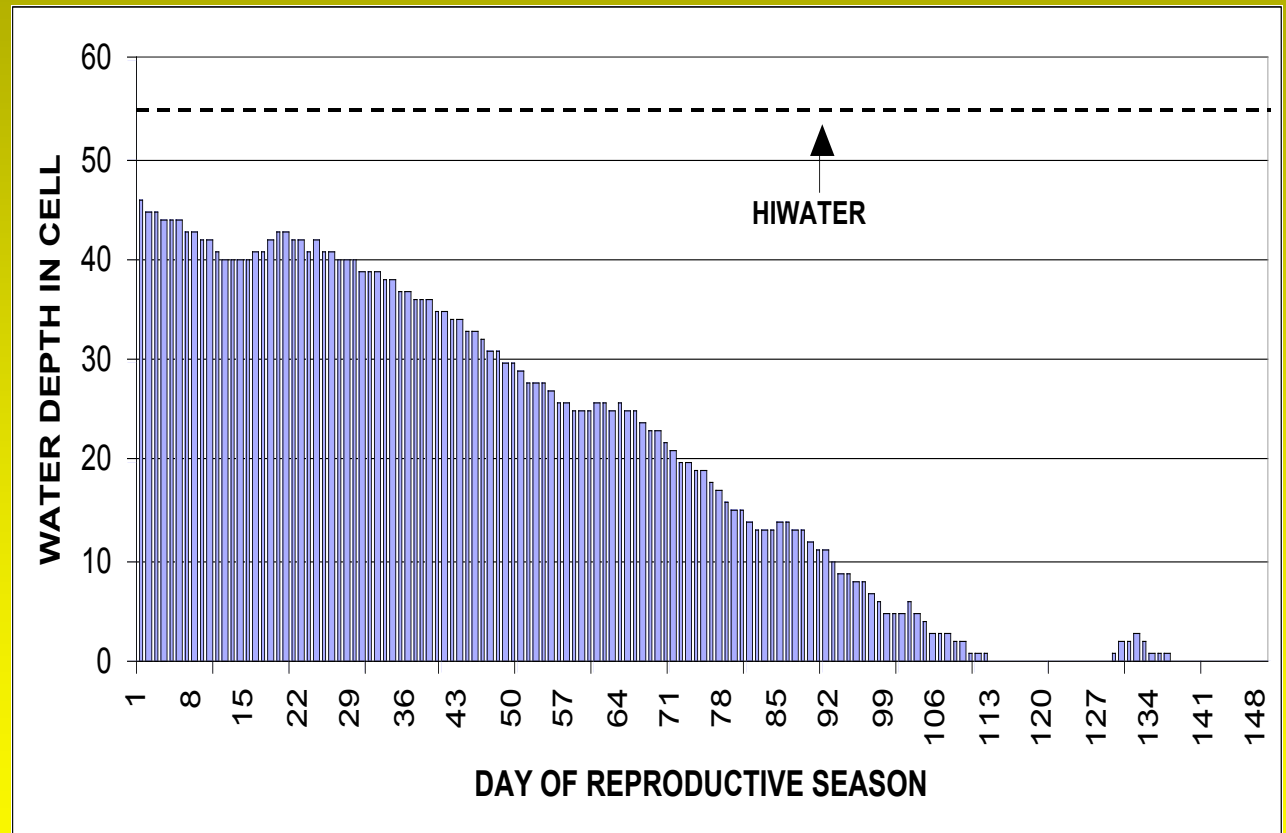
The following quantitative rules are formulated based on the above ecological considerations:

- **Urban area exclusion rule.**
- **High water rule**
- **Length of previous year hydroperiod rule.**

High Water Rule

A depth of 55 cm, called HIWATER, is defined as depth above which movement and foraging are completely excluded.

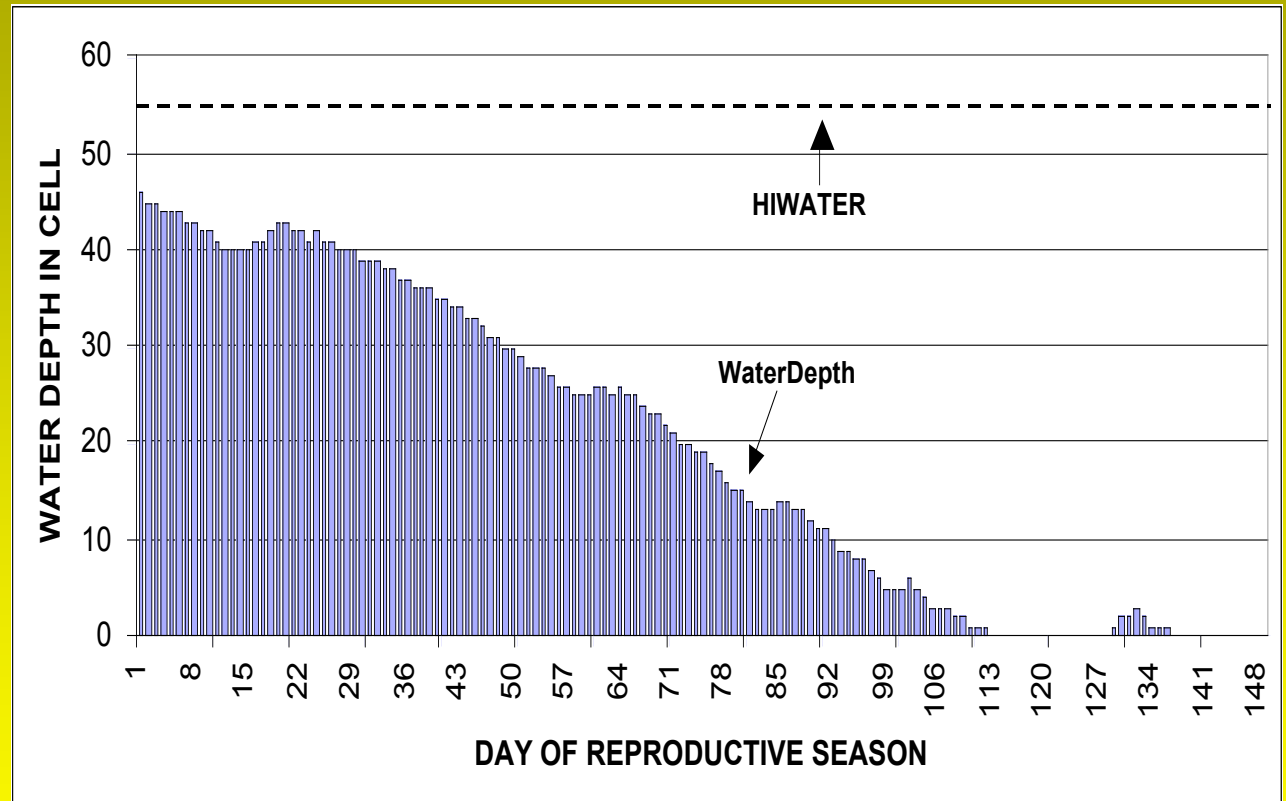
Any depth of water during the reproductive season is assumed to restrict fawning, and so subtracts from the index.



High Water Rule

For each spatial cell (x,y), we integrate the daily depth of water, WaterDepth, divided by HIWATER, over the whole reproductive season.

This integral, called $I(x,y)$, is divided by the maximum value of $I(x,y)$ for the 31-year period, $MaxI$.

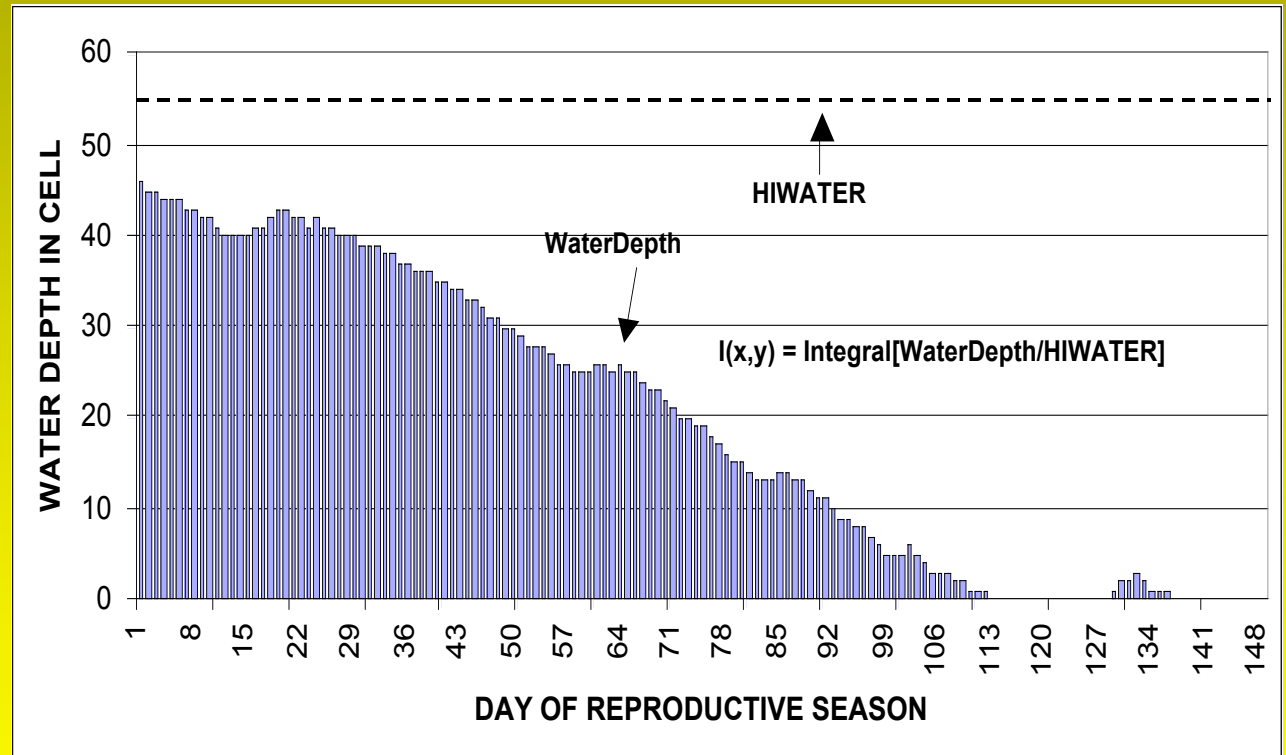


High Water Rule

This integral, called $I(x,y)$, is divided by the maximum value of $I(x,y)$ for the 31-year period, I_{\max} .

Then, the Breeding Potential Index for cell (x,y) is reduced by the factor:

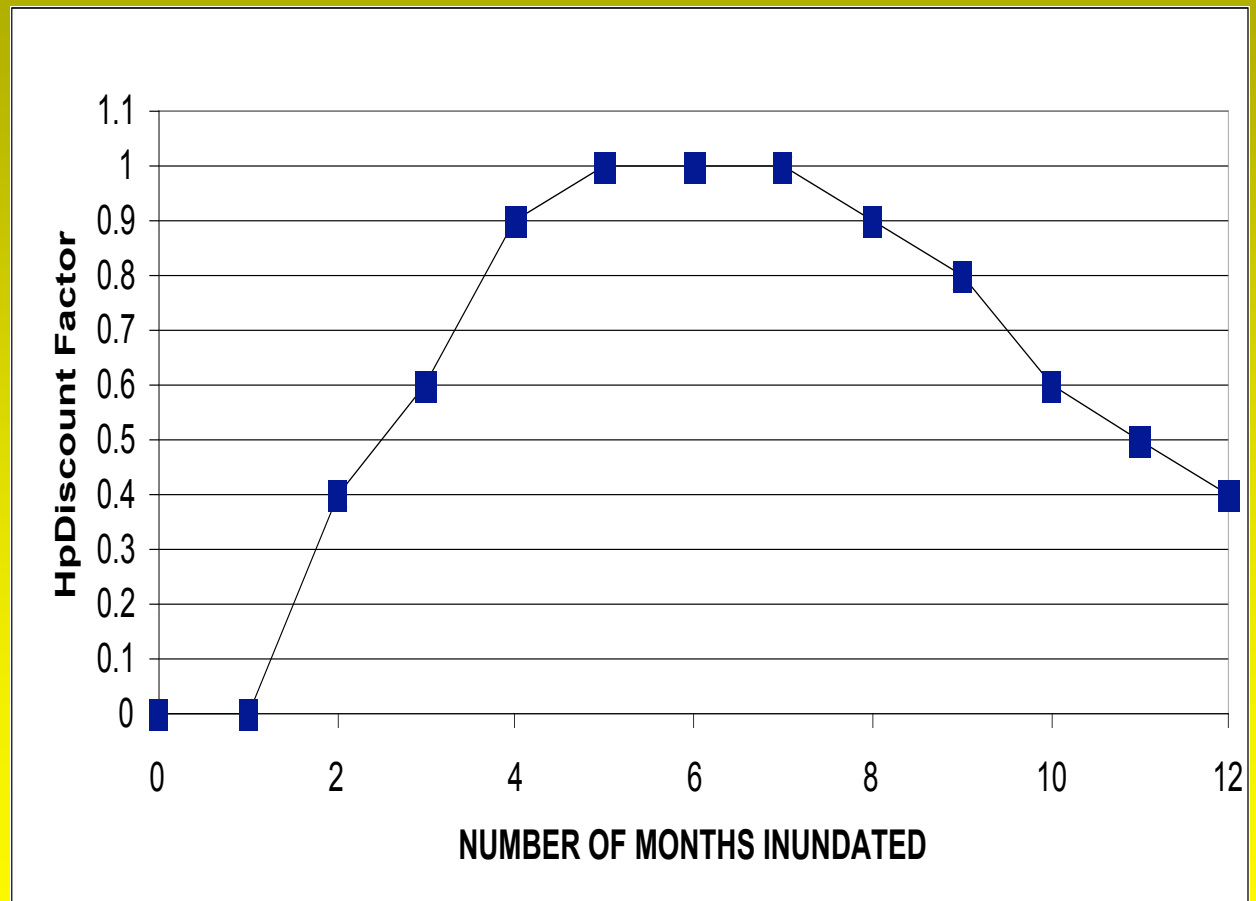
$$\{1 - I(x,y)/I_{\max}\}$$



Hydroperiod Discount Rule

A factor called the hydroperiod discount factor, $HpDiscount(MHp)$, is based on empirical data.

This factor, which is less than or equal to 1.0, depending on the number of months a cell was inundated the preceding year, further reduces the BPI.



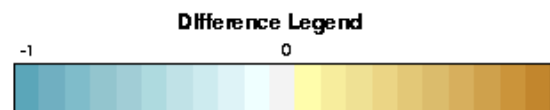
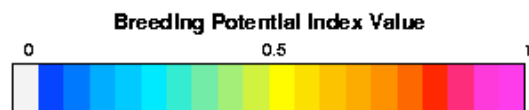
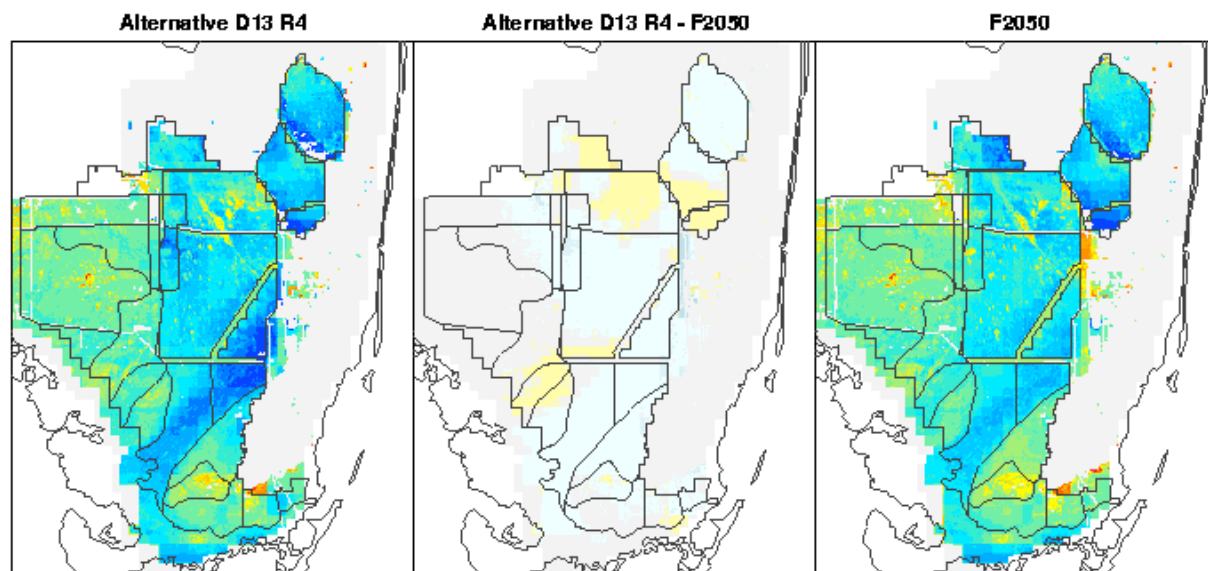
Total White-Tailed Deer Breeding Potential Index

The total white-tailed deer BPI for a given cell (x,y) is then given by

$$\text{BPI}(x,y) = [1 - I(x,y)] * \text{HpDiscount}(\text{MHP})$$

White-tailed Deer Breeding Potential

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White-tailed Deer Breeding Potential Mean

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