



# **Shrub Encroachment Impacts on Carbon, Water, and Energy in Herbaceous Peatlands**

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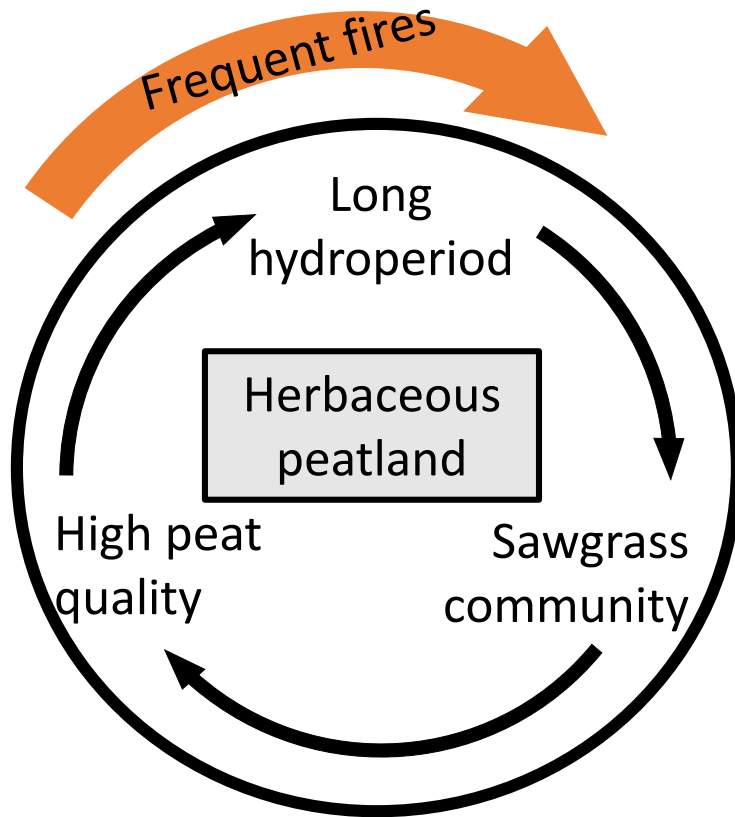
# Carbon Storage in Peatlands

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- Frequent flooding promotes a hydrophytic plant community and reduces soil decomposition
- periodic fires promote a plant community that quickly recovers following fire

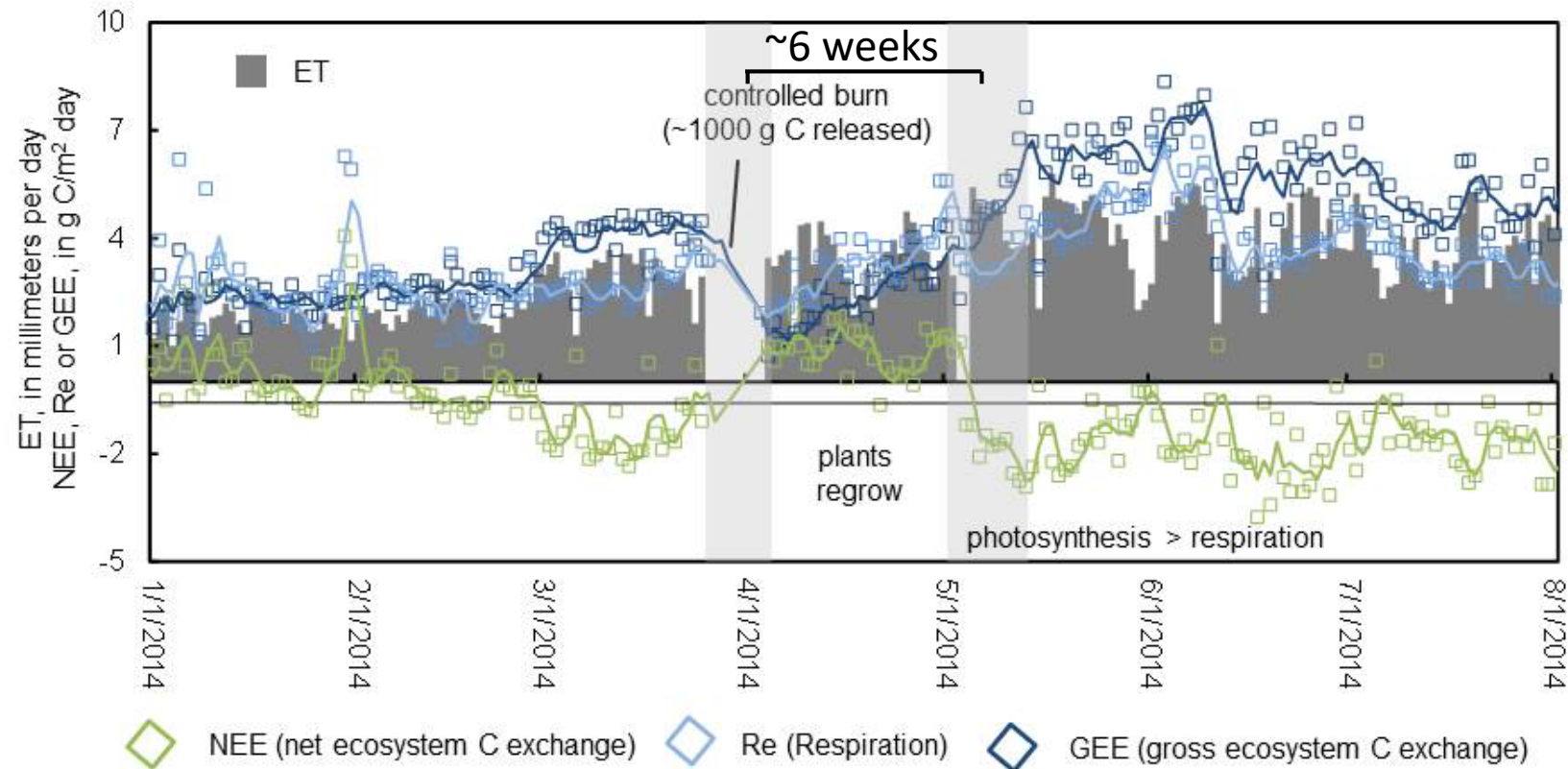


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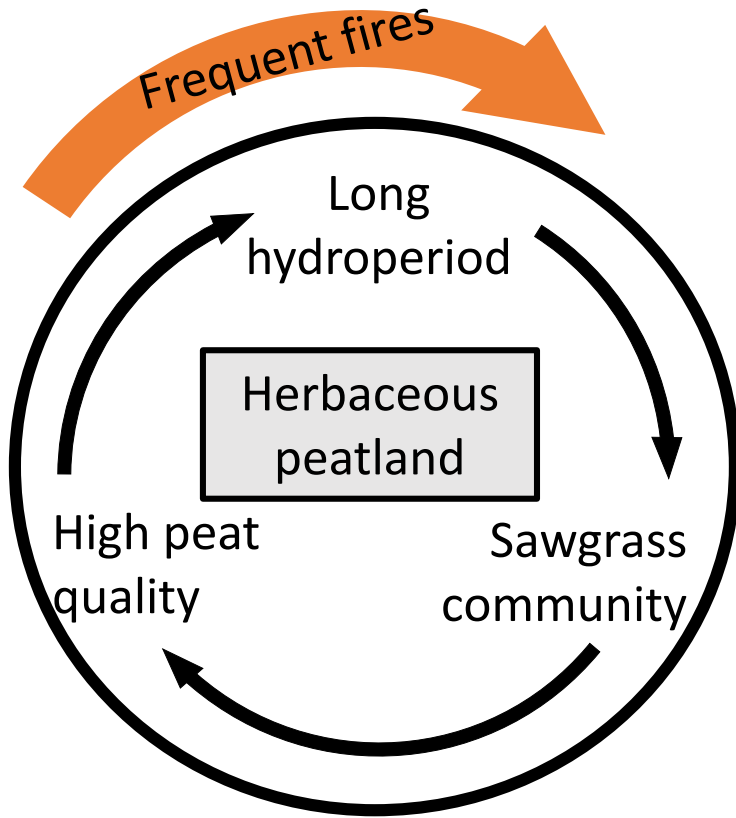
**Production > Decomposition**

## Carbon Cycling Response to Fire Recovery



# Carbon Storage in Peatlands

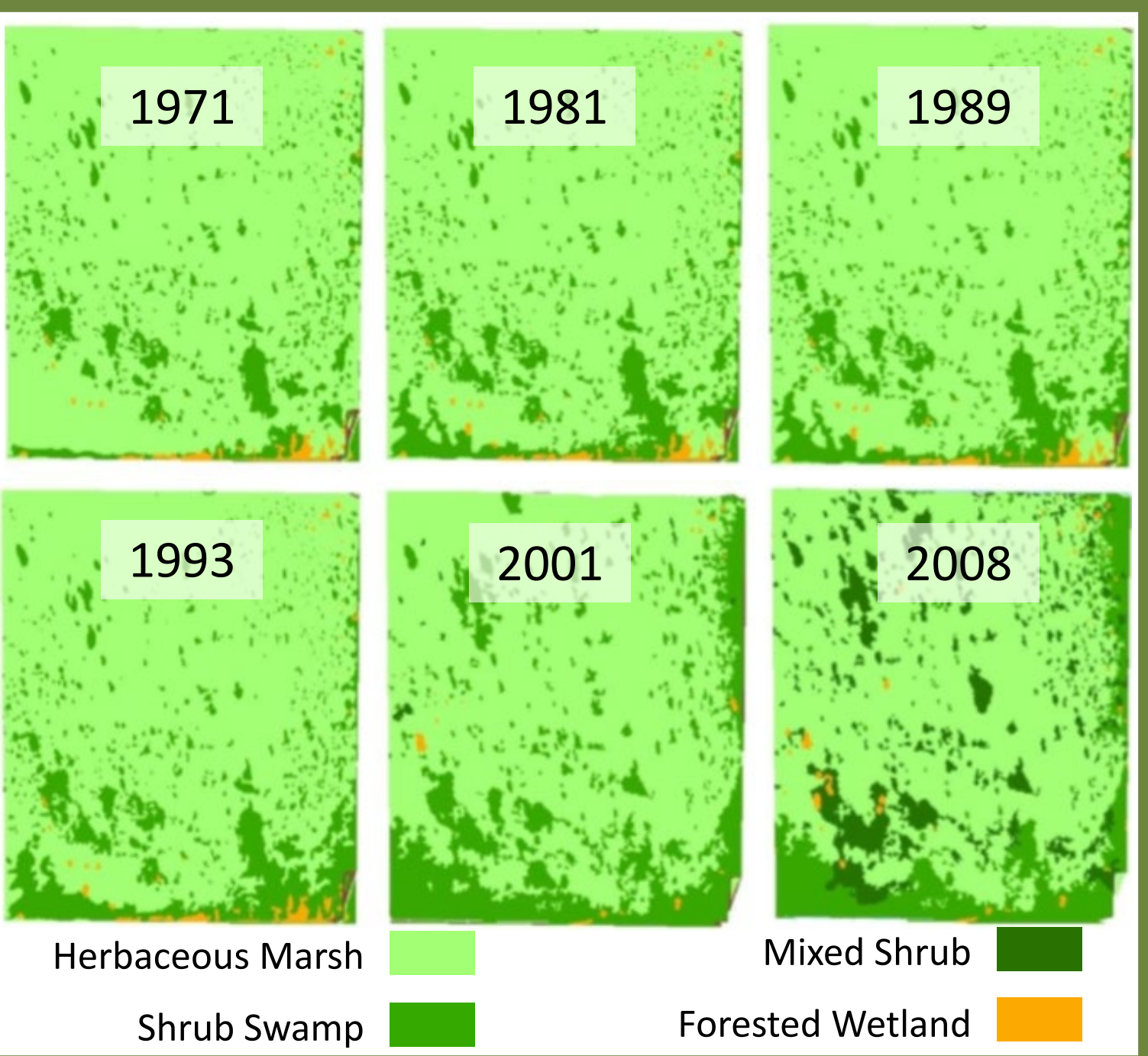
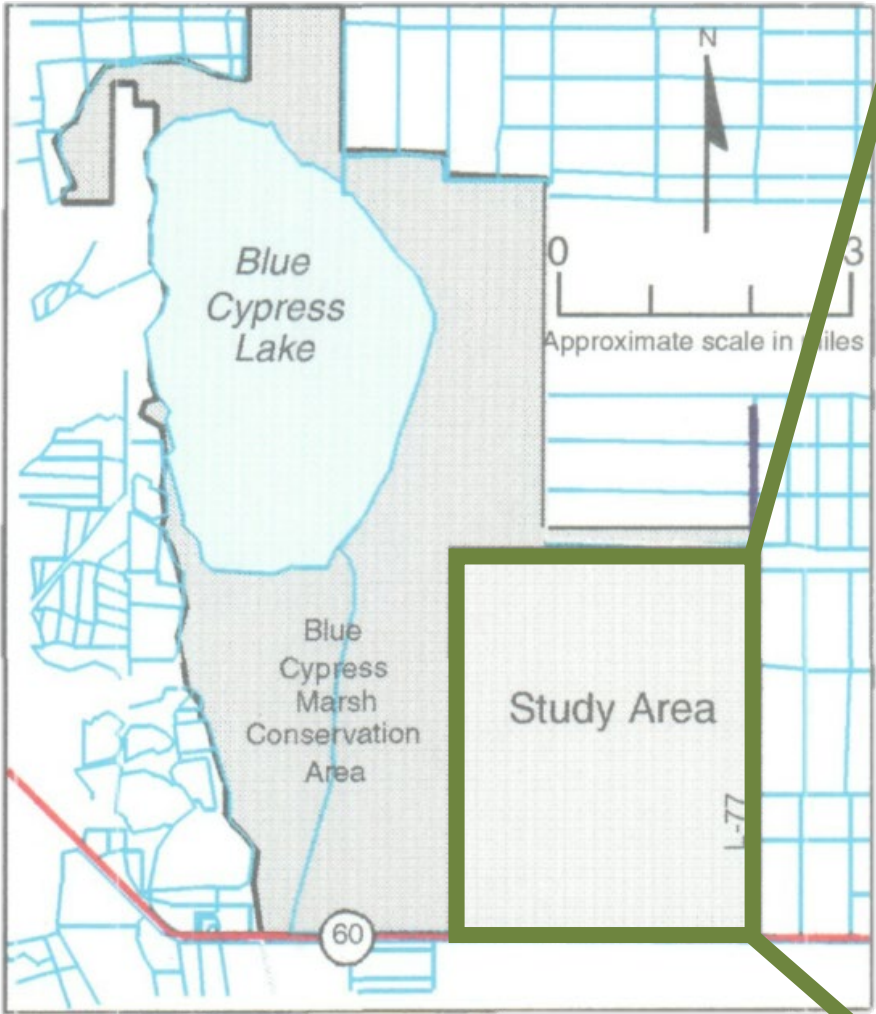
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**How does willow encroachment in a sawgrass peatland affect peat accumulation processes?**

**Production > Decomposition**

# Shrub Encroachment in Blue Cypress Marsh Conservation Area



(Kinser 1997, Hall et al. 2017)

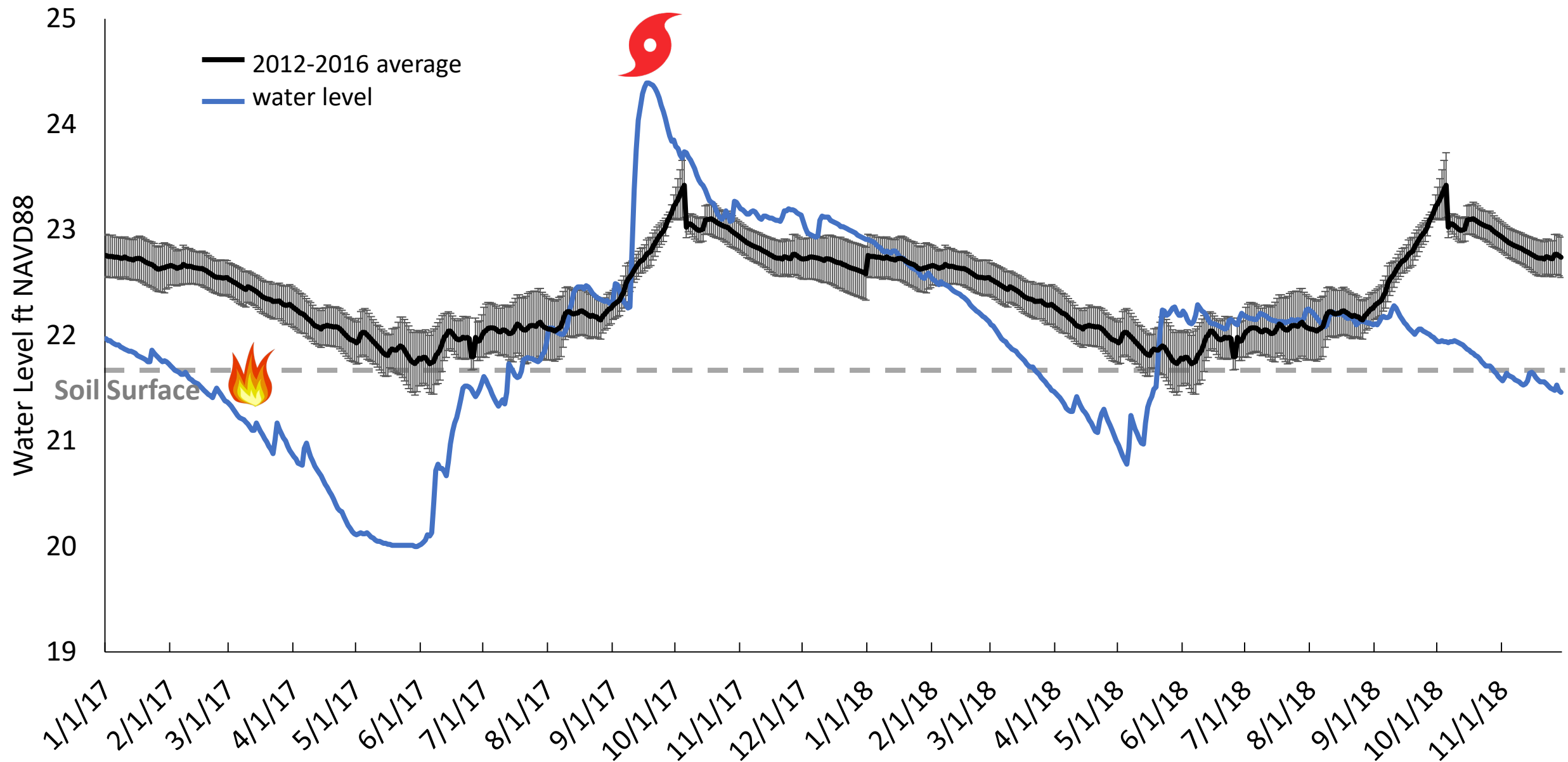


# Morphological and physiological differences between sawgrass and willow may affect peat accumulation processes.

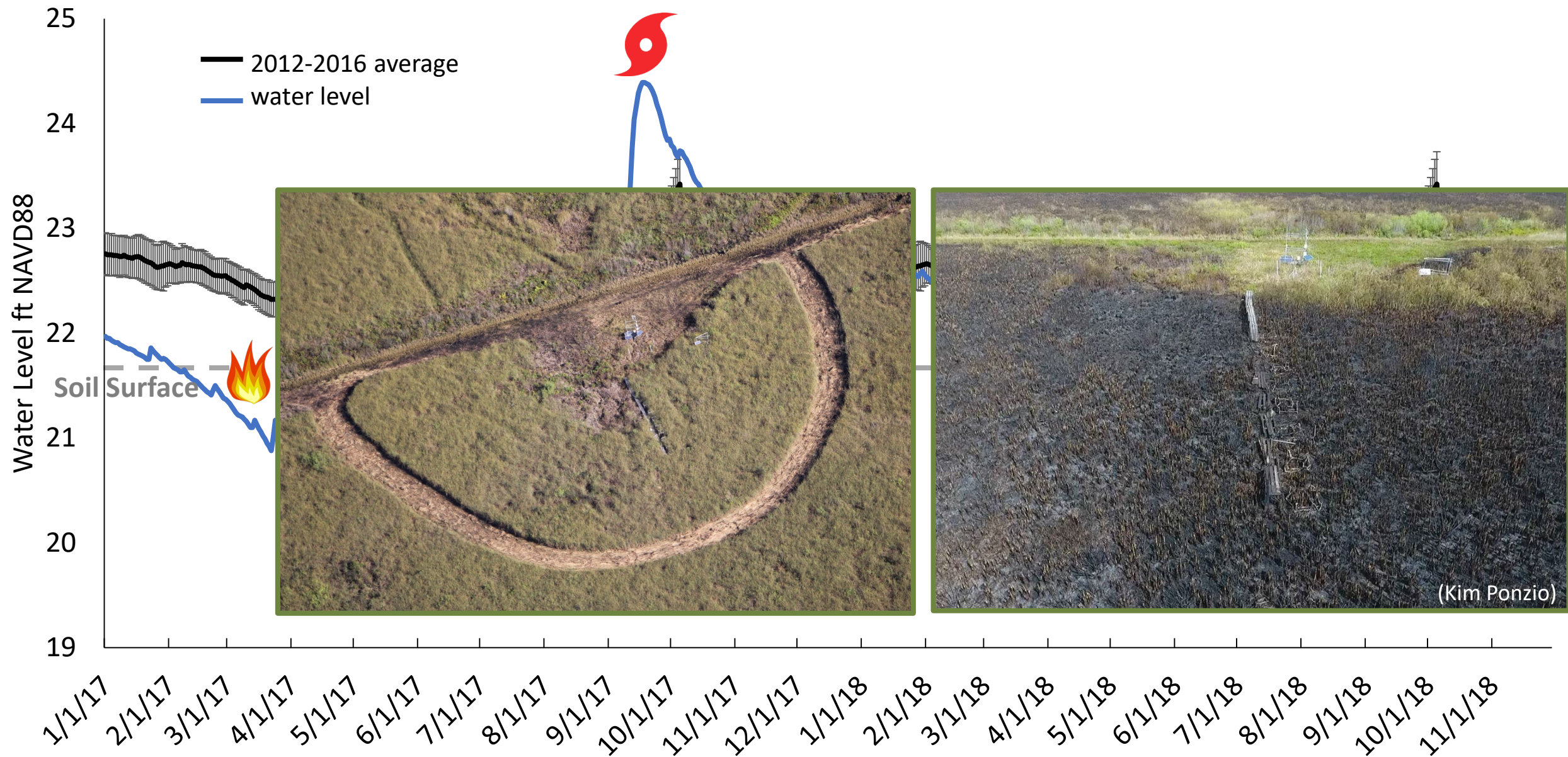
	Sawgrass	Willow
<b>Leaf area index</b> (m <sup>2</sup> leaf m <sup>-2</sup> ground)	0.792	1.773
<b>Stomatal conductance</b> $g_s$ (mol H <sub>2</sub> O m <sup>-2</sup> s <sup>-1</sup> )	0.240	0.359
<b>Net photosynthesis</b> $A_{\text{net}}$ (μmol CO <sub>2</sub> m <sup>-2</sup> s <sup>-1</sup> )	12.52	14.81
<b>Litter decomposition</b> (k)	0.21±0.04	0.26±0.03

(Bundy et al. 2016, Duffy 2013)

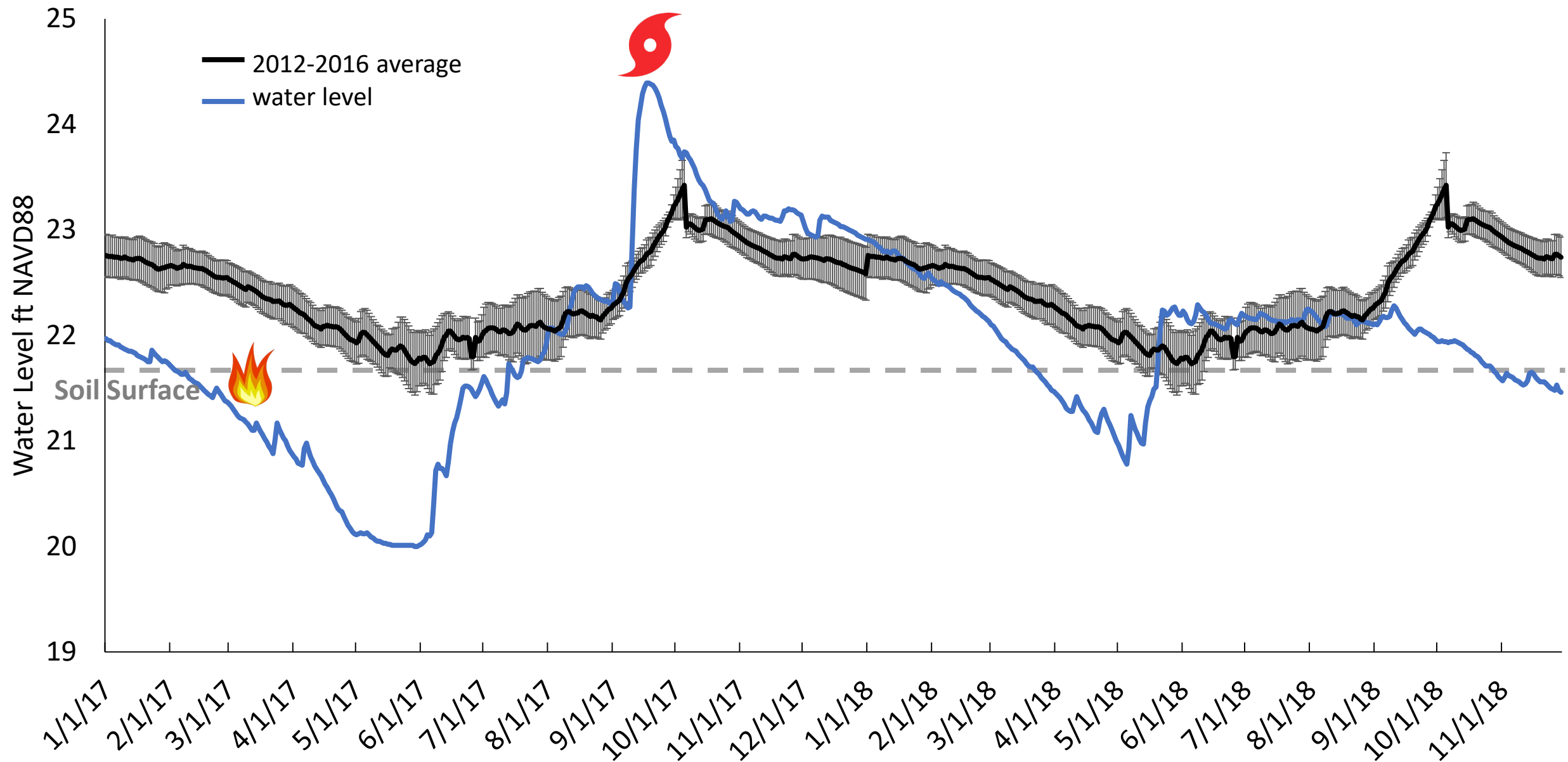
# Ground Water Level at BCMCA



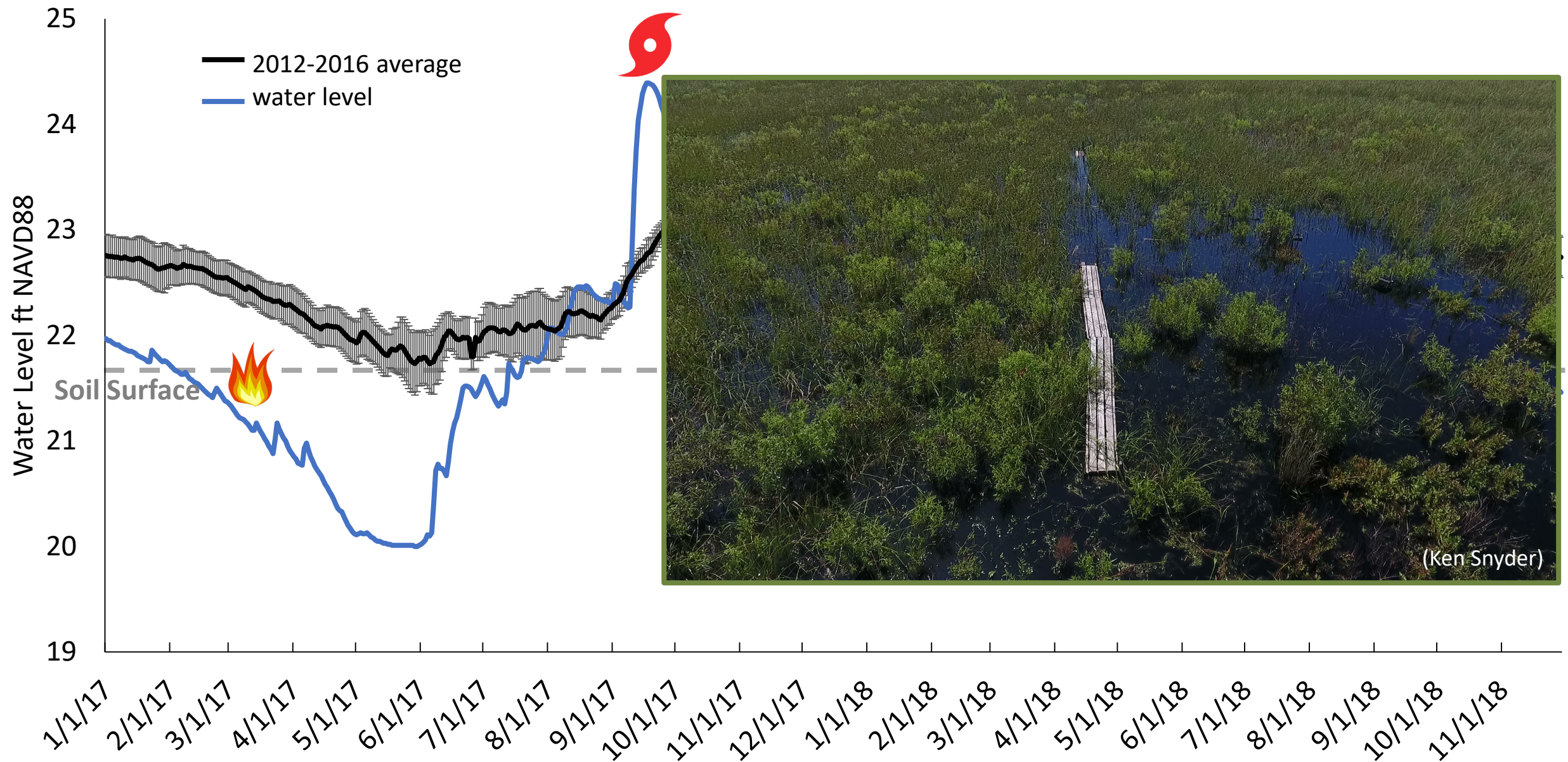
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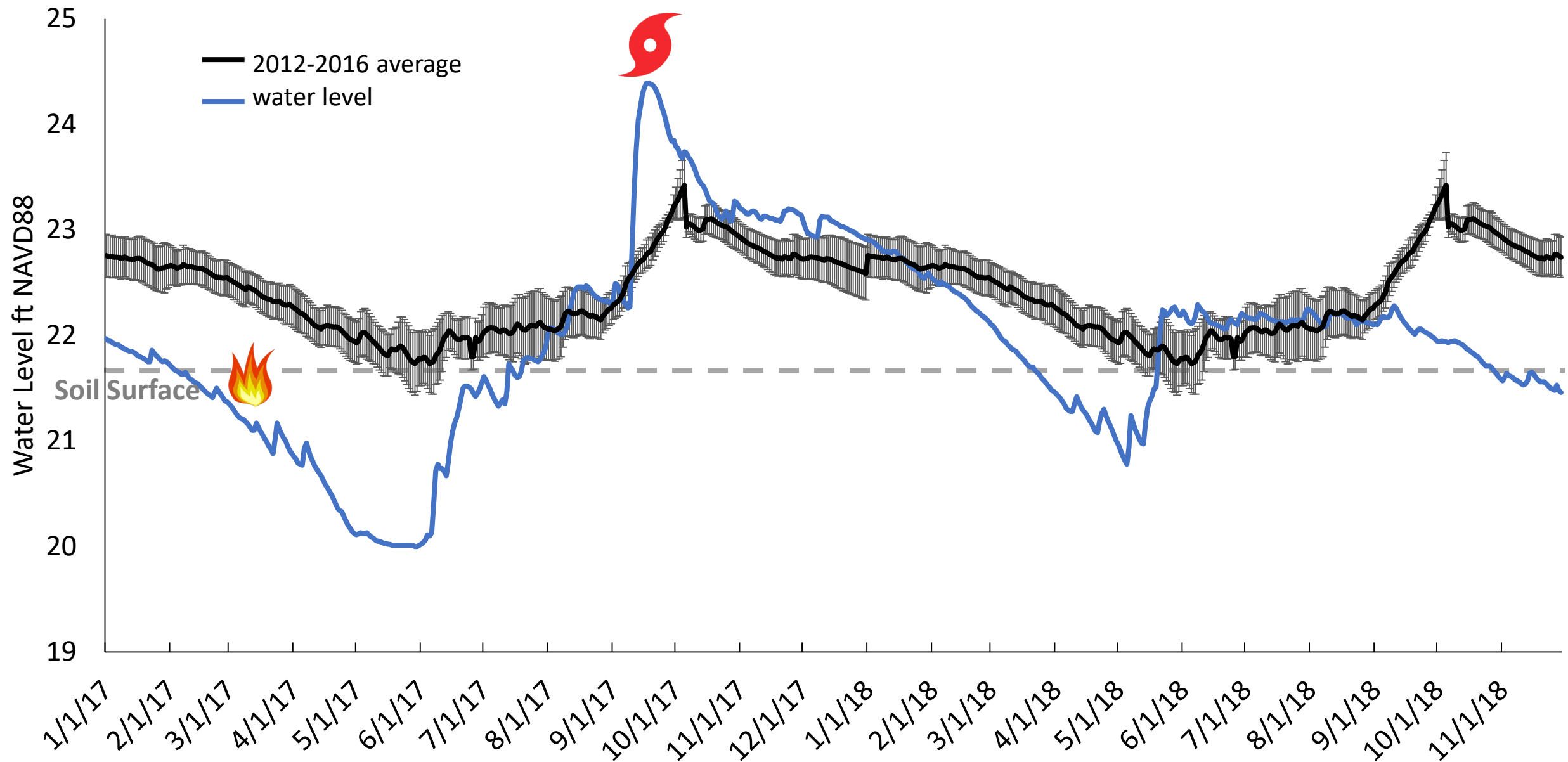
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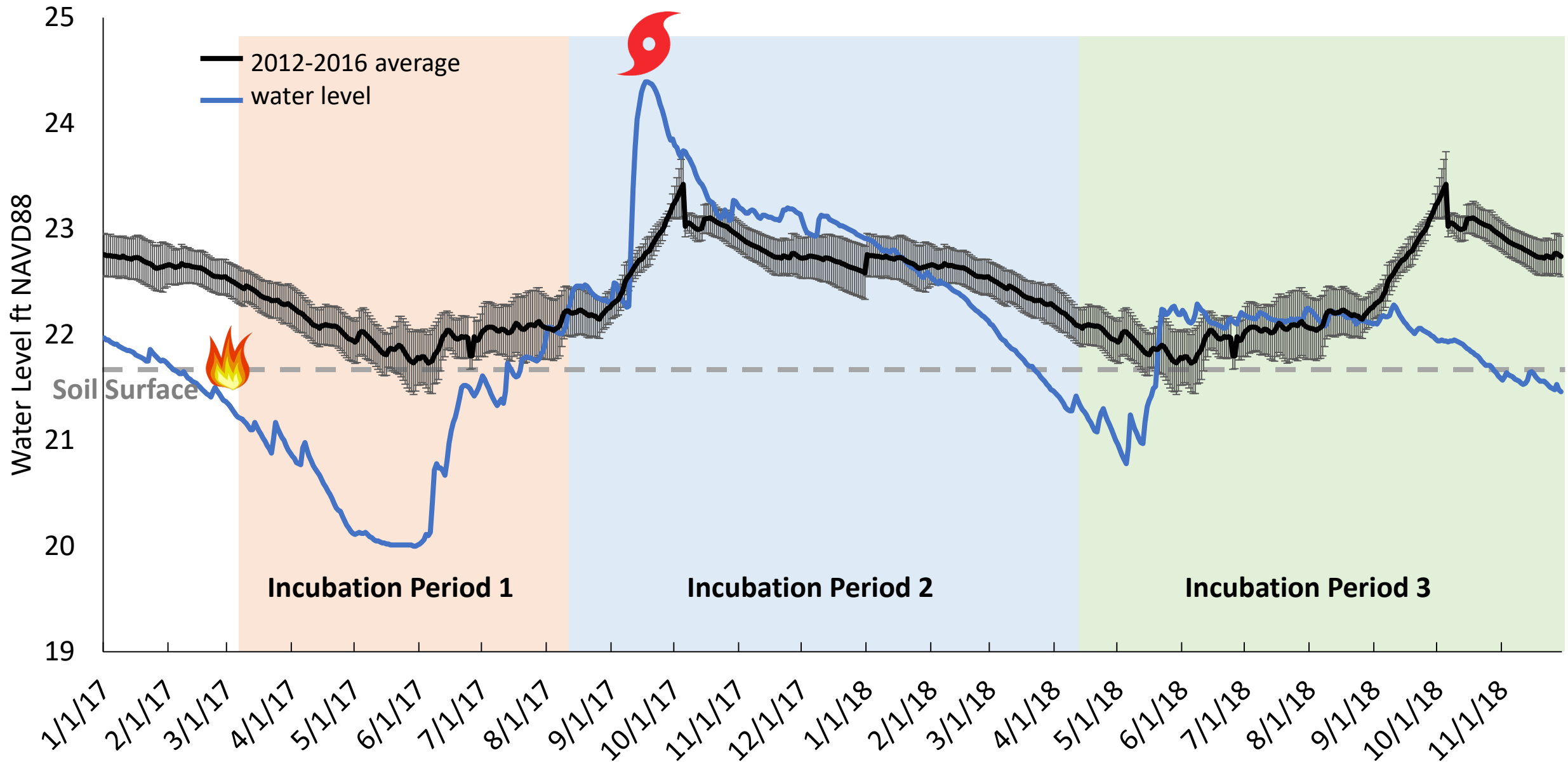
# Litter Decomposition Bags

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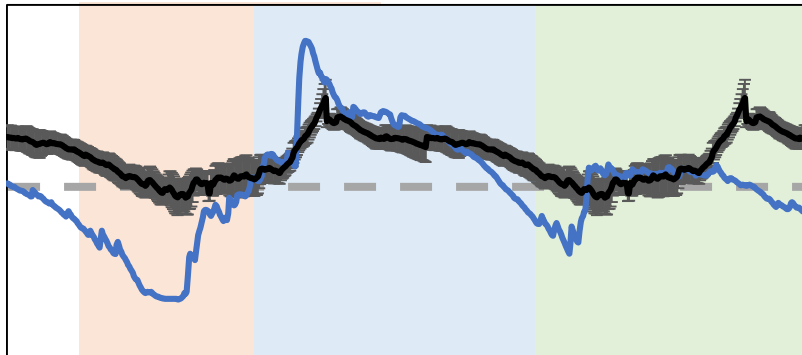
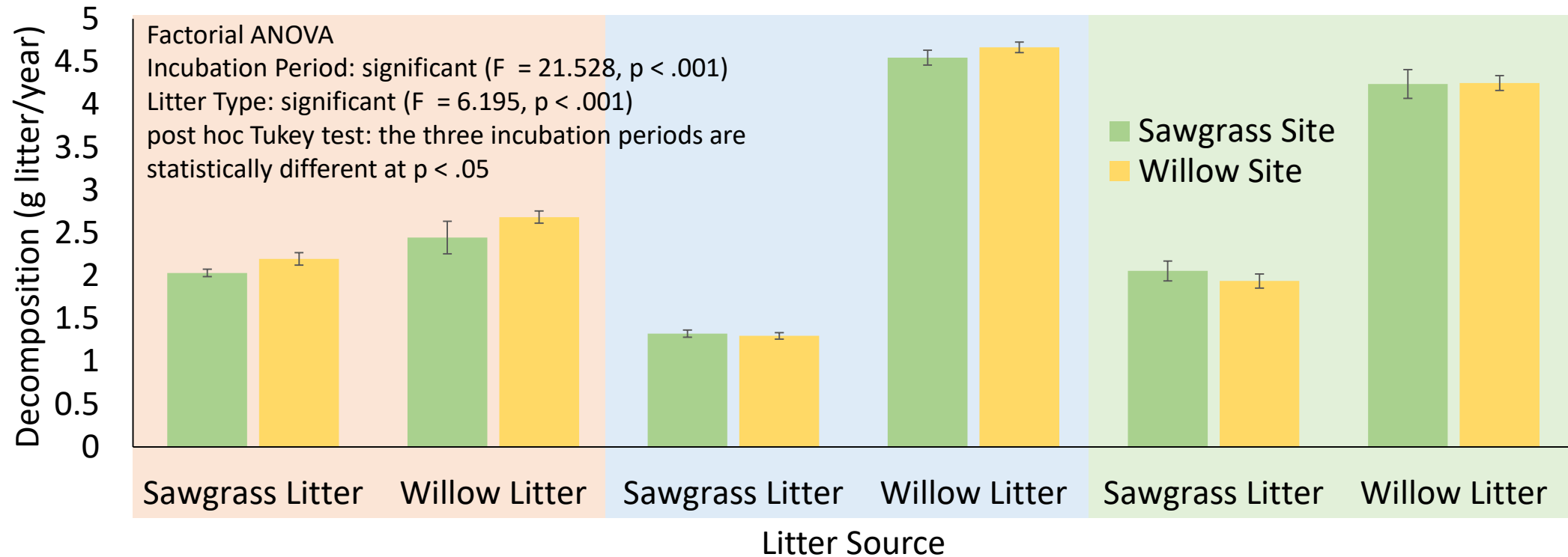
- reciprocal site-source design
- incubated for 6-8 months to capture different hydrological conditions



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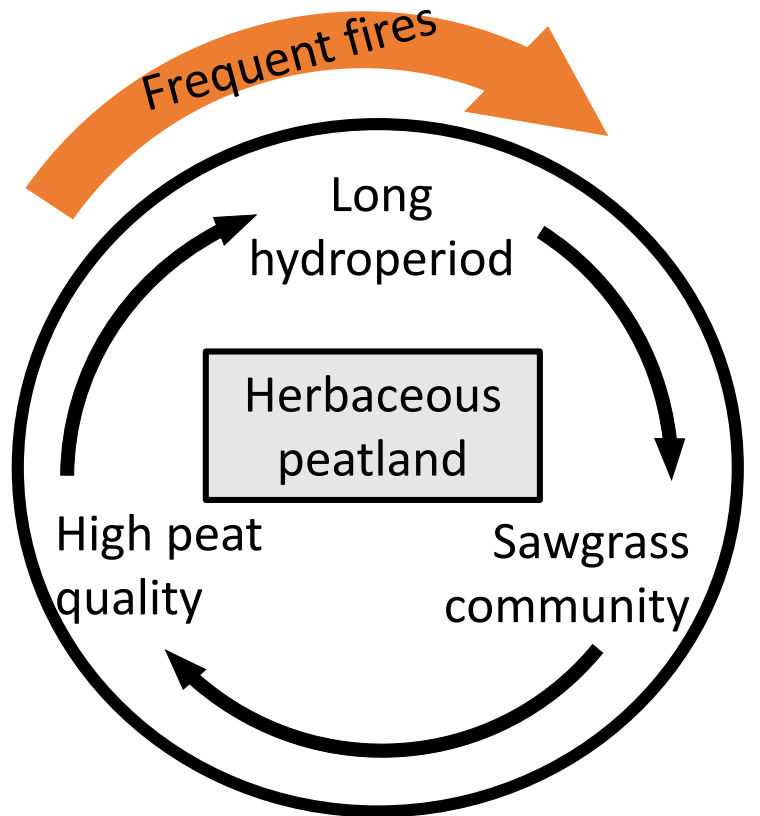
# Litter Decomposition



**Willow Litter Decomposition > Sawgrass Litter Decomposition**  
Willow litter decomposition is greater during wetter incubation periods than drier periods.

# Willow Encroachment May Reduce Peat Accumulation

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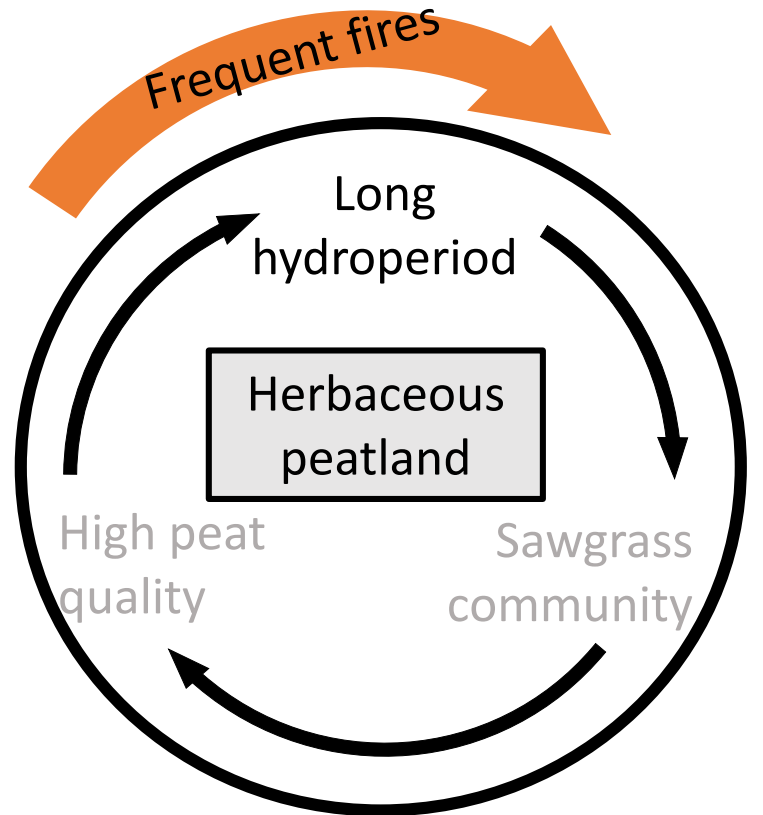


**Production > Decomposition**

- Increased willow litter decomposition likely offsets increased aboveground carbon storage in willow.
- Willow encroachment may disrupt peatland feedback mechanisms
  - greater water loss through transpiration (Bundy et al. 2016)
  - reduced fire frequency

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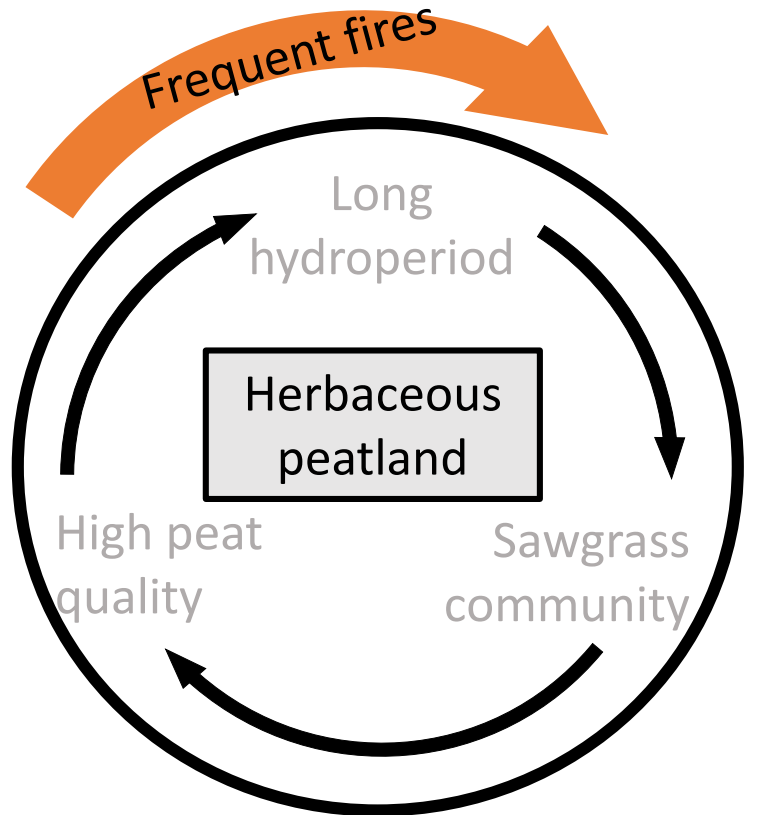


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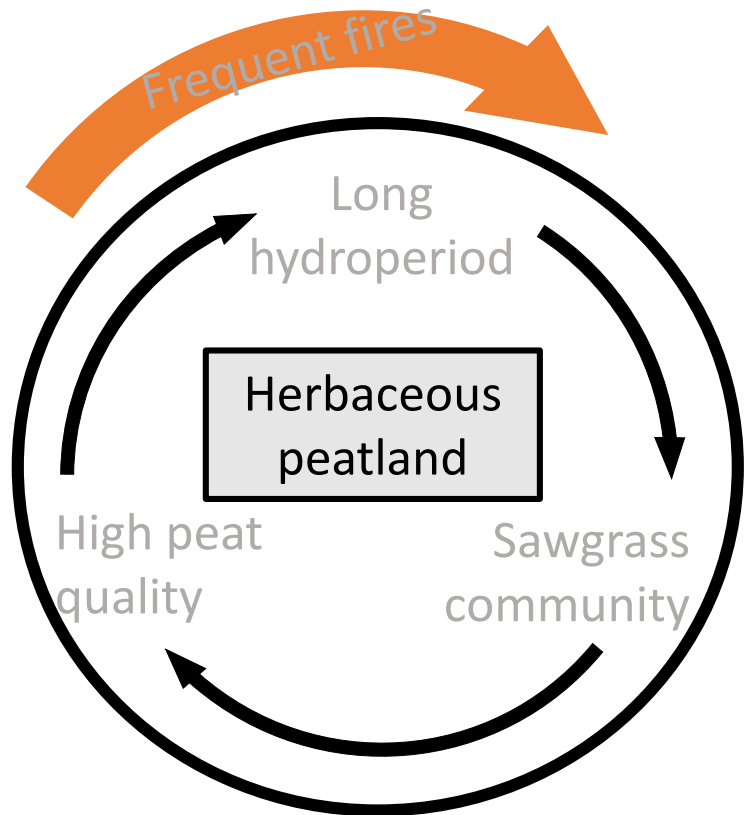


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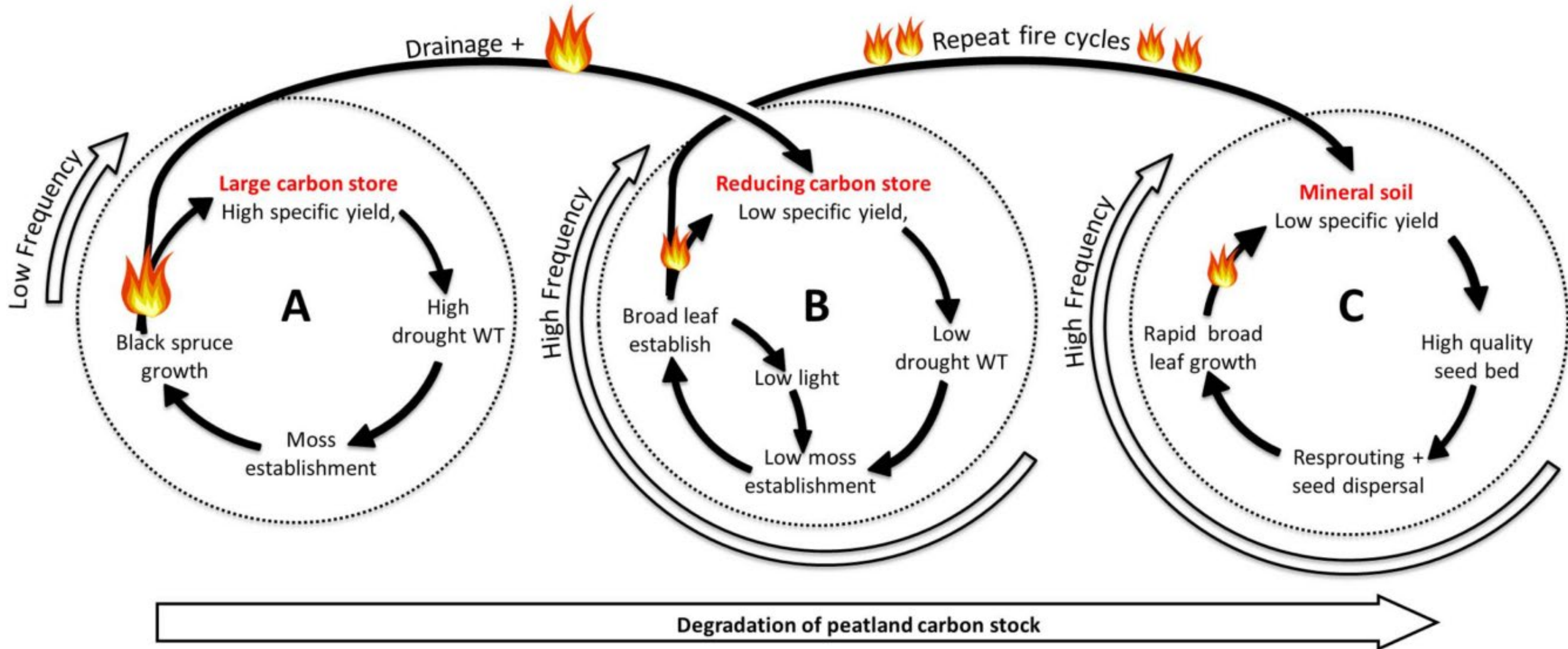
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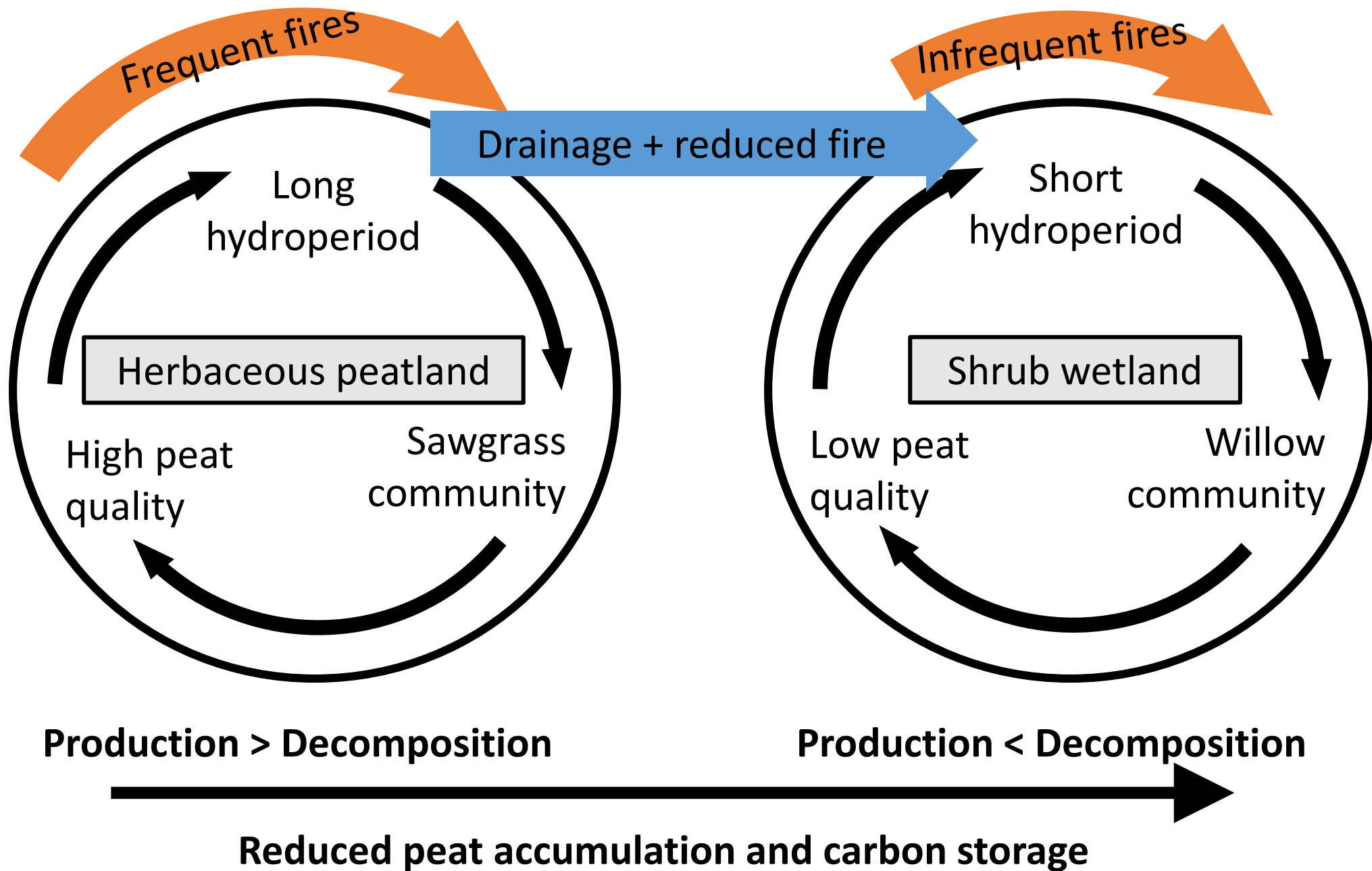


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# Altered disturbance regimes shift moss-dominated peatland to non-carbon accumulating shrub-grass ecosystem.





# Acknowledgements

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