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Fire in Wetlands: Fire Ecology and Prescribed Fire Tactics for Managing Wetlands in the Southeast

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Every day is a burn day even in wetlands

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Topics:

- Ecology of fire-dependent wetland-dependent species at risk
- Role of wetlands and their disturbance regimes
- Incorporating ecological goals in fire objectives
- Measures and monitoring for the multisystem
- Tips for making a No-Go into a GO!
- Adjusting tactics during the burn
- Long view -- shift from restoration burning to maintenance burning

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Greatest decline of species in the South are those that depend on fire-disturbed wetlands

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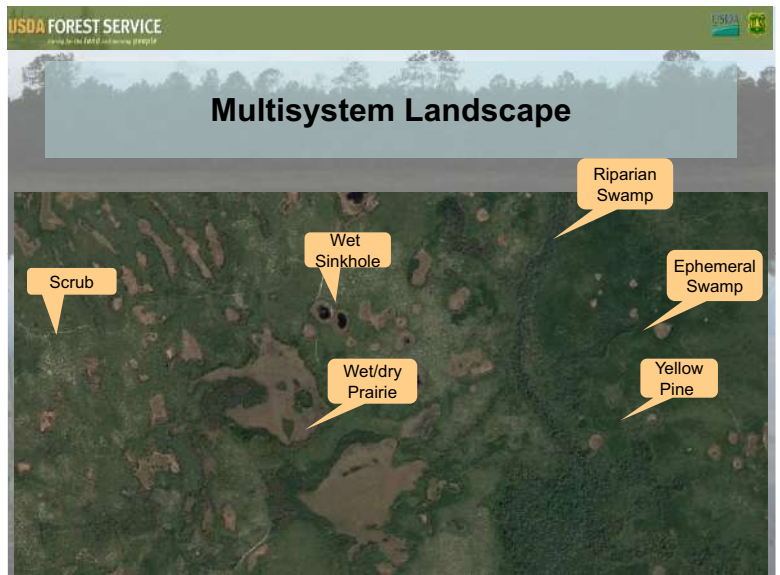
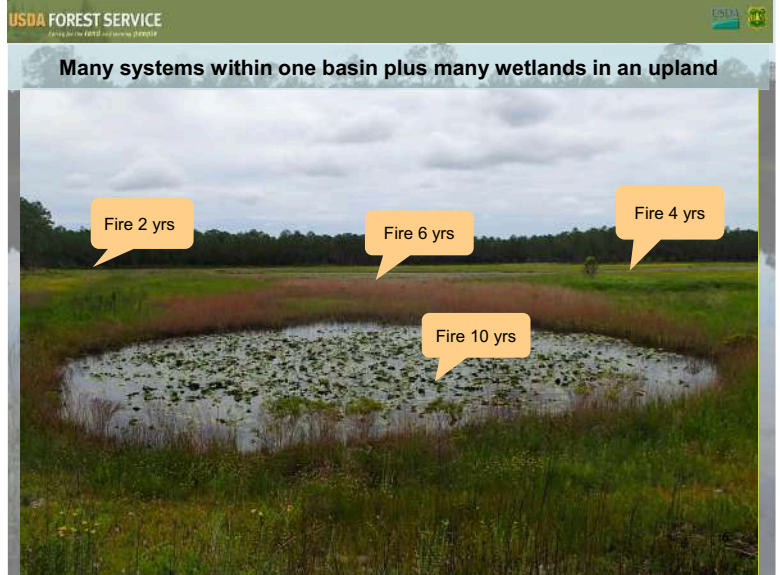
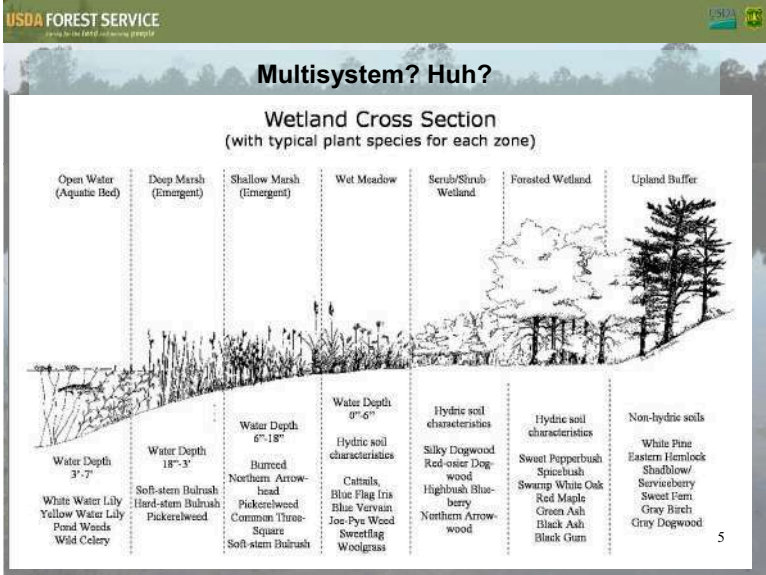
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Why are so many species disappearing? A well-burned wetland is a **multisystem** that...

- Provides **diverse specialized plants** needed for browse, hunting sites, hiding sites, nesting, egg deposit sites.
- Provides wildlife **refuge from fires** if peat is kept low
- Serves as **temporary "upland surrogate" habitat** up to 12 months while uplands regrow after fires
- Is an **oasis** during droughts if peat is kept low
- Is a **grocery store offering both take-out and delivery** serving communities of upland and wetlands – offering abundant foods for all dietary needs

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Mineral Soil Matters (two choices in fire planning)


A peat fire WILL happen!

- Burn plans suggest burning when wetlands are inundated. Short term convenience = long term increased risk.
- Hundreds of years habitat lost?
- Habitat shift to WHAT?
- Public trust in us as stewards?



Planned peat consumption

- Mineral soil in high zones- seed bank/rhizome source
- Mineral soil slows fire, keeps roots & seed cool, keeps moist peat zones from being pre-heated
- Mineral soil patches for rare species needing shallow open water
- Peat mosaic –200-1000% water capacity –moisture of extinction zone vs mop-till-you-drop




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Quick lesson in wetland soils (fuels) –

Duff is not soil yet, it is composting leaf litter



Consume wetland duff for plant diversity & reduced fire intensity






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Quick lesson in wetland soils (fuels) –

Fibric Peat

- Transition zone and upper wetland soil
- Has visible plant cells and fibers (overcooked oatmeal)

- Retains ~60% its volume in water
- Acts like 1 & 10 hour fuels
- Beneficial to keep on frequent return interval

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Quick lesson in wetland soils (fuels) –

Hemic or Mesic Peat


- In area of wetland shallow enough for vegetation, but longer hydroperiods with less soil oxidation and exposure to sunlight.
- Has properties of both Sapric and Fibric Peat (like pudding with oatmeal)
- Behaves like 100-1000 hour fuels.
- Beneficial to occasionally let fire finger through and burn out small pockets for diversity.

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Quick lesson in wetland soils (fuels) –

Sapric Peat



- Deep zone of wetland without groundcover - swamp trees, lily pads, open water.
- Slimy, cannot see plant parts. (pudding)
- Get tractor stuck
- Retains 100% its volume in water
- Acts like 1000+++ hour fuels
- Can skim fire over top when moist.
- Impossible to manually extinguish when dry.

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The result of loss of fire in wetlands took time, let restoration take time




Too much too fast

Phased burn ecotone only

2nd burn Partial peat

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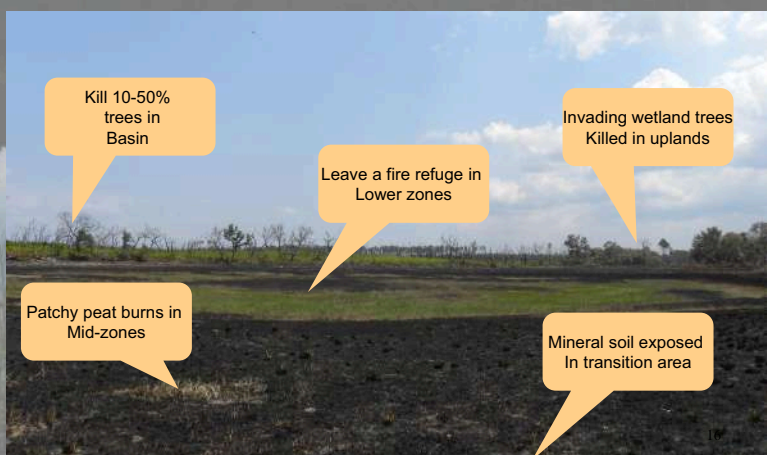
Wetlands are short and long term fire refuges (peat mosaic management)



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Burning wetlands – biological goals



- Kill 10-50% trees in Basin
- Invading wetland trees Killed in uplands
- Leave a fire refuge in Lower zones
- Patchy peat burns in Mid-zones
- Mineral soil exposed In transition area

Translating bio-objectives into burning objectives



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What must fire do to meet bio-objectives?

- Need to identify what fire must do to create conditions:
- Can objectives be achieved with fire alone or better to combine with other treatments?
- Can objectives be met in one burn?
- How intense?
- Moisture scenario? How much is in soil, peat, vegetation? What does it need to be during burn to meet objectives?
- Seasonality?
- Time of day?
- Tactics?

The answers become the fire objectives

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Return Interval

Multi-burn scenario

- Identify a multi-burn scenario over time, objectives are planned and monitored (e.g., 10 year cycle - sandhill 5x, embedded bay swamps burned 2x)



Not 100% each burn

- Mosaic fuels are treated -- maybe overlap or not over intervals. (e.g., prairies in scrub)



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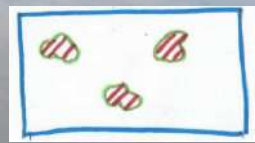
Fire Return interval **same** as surrounding fuel



Fire Return interval **longer** than surrounding fuel



Fire Return interval **shorter** than surrounding fuel



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Fire return Interval of wetland same or less frequent than surrounding fuel.

2007 2010 2012 2015 2017

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Return Interval more frequent than surrounding fuel

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Fire Monitoring Cycle

- Is fire behavior what I predicted? (was my prescription an accurate predictor of fire behavior or do I need to modify it?)
- Selected burn day based on prescription to produce desired fire behavior. Did it?
- After the burn, monitor fire effects in systems. Did the FEW KEY indicators show us that we progressed in meeting our objectives?
- Adjust prescription, plan next burn, monitor.
- **Shift system from restoration to maintenance!**

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Fire-Biology Interface

- Biologist removes uncertainty for Fire Managers in order for them to monitor successfully. Few key indicators for Fire managers (e.g., shrub scorch) paired with ecological indicators for Biologist (e.g., species abundance).
- Biologist provides feedback that prescription is on target or needs adjustment.
- Biological objectives are within a spectrum to allow burn boss flexibility to achieve overall intent without severe restrictions. (Burn when r.h. is below ideal but soil moisture is high)
- Establish trade-offs in prescription. E.g., Peat consumption in dormant season trumps ideal seasonality for rare plant. Prioritize in next burn.

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Developing wetland fire managers

- **Briefing** - Burn boss reads objectives and also delivers intent suitable for the moment.
- **During burn** – burn boss is seeking fire observations from crew and explaining what desired behavior will look like compared to what they are seeing.
- **Modifying tactics** – directing crew and getting feedback
- **After action review** – objectives, fire behavior, intent of modifications, feedback from crew on what tactics were working and how well objectives met. Burn boss is taking notes.
- **Long term learning** – involve crew in monitoring, have them evaluate condition for next plan, look at previous plan and conditions under which it was burned, discuss connections from wetlands they see undergoing restoration versus those in maintenance utilizing the history of prescribed fire.



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Uh-oh! No-Go!

WHY?

- Missed opportunity – had weather but insufficient resources
- Did not do advanced work to mitigate smoke issues
- Options too narrow - Planned too few units, wrote restrictive prescription, or narrow NEPA
- Upper level is not comfortable with risks
- Cannot get a variance
- Concerns from a neighboring land owner



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Turning a No-Go into GO!

Missed opportunity – had weather but insufficient resources

Solutions

- Involve partners in advance, have agreements in place, use their staff and equipment
- Anticipate and prepare: detailers, seasonal firefighters, and maintaining a trained militia
- Use cooperating agencies as contingencies



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Turning a No-Go into GO!

Options too narrow – nothing to burn every burn day

Solutions

- Write prescriptions broadly to allow many conditions, but have well-defined objectives to help you pick best day
- Over plan your burns, so every burnable day has several plans that fit it.
- Flexible footprints within larger planned burn unit to break off areas to meet time or weather conditions
- Federal agencies: all-encompassing NEPA
- Wilderness areas: Pre-established MRDG's for Rx Fire

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Turning a No-Go into GO!

SMOKE

Solutions

- Educating public to expect smoke from prescribed fire like they do with wildfires. Benefits of RxFire.
- Planning ahead for smoke patrols, signs, law enforcement.
- Know how long it will smoke, how much it will put up, minimize number of people impacted (software models).
- Utilize tactics that minimize smoke, like backing fire, or igniting major smoke fuels first, smaller units.
- Promote/market wetland burn through public information.
- Start with restoring wetlands further from populations



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Turning a No-Go into GO!

Upper level of agency is not comfortable with risks, cannot get variance

Solutions

- Involved in desired future condition
- Building trust with honesty, knowledge
- Understanding program of work and role everyone plays in it
- Fire manager builds skills, trust, and communication with burn boss. Develops experience, mentors subordinates.
- Demonstrates professionalism of crew to higher admin.
- Show risk management: mitigations, additional staffing, minimize risks yet meeting objectives
- External relationship of trust – Forest Area Supervisor can override Dispatch when permit is denied if you've earned support.



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Turning a No-Go into GO!

Concerns from a neighboring land owner

Solutions =

- Communications and agreements with landowners
- Understanding their concerns and working around serious issues
- Pre-burn notification for breathing issues
- Prescriptions that consider economic concerns (smoke harming foaling barn, poultry production)



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*Thank you!
Keep burning.*

