Prescribed Fire: A Tool For Ecosystem Management

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Prescribed Fire: Defined

- Prescribed fire is fire that is planned and implemented to accomplish specific management goals.
- Wildfire is a fire that is unwanted from a human point of view.
- An ‘escaped fire’ is a prescribed fire that is transitioning to a wildfire.
Prescribed Fire: Getting Started

- Where to begin?! Fire can be a scary thing!
  - First, think about what the prescribed fire is intended to do: most problems arise from poor planning
Prescribed Fire: Getting Started
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- Where to begin?! Fire can be a scary thing!
  - First, think about what the prescribed fire is intended to do: most problems arise from poor planning
  - Start small!
Prescribed Fire: Getting Started

- The question of liability – it can be mitigated by appropriate planning and timing
  - For most private burns with legitimate objectives, typical insurance policies should be in effect (double check!)
  - Know your local laws - they vary by state! (TX, FLA, GA have good prescribed fire laws…IA has none!)
Prescribed Fire: Getting Started

- Understand your local jurisdiction & laws – who is in charge?
  - State, county, municipal jurisdictions

- Understand what factors may make a particular day better or worse for burning

- Always notify emergency response authorities!
Prescribed Fire: Planning

- Most important part of a prescribed fire:
  - PRESCRIBED BURN PLAN

- The Prescribed Burn Plan sets forth a plan-of-action for all components of the fire:
  - Objectives
  - Acceptable Conditions
  - Strategy & Tactics
  - Communications
  - Maps / Topography
  - Organization
  - Equip / Resources
  - Ignition & Mop-up
  - Smoke Management
  - Contingencies
Prescribed Fire: Burn Plan

Think about:

- What are my objectives for starting this fire?
  Can I justify this action?
- Wildlife habitat management
- Fuels management
- Vegetation revitalization
- Improvement of forage growth
- Training
Prescribed Fire: Burn Plan

- Objectives:
  - What effects are sought with this burn?
  - Habitat effects: perhaps a patchy matrix is best
  - Timing of fire influences plant community that regenerates
  - Ecosystem may require fire in order to regenerate
Prescribed Fire: Burn Plan

- Examples of habitat objectives:
  - Increase vigor of a native grass planting, reduce cool season grass dominance
    - Spring or early growing season burn is most appropriate
Prescribed Fire: Burn Plan

Examples of habitat objectives:

- Reduce grass dominance, enhance forbs and other plants
  - Late growing season or even a fall burn tends to promote forbs over grasses (many forbs have gone dormant while grasses may still be storing root reserves)
Examples of habitat objectives:

- Reduce woody or tree cover (e.g., eastern red cedar)
  - May have to consider more severe conditions to get enough scorch to kill tree
Examples of habitat objectives:

- Open up woodland understory to improve oak regeneration
Prescribed Fire: Burn Plan

- How severe a fire is needed to accomplish the desired objectives?
  - Fire intensity, BTU release, temperature, “completeness” of burn
Prescribed Fire: Burn Plan

What conditions are needed to accomplish the goals of my prescribed fires?

- Weather Conditions (Temp, Wind, RH, Cloud Cover, Approaching Fronts)
  - Temperature and wind combine to dry out fuels quickly, breathe life into a fire
  - Relative humidity may be most important (along with wind) determinant of how fire burns
  - Cloud cover – sun will make a fire burn hotter
  - Weather fronts cause wind shifts and other conditions

- Question: Where should I get my weather?
Prescribed Fire: Burn Plan

- Adjust your prescription to suit your goals:
  - Woodland fires may be slower (creeping), wetter, more smoke
    - Require more wind, perhaps lower RH, more sun for burn day
  - Grassland fires can be fast (very fast!) moving; fuel dries quickly, and more difficult to control
    - Will require less wind to move fire, burn with higher RHs (50%+)
Prescribed Fire: Burn Plan

- Fuel Conditions (1hr, 10hr, 100hr, 1000hr)
  - 1 hour fuels = grass, leaves, sticks
  - 10 hour = bigger sticks
  - 100 hour = small logs
  - 1000 hour = big logs

- Slope = fire travels fast uphill, more slowly downhill

- Fire Breaks – natural or created

- Topographic Features – Aspect, Exposure, Connectivity of fuels, and breaks in terrain
Prescribed Fire: Burn Plan

- What types of equipment and how many personnel are needed to conduct the fire?
  - Engines? UTVs? Hand Tools? Bulldozers?
  - Personnel & training: level of experience based on complexity / risk of burn
- Burn Boss, Sawyer, Firing Specialists, FFT2s
Prescribed Fire: Burn Plan

Know some tools of the trade, and dress appropriately!

- Absolute basic gear – clothing:
  - Natural fiber clothes (denim jeans, cotton shorts, leather boots and gloves, preferably a helmet

- Preferred gear for burning – clothing:
  - Nomex/Indura cotton shirt/jacket, pants, helmet, leather boots & gloves, eye & hearing protection, fire shelter
  - Check out online auction sites for affordable gear!
Prescribed Fire: Burn Plan

Preferred PPE

- Helmet/Hard Hat
- Eye Protection
- Nomex/Indura Shirt/Jacket
- Backpack
- Leather Gloves
- Nomex/Indura Pants
- Leather Boots
Prescribed Fire: Burn Plan

Know some tools of the trade, and dress appropriately!

- Basic tools:
  - Brush rake, shovel, backpack water pump, drip torch
    - Most available at lawn & garden stores
  - ATV with a sprayer tank, tractor with disk or water tank/hose
Prescribed Fire: Burn Plan

- Know some tools of the trade, and dress appropriately!
  - More advanced or specialize tools:
    - Flapper, Pulaski, McLeod, Council Rake, Backpack Sprayers, drip torch, fusee
    - Portable Fire pumps for UTV, Pickup truck
    - Trucks set up specifically for fire management
Prescribed Fire: Burn Plan

- How will the fire be conducted? (Strategy & Tactics)
  - Who needs to be notified of the prescribed fire?
  - How will crew stay in communication?
  - What is the firing plan – sequence of ignition, firing techniques?
    - Headfires, Backfires, Strip Headfire, Flank Fire, Ring Fire, Spot Firing
  - Each technique has benefits and drawbacks, and can be used to mitigate other conditions
Prescribed Fire: Burn Plan

- How will the fire be conducted? (Strategy & Tactics)
  - Who will be in charge?
  - Who is assigned duties of lighting, holding, lookout?
  - What is the mop-up plan when firing is complete?
  - What is my contingency plan? Who will be called?
Prescribed Fire: Ignition Techniques

Diagram showing different types of fires:
- Heading fire
- Flank fire
- Left flank
- Right flank
- Mean direction of wind
- Back
- Backing fire
- Ignition point
- Burnt area
Prescribed Fire: Ignition Techniques

- **Headfires** – driven by prevailing wind; incomplete combustion, leave more residue...can be very intense
- **Strip headfires** – used to reduce intensity, but achieve similar results of a headfire
- **Spot ignition** – results in a “ripple effect” of starts that grow together; also reduces intensity, smoke mgmt
- **Flankfires** – less intense, fires that grow together to pull smoke and heat to center of unit
- **Backfires** – moving against prevailing wind; move more slowly, but result in more complete combustion
Prescribed Fire: Burn Plan

Social Considerations

- Fire is not well understood by people of “Eurasian” heritage in North America
- Frequently used extensively by peoples throughout the world
- People WILL call authorities – or take matters into their own hands – when they see smoke on the horizon… and in some instances, with good reason

Saturday, 15 November 2008
Yorba Linda, CA – set by “kids” who didn’t put out a bonfire
Prescribed Fire: Burn Plan

- Social Considerations
- Climate change concerns – release of fixed carbon (e.g., Savory argument)
- Especially sensitive in the WUI (Wildland Urban Interface)
  - Many people build in areas that are extremely fire prone, and do not take appropriate precautions
  - Often don’t appreciate that fire WILL happen
  - Will panic when they see smoke on the horizon
Prescribed Fire: Burn Plan

Iowa
Wildland Urban Interface 2000

WUI
- Intermix
- Interface

Non-WUI
Vegetated
- Very Low Density Housing
- No Housing

Non-Vegetated or Agriculture
- Medium and High Density Housing
- Low and Very Low Density Housing
- Water

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Prescribed Fire: Burn Plan

California
Wildland Urban Interface 2000

- WUI
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Prescribed Fire: Burn Plan

- Smoke Management
- Have smoke- and fire-sensitive areas been identified prior to the burn date?
  - Examples of smoke sensitive areas:
    - Dwellings (human & animal)
    - Road ways / Airports
    - Power Transmission Lines
    - Airsheds
Prescribed Fire: Burn Plan

- Smoke Management
  - Smoke is problematic in several ways:
    - Releases greenhouse gases (e.g., CO$_2$)
    - Releases gases harmful to human & animal health (e.g., CO)
    - Releases particulate matter (visibility and health – think asthma and 10-car pile-ups)

*Florida, 2006 = fatalities from smoke over interstate*
Smoke Management: Mitigation

- Manage potential smoke problems by adjusting plan prescriptions
  - Consider wind direction, dispersion characteristics, mixing heights, fuel moistures
- Reduce smoke by altering firing techniques – different types of fire produce different types of smoke: examples?
Prescribed Fire: Burn Plan

- Smoke Management: Mitigation
  - Know your fuel types: smoldering fires produce 3-5 times as much smoke as do flame fronts; heavy fuels (100hr and 1000 hr) will burn long and smolder longer
  - Greenness & wetness contributes to smokey, more incomplete fires
  - Burning in timber stands tends to pose smoke problems, as wind is reduced
Prescribed Fire: Burn Plan

Post-fire, take time to evaluate your burn…

- Immediately following the fire, review how the operation went
  - Did the fire behave as planned? Did any unexpected events occur?

- Weeks and months following fire, continue to watch the site
  - Are the habitat/vegetation effects you’d hope to see present?
Prescribed Fire: Evaluation
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Where to seek more information:

- State natural resource agency professionals
- USDA-NRCS offices
- NGOs
- Natural Resource Consultants
- Local volunteer fire departments
- Internet (for examples of prescribed burn plans)
Questions?