Landscape Design for Bioenergy and Ecosystem Sustainability - Biodiversity -

- Funding provided through the Association of Fish and Wildlife Agencies via grant from the Sport Fish and Wildlife Restoration Programs of the USFWS, pursuant to the Stevens Amendment to P.L. 100-463

- Contractor: Bill McGuire
  Bill McGuire Conservation, LLC
  Conservation Policy

Bioenergy and Biodiversity
Wildlife - Key Factors

- Outdoor industry (6.5 million jobs – 1 in 20 of all U.S. jobs - $730 billion/year)
- Year-round wildlife needs are important
- Species richness is not enough (when ecosystems are fragmented, habitat generalists usually gain while habitat specialists lose)
- Agro-ecosystem (the native ecosystem best standard for native biodiversity)

Bioenergy and Biodiversity Wildlife – 5 Risks

1. Reduction in native plant diversity - within field/on the landscape = less habitat quality
2. Management that diminishes habitat; increased density; reduced structure, winter/early nesting cover; nest disturbance = less habitat quality
3. Water quantity/quality (81% of fish communities diminished) – use more water/apply more chemical = negative to aquatic species

Bioenergy and Biodiversity
Risk # 4 - Aggressive Plants that Invade

Energy Crop Characteristics

- Easy to establish
- Fast/robust growth
- Adaptable
- Ability to outcompete other plants

giant miscanthus - photo by Bill McGuire

Invasive Species Characteristics

- Establish easily (seed, rhizomes, etc.)
- Rapid growth
- Grow on a variety of sites
- Outgrow/inhibit other plants

callery pear invasion - photo by Bill McGuire

Bioenergy and Biodiversity
Risk #5 - Land Conversion

30 ecosystems have declined > 98%; 96 by 70-98%: Losses greatest in the South, Northeast, Midwest, and far West

Direct: Native ecosystem
to energy crop

Indirect: Native ecosystem replaces cropland/pasture going to energy crop; replacing ecologically site-appropriate native plants with other natives (longleaf to loblolly pine, prairie to willow)

Arkansas forest - photo by Bill McGuire

Bioenergy and Biodiversity Paradigm Compatibility

blue highlight depicts commonality

Energy Crops

- Monoculture
- Use most productive crops
- Aggressive and often GMO and/or non-native plants
- Higher stand density
- Use land not suited to food production
- Harvest after dormancy
- Remove all biomass
- Water as needed

Wildlife Habitat

- Plant diversity
- Plantings match ecosystem
- Native, non-GMO, and non-aggressive plants
- Lower stand density
- Sustainable management of native ecosystems
- Avoid nesting disturbance
- Leave some residual
- Conserve water (w/o irrigation)

Wildlife conservation will …

… not be accomplished by chance.

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Bioenergy and Biodiversity
Maximal Biomass Production

1. Urban/disaster waste, invasive species eradication, highway rights-of-way
2. Energy crops using existing cropland (least productive), pasture, or plantation forest (as few acre as possible)
3. Use non-aggressive species or take responsibility for the cost of controlling escapes onto private/public land
4. Safeguards to preclude public funds incentivizing conversion of native ecosystems
5. Collaboration with USFWS and state fish/wildlife agencies
6. Use Best Management Practices that integrate wildlife

Bioenergy and Biodiversity Optimize Among Societal Needs

1. Urban/disaster waste, invasive species eradication, highway rights-of-way
2. Residue from sustainably managed native ecosystems (ecologically site-appropriate forest, etc.)
3. Diverse native-grass/forb plantings, particularly on grassland landscapes and that provide flexibility for bioenergy and livestock forage uses
4. Management of existing plantation forest, cropland, pasture - compatible with native ecosystems

Bioenergy and Biodiversity Conclusions - Recommendations

1. Fish, wildlife, and their native habitats (and the jobs/economy) should be an integral part of the bioenergy sustainability concept.
2. Include state fish and wildlife agencies/USFWS (agencies that know the most) in bioenergy discussions at all levels.
3. Develop and use Best Management Practices that incorporate fish/wildlife and native ecosystem sustainability.
4. Safeguards are needed so that public funds do not cause unintentional conversion of remaining ecosystems or diminishment of native wildlife.
5. Clarify responsibility - who will pay for control of aggressive plants if they escape their planted area (i.e. those that hold patents, sell, or plant them or the public (individually or collectively through taxation).
6. Increase awareness of bioenergy implications to fish, wildlife, native ecosystems, and jobs/economy – the public has a right to know.

Bioenergy and the 2008 Farm Bill Observations

- Government spending to stimulate bioenergy, on a foundation of partial conservation, is likely to trigger the need for more spending to address unintended consequences.

- With thought and planning, the production of bioenergy can be compatible with all natural resource needs, including fish/wildlife.

- ***Policymakers, industry, and stakeholders have choices***.

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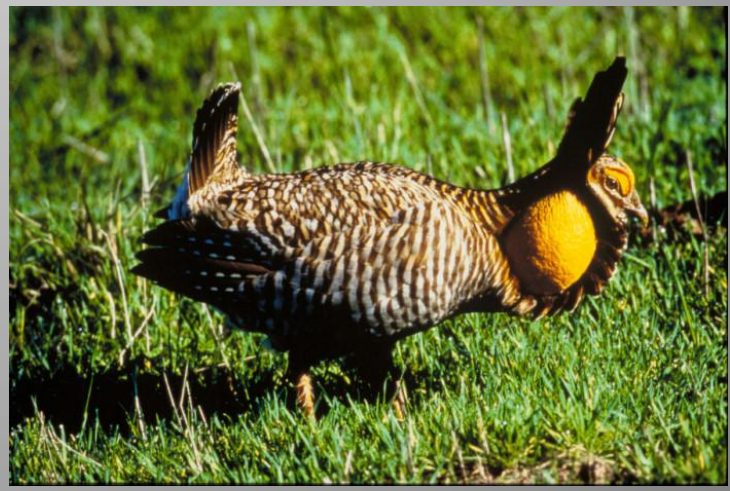

Courtesy USFWS - George Lavendowski