

## Appendix 1. Qualitative elicitation materials

This appendix contains the Design Workshop agenda, the list of experts in attendance, and the worksheets used to guide discussions. The worksheets have been reformatted and minor adjustments have been made to clarify elicitation instructions.

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### A. WORKSHOP AGENDA

#### Wednesday, July 13, 2011

9:00 Welcome & Introductions

9:45 Field to Market guest presentation  
(Julie Shapiro, Keystone Alliance for Sustainable Agriculture)

10:15 Outcome-based metric for biodiversity  
(Ashton Drew, NCSU Biodiversity & Spatial information Center)

11:00 Operational Decision Review

- Review instructions and terminology
- Individual voting on operational decision relevance

*12:00 Lunch*

1:30 Operation Decision Review (continued)

- Small group discussion to recommend additional decisions
- Large group discussion to compare and finalize operational decision list

5:00 Dismiss

#### Thursday, July 14, 2011

8:00 Species Review

- Review instructions and terminology
- Small group discussions of species characteristics
- Large group discussion to finalize characteristics list

10:00 Biodiversity Review

- Review instructions and terminology
- Small group discussions of biodiversity axes
- Large group discussion to compare and finalize biodiversity axes

*12:00 Lunch*

1:30 Scale Review

- Review instructions and terminology
- Large group discussion to finalize scale

#### 2:45 Expert Contacts

- Review instructions and terminology
- Individual identification of experts for quantitative interviews

#### 4:00 Dismiss

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## B. PARTICIPATING EXPERTS

<b>John Anderson</b>	<i>Retired Full Professor Department of Crop Science North Carolina State University</i>
<b>Philip Barbour</b>	<i>Wildlife Biologist USDA Natural Resources Conservation Service Ecological Sciences Division, Mississippi</i>
<b>Trey Cooke</b> *attendance by Skype	<i>Director Delta Wildlife, Inc., Mississippi</i>
<b>Steve Corak</b>	<i>Production Technologies Manager, Pioneer Hi-Bred program DuPont , North Carolina</i>
<b>Dave DeGeus</b>	<i>Lead, Sustainable Agriculture program The Nature Conservancy, Iowa</i>
<b>Cecil Dharmasri</b> *cancelled	<i>Environmental Scientist Syngenta Crop Protection, LLC, North Carolina</i>
<b>Jeff Hall</b>	<i>Wildlife Biologist NC Wildlife Resources Commission Partners in Amphibian &amp; Reptile Conservation, North Carolina</i>
<b>Tilghman Hall</b>	<i>Ecotoxicologist Bayer Crop Science, North Carolina</i>
<b>Hank Henry</b>	<i>Wildlife Biologist USDA Natural Resources Conservation Service East National Technology Support Center, North Carolina</i>
<b>Mark Jones</b> *unable to attend, sick	<i>Private Lands Biologist NC Wildlife Resources Commission, North Carolina</i>
<b>Chris Moorman</b>	<i>Associate Professor, Fisheries, Wildlife &amp; Conservation Biology North Carolina State University</i>
<b>Don Riley</b>	<i>Biologist USDA-NRCS Ecological Sciences, North Carolina</i>
<b>Julie Shapiro</b>	<i>Coordinator, Field To Market project The Keystone Center, Colorado</i>

<b>Sally L. Shaver</b>	<i>Agricultural Consultant Shaver Consulting, Inc., North Carolina</i>
<b>Christy Slay</b>	<i>Post-doctoral Researcher The Sustainability Consortium University of Arkansas</i>
<b>John Wooding</b>	<i>Small Game Biologist NC Wildlife Resources Commission, North Carolina</i>
<b>Louise Alexander</b> *facilitator*	<i>Research Associate Biodiversity &amp; Spatial Information Center NC Cooperative Fish and Wildlife Research Unit NCSU Department of Biology</i>
<b>Ashton Drew</b> *lead facilitator*	<i>Research Coordinator, Project PI Biodiversity &amp; Spatial Information Center NC Cooperative Fish and Wildlife Research Unit NCSU Department of Biology</i>

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## C. OPERATIONAL PRACTICES

Name: \_\_\_\_\_

Group #: \_\_\_\_\_

### Instructions:

The following pages present various questions about a producer's operational decisions. Questions in **black** are those already included in the Field to Market tool. Questions in **red** are draft questions that we are proposing to add. These have been organized under heading:

- Crop Choice
- Tillage Practices
- Fertilizer Practices
- Crop Protectant Practices
- Irrigation Practices
- Harvest Practices
- Rotational Practices
- Field Border/Ditch/Swale Practices

- (1) Whole Group: We'll review the material quickly. Please ask about terms you do not know.
- (2) Individual: Vote Yes, No, or No Knowledge for whether you think the question is one relevant to vertebrate wildlife use of the field and immediate field border. Also indicate if the practice is relevant to all of the crops.
- (3) Small Group: Review the list of questions and determine if there are additional questions that should be added to any of the sections.
- (4) Whole Group: Comparison of results to reach consensus on list of relevant questions.

### CROP CHOICE

#### What did you plant in the field?

Corn, Cotton, Wheat, Soy

**How many acres were planted?**

(enter any number)

**What variety did you plant?**

Conventional, GMO Pest Resistant; GMO Herbicide Tolerant

**TILLAGE PRACTICES****What pre-plant tillage system best describes your practices?**

No-till, Strip-till, Mulch-till, Reduced-till, Conventional-till, Intensive-till

**No-till**

No full-width tillage, fluffing harrow ok

**Strip-till**

Zone tillage usually with anhydrous ammonia toolbar (10" zone disturbance)

**Mulch-till**

Chisel-plow or disc and 1-2 secondary tillage trips

**Reduced-till**

Chisel-plow or disc and 2-3+ secondary tillage trips

**Conventional-till**

Chisel-plow or disc and 3+ secondary tillage trips

**Intensive-till**

Disc, moldboard plow, disc, 2x combination tool, spray, and row cultivate

**When did you till the field?**

(enter month)

**How often do you sub-soil or deep rip this field?**

Never, Every Year, Every 2 Years, Every 3 Years, Every 4 Years, > 4 Years

“Deep rippers or subsoilers typically operate at depths greater than would have historically been reached with moldboard plows or traditional chisel plows. Also, the shanks are often at a wider spacing, for example 30 inches.”

**When do you typically sub-soil or deep-rip the field?**

(enter month)

**How often do you use an undercutter tillage tool on this field?**

Never, Every Year, Every 2 Years, Every 3 Years, Every 4 Years, > 4 Years

“Undercutters are typically equipped with very wide V-blade sweeps and operate at relatively shallow depths. This implement is often used to control weeds on fallow ground as part of a wheat rotation.”

**In what month do you perform undercut tillage?**

(enter month)

**What soil conservation practices do you use?**

None, Cover Crop, Contouring, Terracing, Strip Cropping, Vegetative filter strips

## FERTILIZER PRACTICES

**How many fertilizer applications were made to this field for the growing season you are analyzing?**

0 to 5

“An application is a single trip across a field to apply a single fertilizer or a fertilizer blend (e.g., N-P2O5-K2O blend).”

**What form of fertilizer was applied?**

N-P2O5-K2O Blend	Nitrogen solutions (30%)	Super-phosphate 44-46% phosphate
N-P2O5-K2O Rate	Nitrogen solutions (32%)	Diammonium phosphate (18-46-0)
Elemental nitrogen	Urea 45-46% nitrogen	Other phosphate fertilizers
Anhydrous ammonia	Ammonium nitrate	Potassium chloride 60% potassium
Nitrogen solutions (28%)	Sulfate of ammonium	Potassium other
	Super-phosphate 20% phosphate	

**What amount of product was applied?**

0 to >1000 lbs/acre

**Nitrogen Stabilizer?**

Yes, No

**How many types of manure applications have been applied?**

0 to 3

**What type of manure was applied?**

Dairy, Poultry, Hog, Beef

**How was the manure applied?**

Surface applied, Incorporated

## CROP PROTECTANT PRACTICES

**How many crop protectant applications were made to this field for the production year you are analyzing?**

0 to 10

“An application is a single trip across a field; a single application may include a combination of herbicides, insecticides, fungicides, seed treatment, growth regulators, and fumigants. For example, applying an herbicide and an insecticide in the same tank-mix is considered one application but two products. Alternatively, if you apply a burn-down herbicide as well as a pre-emerge product in the same tank, this again is one application with 2 herbicide products. If you were to apply the same insecticide twice in the same season using two different trips, this would be considered two applications with one insecticide product each time.”

**What type of protectant was applied?**

Herbicide, Insecticide, Fungicide, Seed Treatment, Growth Regulator, Fumigant, Harvest Aide

**Was type of herbicide was applied?**

General, Targeted

**What type of insecticide was applied?**

General, Targeted

**How was the protectant applied?**

Whole field surface application, Partial field surface application, Whole field aerial application, Partial field aerial application

**Do you use integrated pest management practices?**

Yes, No

**IRRIGATION PRACTICES**

**Estimate the amount of water applied as irrigation in 2010.**

0 to > 30 inches

**What was the source of your water?**

River/Stream, Reservoir, Irrigation district, On-farm holding pond, Municipal pipe, Well

**What was the pressure at the pump?**

0 to 150 psi

**What was the pumping depth (lift)?**

0 to >975 ft

**HARVEST PRACTICES**

**Do you use a flushing bar?**

Yes, No

**When do you harvest?**

(enter month)

**Do you delay harvest to accommodate wildlife?**

Yes, No

**Do you mow the field after harvesting?**

Yes, No

**ROTATIONAL PRACTICES**

**How frequently do you add perennial or annual forages to your crop rotation?**

Never, Every 2<sup>nd</sup> Year, Every 3<sup>rd</sup> Year, Every 4<sup>th</sup> Year, Every 5<sup>th</sup> Year, +5 Years

**Are there field buffers or margins within or at the edge of your crop fields?**

Yes, No

**What types of field borders, boundaries, and/or margins neighbor this field?**

Hedges or hedgerow, fence, wall, road, stream, ditch, drain, conservation buffer

“Hedgerows are narrow bands of woody vegetation that separate fields. The term hedge is sometimes used interchangeably with hedgerow, but generally has the narrower sense of a hedgerow composed of low dense vegetation (shrubs or small trees), which is planted and managed”

“Conservation buffers are vegetative barriers (grass, shrubs, trees) strategically located within or at the edge of crop fields to protect elements of the natural environment from effects of weather and human activities.”

**What types of vegetation predominantly characterize the buffers?**

Grasses, shrubs, trees, a mix

**Is the buffer planted with native vegetation?**

Yes, No

**Describe the fencing within or at the edge of your crop fields?**

Wooden posts, chain link, wire, stock fencing, vertical electric

**Are the ditches vegetated?**

No, Yes with native vegetation, Yes with non-native vegetation

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**D. SPECIES TRAITS**

Name: \_\_\_\_\_

Group #: \_\_\_\_\_

**Instructions:**

The following pages present all the modeled vertebrate species associated with “row crop” land cover as either a primary (name in plain text) or secondary (name in **bold** text) habitat resource. A secondary habitat resource is only used if it is within a specified distance of a primary habitat type (e.g. a forest bird might occasionally forage in a row crop). The species have been organized into the following groups:

- Amphibians
- Reptiles
- Migratory birds
- Resident birds
- Waterfowl & Waterbirds
- Small mammals
- Large mammals
- Bats

- (5) Whole Group: We'll review the instructions and material quickly. Please ask about terms you do not know.
- (6) Small Group: Review the list of examplespecies and suggest traits that might make species more or less sensitive to alternative operational decisions. Consider such factors as required resources, timing of major developmental events, sensitivity to disturbance, etc.
- (7) Whole Group: Comparison of results to reach consensus on list of species traits.

## AMPHIBIANS

Bullfrog, Crawfish Frog, Fowler's Toad, Gulf Coast Toad, Greenhouse Frog, Giant Toad, Hellbender, Southern Toad, Woodhouse's Toad

## REPTILES

Brown Snake, Diamondback Water Snake, Eastern Kingsnake, Eastern Rat Snake, Florida Green Water Snake, Florida Worm Lizard, Mole Kingsnake, Northern Painted Turtle, Northern Water Snake, Racer, Slender Glass Lizard, Snapping Turtle, Spotted Turtle

## MIGRATORY BIRDS

American Crow	Common Raven	Northern Mockingbird
American Goldfinch	Eastern Bluebird	Northern Rough-winged
American Woodcock	<b>Eastern Meadowlark</b>	Swallow
Antillean Nighthawk	Eastern Phoebe	Purple Finch
Barn Owl	European Starling	Purple Martin
Bank Swallow	Great Horned Owl	Red-tailed Hawk
Barn Swallow	Gray Kingbird	Red-winged Blackbird
Bewick's Wren	House Finch	Savannah Sparrow
Black Vulture	Horned Lark	Shiny Cowbird
Boat-tailed Grackle	Killdeer	<b>Sharp-shinned Hawk</b>
Chipping Sparrow	Laughing Gull	Upland Sandpiper
Cliff Swallow	Long-eared Owl	Vesper Sparrow
Common Ground-Dove	Mississippi Kite	White-winged Dove
Common Grackle	Mourning Dove	Yellow-breasted Chat
Common Nighthawk	Northern Harrier	

## RESIDENT BIRDS

Eastern Screech-Owl, Eurasian Collared-Dove, House Sparrow, Ring-necked Pheasant, Rock Pigeon, White-tailed Kite

## WATERFOWL & WATERBIRDS

Black-crowned Night-Heron, Canada Goose, Cattle Egret, Fulvous Whistling-Duck, Glossy Ibis, Limpkin, Mallard, **Mottled Duck**, Sandhill Crane,

## LARGE MAMMALS

**American Black Bear, Puma, Bobcat,** White-tailed Deer, Red Fox, Virginia Opossum, Striped Skunk, Round-tailed Muskrat

## SMALL MAMMALS

**Woodland Vole,** Deer Mouse, House Mouse, Least Weasel, **Marsh Rice Rat,** Norway Rat, Oldfield Mouse, Prairie Vole, Black Rat

## BATS

Eastern Red Bat, Evening Bat, **Hoary Bat, Big Brown Bat,** Jamaican Fruit-eating Bat, **Townsend's Big-eared Bat**

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## E. BIODIVERSITY METRIC

Name: \_\_\_\_\_

Group #: \_\_\_\_\_

### Instructions:

You have reviewed a list of farming operational decisions and considered characteristics of various species that might make them more or less susceptible to habitat changes associated with these decisions. The biodiversity metric appearing in the Fieldprint Calculator can be a composite metric of several biodiversity metrics. It is important to think through what these axes might be and how together they might represent biodiversity impacts overall of the operational decisions. Consider and discuss the following alternatives. Keep in mind:

- the scope and objectives of the Field-to-Market project.
- many of the categories into which we divide species represent value judgments.
- we need the minimum number of bins to meaningfully distinguish outcomes of various operational decisions.

- (1) Whole Group: We'll review the instructions and material quickly. Please ask about terms you do not know.
- (2) Small Group: Debate the proposed alternatives (and propose your own designs) in light of operational decisions and species characteristics.
- (3) Whole Group: Comparison of results to reach consensus on list of axes.

## TAXONOMIC CATEGORIES

Birds, Mammals, Amphibians, Reptiles

## BIODIVERSITY CATEGORIES

Richness (the number of species)  
Evenness (a balanced ratio of species)  
Rarity (the number of endemic species, threatened species)

## SOCIO-CULTURAL AND SOCIO-ECONOMIC CATEGORIES

Game species  
Threatened and Endangered species  
Invasive pest species  
Endemic species  
Iconic species (e.g. Bald eagle)

## FUNCTIONAL CATEGORIES

### Food

- Seed eaters (granivores)
- Foliage eaters (herbivores)
- Insect eaters (insectivores)
- Fruit eaters (fructivores)
- Meat eaters (carnivores)

### Shelter

- Underground nest/burrow
- Herbaceous ground cover
- Shrub cover
- Trees cover

### Water

- From foliage
- From open water