

# **Biodiversity Assessment of Akaogi Farm**

## **Final Report, Vegetation Survey**

November 2009

### **Project Overview**

A wildlife and vegetation assessment and survey plan unique to the Akaogi's rice paddy research project, were developed and honed to accommodate current grant requirements and long term data collection needs. Field observations and data collected from this first year's survey project provides initial baseline data for long term wildlife habitat study in conjunction with the Akaogi's Vermont rice-growing project.

Since mid-April, there have been organizational meetings and conference calls to plan and discuss the Akaogi's grant-funded project, survey planning, and survey team organization. Two informal meetings while working on site occurred between Linda, Takeshi and Em Richards to discuss presentations for the July 25<sup>th</sup> workshop. Em Richards, among others of the team, attended and assisted during the all-day workshop. A short description of the survey plan was drafted and included a part of an information packet for workshop participants (Appendix). The following report is specific to the vegetation survey.

### **Vegetation Survey, Analysis, and Final Recommendations**

#### **Vegetation Survey Tasks**

Two vegetation surveys were conducted at the Akaogi Farm during the field season – the first on July 13, 2009 and final survey on October 12, 2009. In the six flagged sites designated within the study area, observations were noted and plant species identified and quantified according to established sampling protocols. Completed field data sheets containing specific plant IDs are presented as part of this final project report in Appendix A.

During the October site visit, a natural wetland was identified and surveyed as a proposed reference site. The wetland lies adjacent to Westminster West Road and Earthbridge Road. Site observations and plant species were noted within the October sampling data and are further discussed in the following sections.

#### **General Site Observations and Analysis**

Vegetation at six designated sites was surveyed and documented twice during the 2009 growing season. With the exception of domestic rice species, vegetation observed at the site is typical of Vermont farmfield environment that contains some wet meadows and worked fields on higher ground. Plot #1 and #2 are situated within the rice growing areas: Plot #1 encompasses both paddy and dry areas adjacent to it, where as Plot #2 is entirely within a rice paddy. At the time of the July survey, both plots contain aquatic plant species typically found in seasonally inundated conditions. Plots #3 and #4 are situated within a farmed field that is normally plowed and planted. As such, quick-growing species indicative of disturbed soils were noted.

Sites #5 and #6 are located in a wet meadow of dense herbaceous vegetation with seasonally changing (shallow) water levels with no open water discernable. Based on our survey observation, this area would be considered a well-established “shallow emergent marsh” ecological community as described in “Wetland, Woodland, Wildland, A Guide to the Natural Communities of Vermont, but Elizabeth H. Thompson and Eric R. Sorenson. Vegetation found during the survey is typical of such an emergent marsh. Some species noted in the survey data include reed canary grass (in near monocultures), along with bulrush, sedges, and asters.

The survey was extended to include observations of a small swale that lies eastward and directly adjacent to the rice paddies. The swale was created as a result of the paddy berm construction, and the lower lying area has since grown into a small naturally occurring wetlands area. For numerous amphibians that populate the flooded paddies during the growing season while the paddies are flooded, this wet swale has become a useful haven after the rice crop has been harvested and the paddies drained.

The small swale, with its shallow and seasonally changing hydrology could also be considered a shallow emergent marsh. However, the vegetation is more far more diverse than that found in Plots #5 and #6, with no hint of a grass or rush monoculture developing any time soon. It seems more likely that given the strong appearance of cattails, that this area could move toward becoming a “cattail marsh”. As described by Thompson and Sorenson, an established cattail marsh, although often low in plant diversity with dense, uniform stands of the dominant species is “in fact a highly productive ecosystem that provide significant ecological functions”. In general, cattail marsh systems provide flood storage, help surface water quality, and are good wildlife habitat. Given the overall benefits of this type of marsh, with some deliberate ecological management to inhibit or restrict the cattails dominant tendencies, a more diverse plant community could be sustained. A diversely vegetated wetland environment situated so close to the paddies would allow for even more animal species to benefit from the Akaogi’s rice project. In addition, it is recommended that the swale area be enlarged to perhaps twice or three times its current size.

### **Reference site**

A wetland area relatively close to the Akaogi Farm on Earth Bridge property was selected as a proposed reference site. The wetland encompassed approximately 2 to 3 acres and extends into areas of prime farm land. With the exception of some recent disturbance to access a spring in the northern-most portion of the site, the main wetland area remains relatively undisturbed and in a natural state. The assessment of vegetation and hydrologic conditions shows this wetland area to be generally of high quality, representative of a cattail marsh system, and has vegetation and wildlife similar to the manmade swale directly adjacent to the Akaogi’s rice paddies. Bordering a well-traveled local road, the marsh seems to be of good quality, highly functioning as flood control and wildlife habitat with native plant species. As such it is recommended that this area serve as a reference site for any future survey and assessment work conducted in conjunction with the Akaogi rice growing project.

One of the major objectives of the Akaogi rice growing project is to design a wetlands rice paddy system that ensures sustainable management of wildlife and water quality. For the Akaogis to focus on the agronomic aspects of growing rice in Vermont is, in and of itself, amazing, but also to combine that with a commitment to incorporate ecologically sound farming methods that

directly interact with the natural environment shows a deep understanding of our place in this world.

Granted, the main thrust of this agricultural project must and needs to be the growing of rice with funding pursued accordingly. However, to make a convincing argument for the use of environmentally sound methods with expanded awareness, a rigorous long-term study needs to be conducted that can present results to quantify overall benefits of the “extra considerations” in cost and effort – both to the farmer and to the environment. These wildlife and vegetation studies, to have the necessary validity, must be conducted by professionally trained scientists who are recognized experts in their fields. As such, substantially more funding may be required that will support the environmental portion of the project to that end.

This baseline survey of vegetation has been developed and conducted following scientifically recognized sampling methods. It is hoped that results of this year’s survey will be useful and provide a general view of the landscape of the Akaogi Farm – a hydrological and vegetation “snap shot” so to speak, from which more in-depth study and analysis can continue.

Em Richards  
November 2009

## APPENDIX A

# **Overview**

## **Study Design for Wildlife and Vegetation Assessment Akaogi Farm and Rice Paddy System**

### Objective:

To create a species list that identifies the types and abundance of plants, birds, reptiles and amphibians present at the study site. This information will serve as baseline data that the Akaogi's can use to observe changes in the ecological structure of their property as they continue to develop their rice paddy system.

### Study Design:

The study area has been defined to include all habitat types present at the Akaogi Farm. Five primary habitat types were determined to be old-field, woodland, emergent marsh (natural), cattail marsh (man-made swale), and open water rice paddy. Six transect lines have been defined; three of them cross the study area from north to south and two cross from east to west. These lines and their marked intersections (staked and flagged) will be used to collect all data for the study. This method of data collection aims to ensure that we represent the entire area while maintaining objective observation points. In addition, vegetation and wildlife in a natural wetland area, adjacent to the Akaogi property will be surveyed during the first year to serve as a wetland reference site for the study.

Sampling protocols (as outlined below) and data collection intervals have been adapted to accommodate study cost limitations and research team time constraints during this first year of the study. Ideally, researchers would collect wildlife data every two to four weeks between April and September so that the long-term study would conclude with at least 8 sets of wildlife data per sampling year; vegetation sampling would accumulate 3 sets of data per year (one per season) spanning the same time period.

### Vegetation:

- Round "quadrats" to record plant species type and abundance (measured in percent cover and density). Recommendations for the sizes of the quadrats as follows:
  - Trees – 10 m radius
  - Saplings and Shrubs – 5 m radius
  - Herbaceous and Grass – 1.5 m radius
- Quadrats located at the six intersections of the transect lines.
- Data collected twice the first study year.

### Reptiles and Amphibians:

- Immature Stages: Timed observations
- Adult Stages: Listening surveys and Walking Observations
- Date collections coincide with life-stage development as much as possible

### Birds:

- Point Count Surveys conducted along transect in addition to previously determined research sites.
- Data collection timed to coincide with natural bird life stages and migration patterns

Complete one form per sampling event

Name(s) Em Richards

Date: 7/21/09

Study Site Akaogi Farm

Start Time: 10:05 End Time: 12:37

WEATHER	Past 24 hrs	Now (specific measurements available from Akaogi's weather station)
Clear & Sunny	<input checked="" type="checkbox"/>	Air Temp. <u>73.9</u> Staff Gauge Height <u>5</u> H2O Temp. <u>75.9</u>
Overcast	<input type="checkbox"/>	Humidity Dry <u>Low Humidity</u> Very Humid
Showers (intermittent)	<input type="checkbox"/>	Wind Speed None <u>Breeze</u> Strong Wind ( <u>10-15 mph</u> )
Rain (steady)	<input type="checkbox"/>	Wind Direction N NE NW S SE SW W E
Storm (heavy)	<input type="checkbox"/>	Rain <u>None</u> Light Heavy
		Cloud Cover <u>Clear Sky</u> Partly Cloudy Partly Sunny Cloudy

Plot ID: # 1	Density	% Cover	Plot ID: # 2	Density	% Cover
Rice *	31	30	Rice	25	40
Lemna minor	>1000	15	Lemna minor	>500	5
Field grasses, "weeds" ** (along side of paddy)	>100	10	Ludwigia palestris		5
Duff			Duff		
Leaves			Leaves		
Bare Ground		5	Bare Ground		
Open Water		30	Open Water		50
Non-target Vegetation			Non-target Vegetation		
Impervious Surface		10	Impervious Surface		

Plot ID: # 3	Density	% Cover	Plot ID: # 4	Density	% Cover
Trifolium pratense	>50	40	Trifolium pratense	>50	50
Aster pilosus	10	15	Aster pilosus	20	15
Daucus carota	2	<2	Taraxacum officinale	5	5
Phalaris arundinacea		25	Solidago canadensis	19	10
			Oenothera biennis	2	
Duff			Duff		10
Leaves			Leaves		
Bare Ground			Bare Ground		
Open Water			Open Water		
Non-target Vegetation		18	Non-target Vegetation		10
Impervious Surface			Impervious Surface		

Study Site Akeoji FarmDate: 7/21/08

Plot ID: #5	Density	% Cover	Plot ID: #6	Density	% Cover
Reed Canary Grass	>1000	70	Reed canary grass	>1000	60
Solidago canadensis	~100	28	Impatiens capensis	~25	15
Equisetum fluviatile	~10	>1	Equisetum fluviatile	~50	15
Onclea sensibilis	3	>1			
Duff			Duff		
Leaves			Leaves		
Bare Ground			Bare Ground		
Open Water			Open Water		10
Non-target Vegetation			Non-target Vegetation		
Impervious Surface			Impervious Surface		

**Additional Notes & Observations:**

\* Rice species: Shimakikari  
Tomayutaki

Lemna minor - duck weed  
Ludwigia palustris - marsh purslane

\*\* Field Grasses/Plant species:

plot  
#1

Scleria spp. - Bristly Foxtail  
Agrostis alba - Redtop  
Trifolium pratense - Red Clover  
Polygonum persicaria - Lady's Thumb (Smartweed)  
Plantago major - Great plantain  
                  rugelii - common plantain  
Taraxacum officinale - Dandelion  
Eleocharis sp - Spike rush  
Aster pilosus - Heath aster  
Daucus carota - Queen Ann's Lace  
Echinochloa crusgalli - barn yard grass  
Impatiens capensis - Jewel weed  
Equisetum fluviatile - Horsetail  
Onclea sensibilis - sensitive fern  
Phalaris arundinacea - Reed canary grass

Study Site Alkoogi Farm

Date: 7/31/09

Plot ID: A	Density	% Cover	Plot ID:	Density	% Cover
See below					
Duff			Duff		
Leaves			Leaves		
Bare Ground			Bare Ground		
Open Water			Open Water		
Non-target Vegetation			Non-target Vegetation		
Impervious Surface			Impervious Surface		

**Additional Notes & Observations:**

(Plot A)

Wetlands swale - adjacent to rice paddy

Species noted:

- Typha latifolia* - common cattail
- Trifolium pratense* - red clover
- Eleocharis parvula* - spike rush
- Ludwigia palustris* - marsh purslane
- Juncus bufonius* - Toad rush
- Juncus filiformis* - no common name
- Cyperus strigosus* - Umbrella sedge
- Cyperus flavescens*
- Lemna minor* - duck weed
- Echinochloa crusgalli* - barn yard grass
- Cyperus esculentus* - yellow nut sedge
- Impatiens capensis* - jewel weed



## 2009 Plot Sampling Data Form 1: Vegetation

Complete one form per sampling event

Name(s) Em Richards

Date: 10/12/09

Study Site Akaogi Farm

Start Time: 9:30 End Time: 11:47

WEATHER	Past 24 hrs	Now (specific measurements available from Akaogi's weather station)
Clear & Sunny	<input checked="" type="checkbox"/>	Air Temp. <u>51</u> Staff Gauge Height <u>N/A</u> H2O Temp. <u>N/A</u>
Overcast	<input type="checkbox"/>	Humidity <u>Dry</u> Low Humidity Very Humid
Showers (intermittent)	<input type="checkbox"/>	Wind Speed <u>None</u> Breeze Strong Wind
Rain (steady)	<input type="checkbox"/>	Wind Direction <u>N</u> NE NW S SE SW W E
Storm (heavy)	<input type="checkbox"/>	Rain <u>None</u> Light Heavy
		Cloud Cover <u>Clear Sky</u> Partly Cloudy Partly Sunny Cloudy

Plot ID: # 1 *	Density	% Cover	Plot ID: # 2 *	Density	% Cover
Rice (stubble)	20	10	Rice (stubble)	25	15
Field species (see list) (along side of paddy)		30			
Duff			Duff		
Leaves			Leaves		
Bare Ground	N/A	50	Bare Ground	N/A	85
Open Water			Open Water		
Non-target Vegetation			Non-target Vegetation		
Impervious Surface		10	Impervious Surface		

Plot ID: # 3	Density	% Cover	Plot ID: # 4	Density	% Cover
<i>Trifolium pratense</i>	>100	65	<i>Trifolium pratense</i>	750	30
<i>Poa pratensis</i>	3	5	<i>Taraxacum officinale</i>	7	20
<i>Oxalis europaea</i>	>100	20	<i>Phalaris arundinacea</i>	725	25
<i>Aster umbellatus</i>	2	2	<i>Solidago canadensis</i>	8	15
<i>Solidago canadensis</i>	6	5			
Duff			Duff		
Leaves			Leaves		
Bare Ground			Bare Ground		
Open Water			Open Water		
Non-target Vegetation		3	Non-target Vegetation		10
Impervious Surface			Impervious Surface		

\* Note rice paddies have been abandoned & harvested.

2009 Plot Sampling Data Form 1: Vegetation

Study Site Alcornoque Farm

Date: 10/12/09

Plot ID: #5	Density	% Cover	Plot ID: #6	Density	% Cover
<i>Aster novae-angliae</i>	>30	40	<i>Phalaris arundinacea</i>	>100	95
<i>Phalaris arundinacea</i>	>50	25	<i>Scirpus atrovirens</i>	3	1
<i>Solidago canadensis</i>	10	15			
Duff			Duff		
Leaves			Leaves		
Bare Ground			Bare Ground		
Open Water			Open Water		
Non-target Vegetation		20	Non-target Vegetation		
Impervious Surface			Impervious Surface		

Additional Notes & Observations:

List of Field Species - plot #1

- Sitonia* spp.
- Agrostis alba*
- Trifolium pratense*
- Polygonum persicaria*
- Plantago rugelii*
- Taraxacum officinale*
- Echinochloa species*

*Scirpus atrovirens* -  
Dark green bulrush

*Aster novae-angliae* -  
New England Aster

2009 Plot Sampling Data Form 1: Vegetation

Study Site Alkaji Farm

Date: 10/12/09

Plot ID:	Density	% Cover	Plot ID:	Density	% Cover
See list					
Duff			Duff		
Leaves			Leaves		
Bare Ground			Bare Ground		
Open Water			Open Water		
Non-target Vegetation			Non-target Vegetation		
Impervious Surface			Impervious Surface		

**Additional Notes & Observations:**

Reference wetland - between Alkaji access road & Westminster West Road.

Species noted: Herbs

- Typha latifolia
- Aster umbrellus
- Aster novi-belgii
- Onoclea sensibilis
- Solidago purpurea

Shrubs

- Silky Dogwood
- Buckthorn
- Alder

Trees

- Crab apple
- Black oak
- Poplar
- White birch
- Spruce
- Sumac

Note

Construction area where "spring" had been installed - but majority of wetland area undisturbed.