

SUMP ROTATION RESEARCH NEWS

WINTER 1996

VOLUME I, NO.1

This newsletter is the first of a series that will be produced quarterly, with the goal of keeping the Tule Lake community and other interested people informed about the progress of sump rotation research activities. In this first issue we will provide an overview of the research that was begun in 1995, and what we hope to achieve from this work. In addition, we will introduce you to the people involved in the research activities; let you know how to contact us if you have questions, ideas or concerns about the work; and explain how the research is being funded.

WHAT ARE THE GOALS OF THE RESEARCH AND WHY ARE WE DOING IT?

Cropland/Wetland rotation cycles or "sump rotations" are being studied to evaluate their feasibility as a future management option for the Tulelake Wildlife Refuge. The idea is to see if a combination of short- or long-term rotations (see below) can improve wetland habitat diversity while also creating agricultural land free from soil pathogens and sustain a viable and productive agriculture within the lease lands. Important questions to be addressed include what are the short and long-term impacts on: agricultural production, water quality and water consumption; how effectively is the desired diversity of wildlife habitat created, and at what cost?

Specifically we are working to :

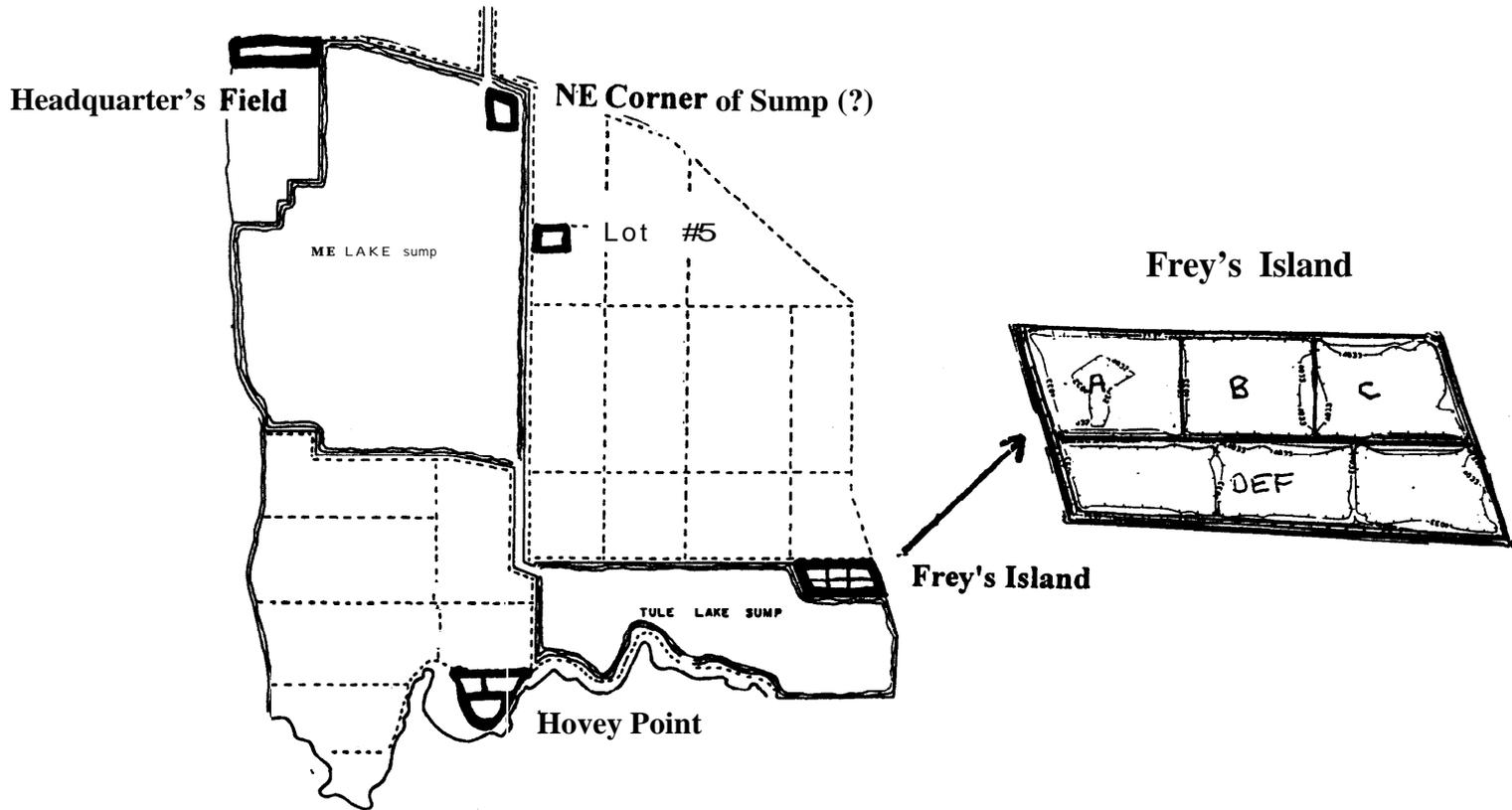
- establish mechanisms for effective *participation* of farmers, federal agencies, and concerned public groups in the research and evaluation process
- establish and monitor *pilot study sites* to determine the impacts of sump rotation on: water use and quality; seasonal patterns of nutrient release, crop production; pest populations; and creation of wildlife habitat.
- collectively determine the *economic, social and environmental implications* of various management strategies, and to identify barriers and opportunities for their implementation.
- test whether use of fall- or spring-planted cover *crops* within crop rotations can be used to suppress key soil pathogens, weeds, and nematodes, while also providing wildlife habitat, and reduce wind erosion.
- test whether *short-term flooding* can control key soil pathogens, weeds, and nematodes, while also providing wildlife habitat.

HOW IS THE RESEARCH BEING DONE?

Public participation:

From the outset it has been important to the researchers involved that the local community and others interested in the region actively participate in this project. We are seeking input both into how the research is being done, and how the

PILOT SITE LOCATIONS



SHORT CYCLE ROTATION PILOT SITES

Year	Lot	Frey's A	Frey's B	Frey's C
1995	barley	barley	potato	barley
1996	crop	seasonal marsh	onion	potato
1997	seasonal marsh	seasonal marsh	crop	crop
1998	permanent flood	permanent flood	seasonal marsh	crop
1999	crop 1	crop 1	seasonal marsh	crop
2000	crop 2	crop 2	permanent flood	seasonal marsh
2001	crop 3	crop 3	crop 1	seasonal marsh
2002	crop 4	crop 4	crop 2	permanent flood
2003	seasonal marsh	seasonal marsh	crop 3	crop 1
2004	seasonal marsh	seasonal marsh	crop 4	crop 2

LONG CYCLE PILOT SITES

Converted to marsh cycle

Fall 1995 Headquarters Field
 Frey's Island DEF
 Fall 1996 Hovey Point

Converted to cropland cycle

1996/7 NE corner of upper sump (?)

information obtained is evaluated. A number of public meetings were held during 1995 which resulted in local farmers self-selecting a committee to work with the project coordinator and representatives from USFWS and USBR on this and other issues affecting the lease lands. This committee operates from within the TID (Tulelake Irrigation District). Researchers meet with this committee regularly to discuss progress on the project, and to address questions or concerns raised by the committee members .

Overview of the project design

Two kinds of rotation cycles are being tested (see Pilot Site Location Map and Cropland/Wetland Cycle Table):

- **Short cycle:** year 1 seasonal marsh
year 2 seasonal marsh
year 3 continuous flood
year 4 crop
year 5 crop
year 6 crop
year 7 crop
- **Long cycle:** 20+ years cropland
20+ years wetland

The short cycle rotation is designed to create early marsh vegetation, such seasonal marsh and sago pondweed, but be too short for the establishment of perennial tules and cattails. Subsequent crop production will tuhs benefit from inputs of readily decomposable organic matter. In addition we anticipate that the flooding regime will reduce soil pest populations. Crops to be produced in the cropping phase will include potatoes, cereals, onions, sugar beet, etc.

The long cycle rotations will allow development of areas of mature marsh, and provide areas of continuous row corop/cereal crop production for a period of 20+ years. To facilitate pest control and habitat enhancement during this long

cropping phase, we are exploring the potential of periodic use of cover crops that could simultaneously provide nematode, weed and disease suppression, and good duck nesting habitat.

Pilot study sites

Pilot sites were established to study a) ***Short-cycle rotations*** (*North* half Frey's Island, Lot 5) b) ***transition from cropland to long-term wetland*** (South Frey's Island, HQ Field, Hovey Point; c) ***transition from wetland to long term cropland*** (area of sump to be drained is still under negotiation). Site locations and the timing of rotation phases are described in the map and table opposite.

Soil samples were collected to generate baseline soil maps and seed bank data for each site. One short-cycle unit (Frey's unit A), and 2 long cycle sites in transition to wetland (HQ field and Frey's Island DEF) were flooded in fall 1995. Other short-cycle units (Frey's units B & C, Lot 5) are being farmed by local growers to obtain baseline yield data for key crops. Methods are being tested to calculate nutrient budgets for each wetland and cropland site, and to characterize management effects on soil nutrient supply which could affect crop water and fertilizer requirements.

Economic assessment

We are developing a map and GIS (Geographic Information System) database. for the refuge which includes information on topography, infrastructure, cropping history, crop management, water flows, soil characteristics, vegetation patterns etc. This will be used together with information from the pilot sites, to model costs/benefits for various sump rotation options. We will use an economic/environmental assessment framework that includes production budgets for major crops and cover crops, estimates

of engineering costs for drainage/flooding, and measures of wildlife habitat quality, water usage and water quality. The TID committee and agency representatives will work with the project staff to develop a framework that is acceptable to all parties

Cover crop trials

A series of experiments were established in the fall of 1994 and 1995, and spring /summer of 1995 to select cover crops that are well-adapted to the area. We are looking for species that can suppress nematodes, weeds or diseases and also provide good duck nesting habitat and ground cover spring and fall. Promising species and mixes undergoing additional trials include:

fall planting: wheat +Austrian winter pea; oil-seed rape cv. humus; cereal rye.

spring planting: oat/pea; oil-seed rape cv. humus and cascade;

summer planting: *amaranthus*; sudan grass

Two fields adjacent to the sumps were planted in Fall 1995 to rapeseed, cereal rye, and winter wheat/pea mix to test their utility as nesting cover for ducks. Bird usage and nesting success will be determined by Refuge staff.

Tests of the effects of flooding

It is critical to understand the effects of flooding cycles on weed seed viability, pathogen and nematode populations, and release of nutrients from the soil. The work underway in this area will be discussed in future newsletters.

Wildlife studies

WETLAND INVERTEBRATES

by Susan Fregien

One of the many goals of the USFWS's cropland/wetland pilot study is to create and maintain healthy wetland habitat for waterfowl and other wildlife. Habitat in Frey's Island DEF and Headquarter's Field, flooded in the Fall of 1995, is currently being monitored by the University of Washington's Cooperative Fish and Wildlife Research Unit. To determine the success of the seasonal wetland management scheme underway we are measuring water quality (pH, temperature, dissolved oxygen and salinity), collecting aquatic insect samples and surveying the plant communities. Of these factors, aquatic insect abundance and diversity will be especially important. Part of our study design includes the use of exclosures (which look like cages) to keep waterfowl off of half of the sample collection sites. These exclosures will eliminate waterfowl foraging on these plots, which will allow us to compare insect populations from site to site even if bird usage is different. We may also get an idea of which kinds of insects the waterfowl are utilizing. Similar types of measurements are being made on the Tule Lake Sumps. Comparisons between the sumps and newly created wetlands will be one measure for the success of the new wetlands.

WATERFOWL & WATERBIRDS

by Chris Bonsignore

As part of the Cropland/Wetland Rotation Project on Tule Lake National Wildlife Refuge, the Washington Cooperative Fish and Wildlife Research Unit is conducting research to determine the variety, numbers, and behavior of waterfowl and other waterbirds using the recently created, seasonal wetlands. Waterfowl (Ducks, Geese, and Swans) and Waterbirds (Grebes and Gulls) are an important part of

the natural system, and depend on productive wetlands to feed, rest and raise their young. They reflect the health of a system and may help determine the quality of the wetlands created under this program. Data is being collected at Frey's Island and Headquarter's Field and ten sump sites (5 sites on each sump) on the refuge. Birds are counted by species within a designated area to determine their density. A spotting scope is used to get a good look at the birds. Next, the group of birds is scanned with 'the spotting scope and their behavior is recorded. This process is repeated at different sites throughout the day to give us a complete daily record of how many birds there were at each site and what they were doing there. Twenty days of sampling were done in Oct.-Nov. of 1995 and 35 days are scheduled for Mar.-Apr. of 1996. At this point, it is too early to say anything definitive about the data that we have collected, but a couple of interesting patterns have emerged. It was discovered early on after fields were flooded on Frey's Island, that geese were very attracted to this new habitat and large numbers of White-fronted, Snow, and Cackling Canada geese could be found there on most days. Our behavior data suggests that the geese are using the fields primarily as resting areas. It is also apparent that study sites on Sump 1B attract a larger number of birds of all kinds in the fall than those on Sump 1A. It will be interesting to see if this pattern continues in the spring.

WHO IS DOING THE RESEARCH?

Agricultural, Economic and Resource Components

Carol Sherman Vegetable Crops UC Davis.
Project Director
Don Lancaster Farm Advisor, Alturas, CA.
Co-Principle Investigator

Wesley Jarrell Oregon Graduate Institute,
Co-Principle Investigator

TID lease land committee

John Crawford Farmer, President Klamath Basin Water Users Protection Association
Bob Byrne Farmer
Nick Macy Macy's Flying Service
Sid Staunton Farmer
Lon Bailey Farmer
Howard Klassen Farmer
Don Kirby IREC
Earl Danosky Tulelake Irrigation District
Mike Fahner Farmer
Bob Gasser Basin Fertilizer&Chemical

Project Collaborators

Mary Abrams Oregon Graduate Institute
Clyde Elmore Extension Specialist Weed Science, UC Davis
Gloria Helfhand Agricultural Economics, UC Davis
Becky Westerdahl Nematology Extension Specialist, UC Davis
Leon Basdekas USBR, Klamath Falls
Laura Allen USBR, Klamath Falls

Research Staff

Francisco Costa Post Doctoral Researcher, Vegetable Crops UC Davis
Mike Gjerde PhD Student, Agricultural Economics, UC Davis
Melanie Bode Post Graduate Researcher, Vegetable Crops UC Davis
Sheri Gill MS Student, Plant Protection & Pest Management, UC Davis
Colehour Arden Research Assistant Vegetable Crops UC Davis
Collin Bode GIS Database Manager Vegetable Crops UC Davis

Wildlife Components

David Mauser USFWS, Tulelake Wildlife Refuge
David Gilmer US National Biological Service, Dixon, CA
James Hainline USFWS, Tulelake Wildlife Refuge

Chris Grue US National Biological Services, Seattle, WA
Susan Fregien MS Student, University of Washington
Chris Bonsignore MS Student, University of Washington

WHO IS PAYING FOR THE RESEARCH?

Research grants for agricultural and economic components

The bulk of the research on crop production, soil fertility, water quality, water use, cover crops, pest control and economic assessment are being funded through grants obtained by the project investigators through USDA competitive grants programs. One grant of \$ 269,000 was obtained through the "Agriculture in Concert with the Environment" program, and a second for \$2 19,000 from the "Agricultural Systems" program that is part of the USDA National Research Initiative. These grants, together with some salary and personnel support from the University of California, will cover basic research costs until 1997/8. Further grants will be applied for by the project staff to cover any additional research needs and to continue the work beyond 1998.

Pilot study sites:

Engineering costs: for the construction of sites at Frey's Island, Headquarter's field and Hovey point have been paid for by the USFWS, with the Bureau of Reclamation paying for surveying and the installation of tile drains in units A, B and C at Frey's Island. Ducks Unlimited sponsored the tile drains on Hovey point.

Baseline data: soil and water samples were collected at each pilot site to obtain information before sump rotation was initiated. This was paid for by a portion of the research grants described above, plus a

one-time grant of \$27,500 to Carol Shennan from the Bureau of Reclamation.

Farming: all the pilot sites in the cropland phase are farmed by local growers who bid for leases on the sites through the standard Bureau of Reclamation lease process.

Wildlife studies

The Invertebrate and Waterfowl studies which include invertebrate monitoring, water quality, vegetation surveys, waterfowl counts, and waterbird behavior monitoring on pilot sites and comparison sites in the sump are being funded by an internal grant of \$73,000 from the National Biological Service with in-kind support from USFWS Tulelake Refuge.

HOW CAN YOU HAVE YOUR SAY ABOUT THE RESEARCH?
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Contact:

Carol Shennan	Project Director (916) 664-2080 or (916) 752-7566
Earl Danosky	TID Lease Land Advisory Committee (916) 667-2247
Dave Mauser	US Fish & Wildlife (916) 667-2231.

