WALNUT CREEK NATIONAL WILDLIFE REFUGE - PRAIRIE LEARNING CENTER

Prairie City, Iowa

ANNUAL NARRATIVE REPORT

Calendar Year 1993

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

REVIEW AND APPROVALS

WALNUT CREEK NATIONAL WILDLIFE REFUGE - PRAIRIE LEARNING CENTER

Prairie City, Iowa

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INTRODUCTION

Walnut Creek National Wildlife Refuge - Prairie Learning Center is located approximately 20 miles east of Des Moines, in southwest Jasper County, Iowa. The project was established in September 1990, 30 days after release of an Environmental Assessment and signing of the Finding of No Significant Impact. Authority for establishment was the Fish and Wildlife Act of 1956.

Authorized size is 8,654 acres. The core of the project was 3,622 acres formerly owned by Redlands Corporation, a subsidiary of Iowa Power and Light Company. The land had been purchased originally in the late 1970s and early 1980s as the site for a nuclear power plant. The plant was never built and the land had been intensively farmed by tenants.

The rolling topography within the Walnut Creek watershed contains lands which are highly erodible with steep slopes draining into Walnut Creek. Current land use within the project boundary is approximately 70% corn and soybeans, 14% pasture and small grain, 9% forest and 7% "other". Wooded areas are mostly oak savanna and riparian corridors along Walnut Creek.

The primary purposes for establishment are: "(1) to restore native tallgrass prairie, wetland, and woodland habitats for breeding, migratory birds and resident wildlife, (2) to serve as a major environmental education center providing opportunities for study, (3) to provide outdoor recreation benefits to the public, and (4) to provide assistance to local landowners to improve their lands for wildlife habitat."

A preliminary feasibility study done by the Service indicated a traditional waterfowl refuge was not viable nor in keeping with purposes for which this project was established. Reconstruction of the tallgrass prairie ecosystem, providing a major environmental education facility and providing an opportunity to work on private lands and Service lands within one discreet watershed; these are all new goals for the Service and as such, this project takes on a new and more immediate significance.

A. HIGHLIGHTS

Water, water everywhere, the floods of summer impinged on everything in 1993, details throughout the Annual Narrative.

The Record of Decision signed ending the EIS/Master Planning Process, D.1.

Beginning of a Friends of Walnut Creek group, H.18.

A series of First's -- First Prescribed Burns, F.9; First Wetland Restoration, F.15; and First Audubon Bird Count, G.7.

GIS becomes a reality, I.6.

B. CLIMATIC CONDITIONS

Severe flooding during 1993 brought Iowa its worst natural disaster of the century. Winter snowmelt, combined with consistent rainfall, lead to chronic problems for Iowans. The torrential rains destroyed thousands of homes, businesses and crops. Seven lives were lost as a result of the Flood of '93.

Four days after authorities said no major flooding was expected, record flood levels developed along the Cedar, Des Moines and Iowa Rivers. On April 1, eight counties in Iowa were declared state disaster areas due to flooding. In early May, thousands of dollars worth of cargo were delayed on barges on the upper Mississippi River when the U.S. Army Corps of Engineers were forced to close several locks along the state's southeastern border. In late June, the Mississippi River was closed to all commercial traffic and boaters were urged to stay off the river.

July brought continuous rainfall, visits from President Clinton, cancellation of summer classes at Iowa State University when Ames became virtually inaccessible, and catastrophic flooding in Des Moines. More than 250,000 Des Moines residents were without water after the waterworks was overcome by flood waters and an estimated 35,000 Midwest Power customers were without electricity. Downtown Des Moines resembled a ghost town after businesses were asked to remain closed. The Federal Emergency Management Agency opened offices in Iowa after all 99 counties in the state were declared eligible for federal disaster aid. Several highways and bridges were closed.

Colfax, a Jasper County community six miles north of WNT, experienced flooding when four levees protecting the community from the Skunk River, gave way. Portions of Interstate 80 near Colfax were closed due to near collapse of a culvert, causing motorists to take an 80-mile detour. The Jasper County Fair, an annual event, was forced to relocate because water was standing ten feet deep on some parts of the fairground.

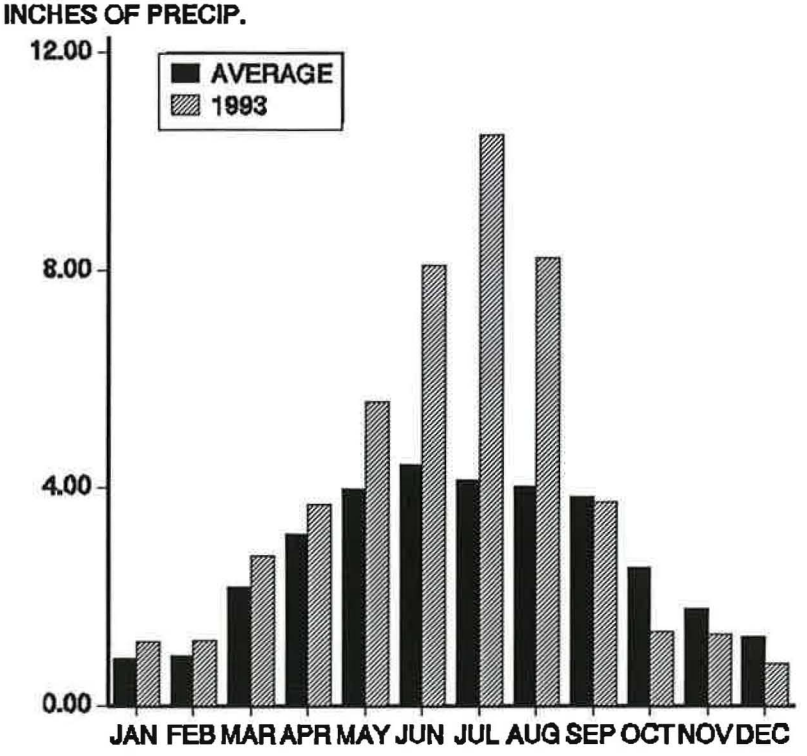
WNT staff members and their families were not immune to flood-related problems. Those living in Des Moines and surrounding communities were without safe drinking water for 19 days. Purchasing drinking water, (a precious commodity) and visiting the laundromat became a way of life. (Ironic to think there was plenty of water outside, but not a drop to drink.)

Although Refuge planting efforts were halted by the wet conditions during the spring and summer months, WNT was spared from major flood damage. Our Cooperators were forced to decide whether they should "mud" their seed into the ground or not plant at all. Planted seeds lay dormant, waiting for warmer, drier weather. Hay and alfalfa crops were extremely poor also.

Overall, state rainfall for 1993 was the wettest since state records began in 1873, with a total of 48.20 inches, 15.09 inches more than normal. Newton, 15 miles northeast of WNT, set a new annual precipitation record of 52.77 inches. More than half of the precipitation fell during the three summer months.

Finally, the rain clouds disappeared and sunny skies and mild temperatures favored Iowa during October and November; creating suitable conditions for prairie seed harvest and fall planting. Little snowfall occurred during December, ending 1993 on a drier note, a welcome change from the summer months.

1993 MONTHLY PRECIPITATION IN IOWA



The flood of 1993 created opportunity, as well as hardship. Here, area anglers try their luck in the middle of a dirt road one mile south of the Refuge.

C. LAND ACQUISITION

1. Fee Title

Efforts continue with good success in 1993, five tracts totaling 359.6 acres were added to the land base. Don Kleven, WAM3-Fergus Falls, MN, continues as the Realty Specialist working for WNT. Don has been consistent in developing sound relationships with potential sellers.

Appraisals are still seen as being low and little land is being sold in the neighborhood. No good market is established in local land, what sales there are seem to indicate a slight rise in prices. The best quality agricultural land was reported to bring over $2,225.00 per acre in one private treaty sale.

The local custom traditionally divides offered price by total acres to arrive at the "price per acre." This skews the real value by not deducting the value of buildings and other improvements and makes comparison of one tract to another difficult. However, this is always a hot topic of local coffee shop rumor.

In summary, at the end of the year:

Tract#	Name	Acres	Status
38	Williams	80.0	Ag & Bldg use thru Oct. 1, 1995
47	ISU Foundation	110.0	Ag use thru Dec. 31, 1994
20	Berkenbosh	160.0	Ag & Bldg use thru Dec. 31, 1994
32	Davenport	3.3	Bldg use thru Dec. 31, 1994
56	Beerends	6.3	Ag & Bldg use thru Dec. 31, 1995
	Total for 1993:	359.6 acres	

2. Easement

Nothing to report.

3. Other

Nothing to report.

4. Farmers Home Administration Conservation Easements

Refuge Operations Specialist Bernie Petersen investigated five potential conservation easements in the WNT Management District in 1993. There were no existing or potential wetland or wildlife restorations.

Boone County	2 sites
Madison County	2 sites
Polk County	1 site

It was decided after consultation, to transfer management responsibility of the DONOVAN & KUCERA Easements in Tama County back to the Savanna District of the Upper Mississippi River National Wildlife and Fish Refuge. These are two intricate easements that will be better served by not complicating management with a change in players.

The SHAW Easement in Polk County was inspected for compliance in June 1993. Everything looked to be in good shape. Plans to restore two small wetlands were again postponed due to wet conditions. One day, we will get to it.

D. PLANNING

1. Master Plan

Much of the time and energy of the Refuge staff was still involved in the Master Planning and Environmental Impact Statement development effort throughout the year. The Record of Decision (ROD) was signed by the Service early in the year, but the U.S. Army Corps of Engineers (COE) had some problems coordinating their response; as a result, the ROD was not signed until shortly after January 1, 1994. Several telephone calls, correspondence and site visits by COE staff were necessary to accomplish this. It should be noted that several of the COE biologists inquired about openings at WNT. The exercise was an object lesson in what the private sector criticizes when dealing with wetland issues and the government.

The Master Plan itself is still in DRAFT form but will be finalized and published in early 1994. The DRAFT is approved and is serving as guidance during the initial development of the project.

WNT Development TEAM, Refuge Staff and personnel from the Regional Office and Service Engineering Center coordinating.

2. Management Plan

Specific management planning took place at many levels during the past year. Refer to individual sections for details. At this stage in the development of the WNT project, stepping down from the Master Plan to specific on-the-ground details is very important and takes a great deal of effort on the part of all involved.

Fire plans for specific Prescribed Burn Units were written and approved prior to burning in the spring. An overall Refuge Fire Plan is being drafted.

The Interim Hunting Plan developed and approved in 1992 was implemented this year.

The most inclusive and unique plan being developed is the Prairie Restoration/Reconstruction Plan. Work continues on this major effort, guided by DRAFT plans.

The other major Management Plan being developed at WNT is the Monitoring/Research Plan. Refer to the Research Section for details.

3. Public Participation

The Refuge Manual calls for this section to "... Describe any refuge activities involving public participation in the planning or decision making process ....".

Activity at Walnut Creek National Wildlife Refuge - Prairie Learning Center is so replete with public participation, (it is after all a verb, not a noun), that to document any single segment or event would be meaningless. We have decided to skip this portion of the Annual Narrative in favor of including some of the specifics in appropriate sections.

4. Compliance With Environmental and Cultural Resource Mandates

See D.1, otherwise, nothing to report.

5. Research & Investigations

John Bowles and David Kinateder, Central College, Pella, Iowa; PROPOSAL FOR INDIANA BAT MONITORING AT WALNUT CREEK NATIONAL WILDLIFE REFUGE, 1993. (Ongoing).

Mist-netting of bats in 1993 was stalled due to delays in obtaining sub-permitting for cooperating researchers. There also was concern that, due to cool, damp conditions; either bats would not be active, that young might not survive, or that bats possibly did not migrate as far north as WNT in 1993. Despite a late start at mist-netting, three Indiana

bats were caught, confirming the presence of both adult females and survival of at least two offspring. Additional species netted included red bat, big brown bat and evening bat.

Netting was attempted at three sites in 1993, though only the original 1992 site yielded bats. Activities were hindered by heavy rains, with flooding of Walnut Creek resulting in loss of nets and poles on one occasion. On many other occasions, wet weather resulted in poor conditions for bat netting activities.

In addition to capture activities, a study of woody species in a savanna likely to be a nursery colony site was conducted. Baseline data regarding the species diversity, DBH and frequency of woody species was collected in several permanent plots.

Second year data from a study by Bruce Menzel et al; A REGIONALIZED ASSESSMENT OF THE INFLUENCE OF RURAL NONPOINT SOURCE POLLUTION ON THE ECOLOGICAL INTEGRITY OF STREAM ECOSYSTEMS AND AN EVALUATION OF ASSOCIATED POLLUTION CONTROL MANAGEMENT was gathered this year. This three-year study of water quality on 14 watersheds in Iowa, Nebraska and Kansas is jointly sponsored by Iowa State University and the EPA. The work involves monitoring of aquatic invertebrate and vertebrate populations, as well as characteristics of hydrology and water quality.

Preliminary data analysis indicates that although Walnut Creek watershed was of median size and flow among 14 watersheds studied, it was among the three lowest in terms of fish diversity and biomass. In addition, Walnut Creek ranked highest in terms of atrazine and metolachlor levels, both of which are herbicides not used on the Refuge since 1992.

Two bird studies were carried out in 1993. Both of these Iowa State University projects were conducted by Timothy Bergin et al; THE EFFECTS OF LANDSCAPE STRUCTURE ON AVIAN COMMUNITIES IN AN AGRICULTURAL LANDSCAPE and EFFECTS OF LANDSCAPE STRUCTURE ON NEST PREDATION. Both studies focused on agricultural landscapes and included sites on WNT as well as off-refuge sites. Results are not available at this time.

An informal survey of earthworms on WNT, conducted by Dr. Samuel James, Fairfield, Iowa, revealed the presence of five native and five exotic species on the Refuge. This may prove important because native earthworms are apparently absent in northern Iowa, Minnesota and much of Illinois. WNT appears to be on the northern edge of the range of native worm species. This suggests some interesting ecological issues, including the nature and degree of competition between native and exotic species and differences in historic and current

nutrient cycling patterns in natural areas. It also points out the gaps in our knowledge of tallgrass prairie and savanna ecosystems.

Efforts to develop a framework for a long-term research and monitoring program culminated in a meeting facilitated by the Service's National Ecology Research Center (NERC), Fort Collins, Colorado. The resulting report, MONITORING AND RESEARCH AT WALNUT CREEK NATIONAL WILDLIFE REFUGE, by James Roelle and David Hamilton, identified several factors important to effective restoration and reconstruction management. The report also contained initial suggestions for specific research questions to further the process of ecosystem reconstruction and restoration.

6. Other

Nothing to report.

E. ADMINISTRATION

1. Personnel

Michelle Sentyrz entered on duty at WNT on June 23, 1993. Shelly is a GS-0025-5/1 Refuge Ranger and will assist in the Public Use Program as Volunteer Coordinator and Interpreter. In addition, she will be in charge of the Geographic-Based Information System (GIS) as well as "other duties as assigned". Shelly graduated from the University of Iowa with an undergraduate degree in geography and environmental studies.

Craig Olawsky entered on duty on December 12, 1993. Craig comes to WNT from a position with the Kansas Department of Wildlife & Parks where he was studying the relationship of CRP on meadowlarks and other ground nesting birds. Craig is a graduate of South Dakota State University with an undergraduate degree in Wildlife and Fisheries Science. His Masters is from Texas Tech University where his thesis work was on lesser prairie-chickens. Craig's position at WNT is to assist in the Operations, he will also be involved in monitoring as well as other programs.

	Permanent Full-Time	Part-Time	Temporary	Term	Total FTES
FY 1993	6	0	.5	2	8.5
FY 1992	6	0	.5	0	6.5
FY 1991	2	0	0	0	2.0

Front row (left to right) - Dave Aplin, Craig Olawsky and Bernie Petersen. Back row - Dick Birger, Shelly Sentyrz, Pauline Drobney, Brian Boot and Carla Dykstra.

2. <u>Youth Programs</u>

Working with the local section of the Boy Scouts of America, WNT attempted to set up an Explorer Post with the Newton High School Counseling Office. At this time, results have been disappointing with little interest shown by prospective participants. Further effort will be made in 1994.

3. <u>Other Manpower Programs</u>

Nothing to report.

4. <u>Volunteer Programs</u>

Specific volunteer events during 1993 included Sow Your Wild Oats Day II (an annual prairie planting festival on the Refuge), the local municipality's "Old Settlers' Day" parade and coinciding Stewardship Saturday, ten seed collection dates at locations across central Iowa and a Christmas Bird Count in conjunction with local Audubon Societies.

Ongoing individual volunteer projects also contributed to the restoration effort in 1993. Tom Cady, a volunteer with the project since its inception, worked more than 800 hours to collect information on historical ecological references to the Walnut Creek area. Personal interviews with local residents, searches through old attics and library vaults and long hours examining small-town newspaper files have discovered information pertinent to the Refuge goal of ecological restoration to times of pre-Eurasian settlement. This individual's working bibliography has provided staff and visitors with a picture of what the landscape looked like before pioneer development began in the 1840's.

Another volunteer, Rayford Ratcliff, donated over 300 hours to WNT by combing local road ditches and cemeteries to locate prairie and savanna seeds to harvest. Upon verifying the locations and species, Mr. Ratcliff would hand-pick seeds and collect them in pickle buckets he attached to both sides of his belt. His visits to the Refuge office always revealed a smile and a car trunk full of bags of seed.

Volunteers gain a wide variety of skills and experience as they help the Refuge. In 1993, volunteers assisted with everything from prairie seed collection...

... to operation of a deer check station.

To cope with the lack of a full time staff Volunteer Coordinator, a volunteer management software program was installed in July. The IBM-compatible Matchpoint system is an enhanced database that stores up to six screens of volunteer information including names, addresses and phone numbers; interests; skills; times available for volunteering; geographic preferences and dates/hours contributed.

The software can be customized to save and manipulate volunteer data. Reports can be generated for individuals, selected groups, or all volunteers; and can be modified to produce printed copies of any volunteer information entered. Examples include reports on the number of 1993 hours contributed by individual or groups and a report on the tasks accomplished by a certain scout troop in July. Options for mail lists provide a means to create tailored form letters and labels.

The Matchpoint feature of primary interest to the Refuge is the ability to match volunteers with particular Refuge volunteer needs. Specifications entered are customized and generate statistics for queries such as volunteers interested in raptors or individuals with teaching experience available on weekdays.

WNT developed 14 volunteer position descriptions for current and projected Refuge needs, all of which were entered in

Matchpoint. Unfortunately, the software had many problems and didn't perform to expectations for several frustrating months. Program and data disks were finally sent directly to Matchpoint programmers early in December. Two weeks later, preliminary tests show the program to be functioning as originally described and it appears capable of enhancing volunteer program management.

5. Funding

Walnut Creek Nat'l Wildlife Refuge-Prairie Learning Center Funding

	Operations & Maintenance		Regional	
	Needed Base	Received Base	Addition	Other
FY 1993	$343,318	$303,125	$4,300	
FY 1992	$354,000	$300,000	$9,100	
FY 1991	$303,700	$298,000	$ 300	$13.55m

6. Safety

Safety remains a high priority of all staff members and volunteers at WNT. Monthly safety meetings included videos on the AIDS virus, office hazards and farm safety; discussion on dangers and precautions to take due to flooding, hunting season precautions and heat stroke.

In March, Bernie Petersen and Brian Boot received heavy equipment operator certification.

WNT Staff received First Aid and CPR Certification in April.

In August, Refuge Staff received the Regional Safety Innovation Award for 1993. Their suggestion was selected during the 1993 Regional Safety Program. The recommendation was to expand the current safety program to include an employee wellness program which would be designed with flexibility to allow for local situations at field stations. The program would include physical fitness, mental well being, health screening and self defense.

Biologist Drobney was bitten by a red bat in August while involved in a study of the endangered Indiana bat. During mist netting activities, the bat was captured and bit the employee on the left index finger while taking wing measurements. The bat escaped, so potential for rabies was unknown. The employee received the prescribed rabies treatment.

All WNT Staff attended an eight hour Defensive Driving Training course given by the Iowa Safety Council in November.

7. Technical Assistance

Nothing to report.

8. Other

Nothing to report.

F. HABITAT MANAGEMENT

1. General

There are two facets to habitat management at WNT: (1) Reconstruction - starting from scratch in an agricultural setting and (2) Restoration - improving the quality of remnant natural communities. Both involve consideration of historic and current conditions, available resources and existing techniques.

WNT is still in the early phases of historic information gathering. Information about plant communities will be carefully combined with historic information about animal populations, land use history, landform characteristics and natural processes such as fire and grazing, to help us begin to understand the historic condition of the natural landscape.

Reconstruction
Approximately two-thirds of the Refuge is being, or has recently been, used for row crop production. Cropped areas are of first priority for prairie planting. Cultivation partially prepares the site for planting. The seed bank of some species of exotic weeds has been reduced. Establishment of a perennial prairie plant community on these sites reduces the vulnerability to erosion.

In 1992, several native prairies, savannas and production plots of local ecotype native grass were harvested for planting on WNT in 1993. Fall weights of harvested material varied greatly from spring weights due to drying, even though the harvest season was dry. For example, by spring of this year, weight of coarse-textured material harvested using a modified Kentucky bluegrass stripper decreased in weight by approximately 50% of harvest weight. The total harvest effort yielded approximately 5,000 pounds of dried material.

Bulky material harvested with a modified Kentucky bluegrass stripper include seeds, seed heads and straw.

Harvested material ranged from a coarse-textured mix of seed, straw and other extraneous material to pure seed. Precise amounts of seed per species were unknown for these harvests. Seed weight estimates were developed based on weights of coarse screen separation of samples of this material and on visual estimates. From these estimates, site visitations prior to harvest, and a previously developed site species list; a general list of species present in the harvested material was developed. Precise species lists per harvest lot, however, have not been developed.

Each machine harvest of a prairie remnant was used as a matrix for first year planting. Species were added to the matrix as appropriate to increase local ecotype diversity. Seeding rates in 1993, therefore, were based on estimates of seed weight, on estimated species composition of prairie matrices and on known amounts of seed per species available in lots of seed that were hand collected seed or harvested from production plots.

Origin of seed was also considered in development of species mixes. Seeds collected from remnant natural communities nearer the Refuge are presumed to be genetically more similar to historic plant communities at WNT than seed collected from more distant sites. For this reason, nearer sites are considered to be a more valuable seed resource. Six ecotype priority zones were developed based on distance from the

Refuge and described by county boundary--Zone 0 being WNT and Zone 5 being most distant (approximately 90 miles) from WNT.

Seed matrices originating from the sites closest to WNT were planted nearest to existing remnants and in more highly restorable areas on the Refuge. Production plots were designed using selected species of clean, or nearly clean, seed collected on, or in close proximity to WNT. Seed originating from more distant areas were planted on sites more distant from existing remnants.

Hand collected seeds are stored by species and grouped within six ecotype priority zones.

Canada wild rye (*Elymus canadensis*) is potentially a valuable species of early prairie establishment. It is a cool season grass that germinates in three days from seed. Its roots are tolerant of disturbance and seem to recover from damage quickly. At a rate of two pounds per acre, this species is reported to establish a solid stand that can be harvested in three years. Through time, these plantings will decrease in vigor, theoretically allowing prairie species to invade from adjacent remnants or from plantings. When planted at a lower rate in conjunction with perennial prairie species, Canada wild rye should deter soil erosion, result in early development of a fire matrix and serve as a nurse crop for the establishment of other native species. As a diverse prairie community becomes established and more vigorous, it decreases in vigor and apparent density. Should soil disturbance occur in the future, this species will re-

establish from seed present in the seed bank; creating conditions favorable for establishment of prairie. Accordingly, Canada wild rye was planted in conjunction with prairie plantings and some seed was reserved for production plantings.

Planting sites were selected based on location within the Refuge. Considerations included if it had been an agricultural unit, its crop and chemical history; and location relative to a construction zone. Areas near the future Visitor Center Site were given high priority so that prairie could be developing in heavily interpreted areas first. Efforts to remove approximately the same percentage of land from each Cooperator meant that some site decisions were based on economic considerations.

Seed from particular remnant community types were matched to sites with similar environmental conditions; i.e., moist-soil lowland sites were matched with wet-mesic prairie harvests and dry upland prairies were matched to dry WNT hillsides. Theoretically, communities on planting sites were similar to communities on harvest sites.

Ordinarily, the Corps of Engineers' Lake Red Rock Reservoir lies three miles from the Refuge. During July, flood waters encroached to the southern boundary of the Refuge. View of Highway F70, in background, looking to the north.

You got water on Refuge?

Maintenance Worker Boot uses the TRAX Truck and the Truax Broadcast Seeder to inter-seed big bluestem into a CRP strip dominated by smooth brome.

Record breaking rainfall during spring and summer interfered with WNT's first large scale planting year. As a result of the wet conditions, only 200 of the planned 400 acres were actually planted. These acres were limited to drier uplands and were planted throughout the summer whenever conditions permitted, rather than during the optimum spring planting season.

Our final planting in 1993 occurred in mid-November after which snow prevented continued efforts. Remaining seed from 1992 has been stored in a cold barn until planting can continue in late winter or early spring.

Developing methodology for processing, tracking and planting seed was extremely time consuming, hopefully we learned things that will make future years more efficient.

Harvest

As in all other field activities this year, harvest of prairie and savanna prairie species was affected by rain. June and July harvests of sedge meadows and fall harvests of wet-mesic prairies were prevented due to standing water or wet soil conditions. Harvesting that would damage remnant natural areas was avoided.

Approximately 100 species of grasses and forbs from prairie and savanna were collected by hand in 1993. Both machine and hand harvested seeds were extremely wet. We anticipate that we will have approximately the same amount of seed from harvests in 1993 as in 1992. Though we will probably have an equivalent amount of seed from this year's harvest, the quantity of individual species and the condition of seed harvested is somewhat different than last year, again, due to the rainy season.

Many wet areas were literally under water, ranging from a few days to several weeks, therefore they did not produce seed. Species growing in wet to wet-mesic areas, such as prairie gayfeather (*Liatris pychnostachya*), generally did not produce viable seed as successfully as last year. Dry areas, on the other hand, produced abundant, plump seed especially from species that bloomed from mid to late season. Scaley blazing star (*Liatris squarrosa*) and rough blazing star (*Liatris aspera*) were observed on one dry site in almost solid 20 foot bands (arranged relative to topography) of healthy seed producing plants. Seed production for such species on dry sites was often in sharp contrast to species such as prairie gayfeather, occurring in wet sites.

Hand harvesting by students and volunteers provides the Refuge with valuable seed while connecting the collectors with their environment.

Some species of prairie plants apparently had low seed production throughout much of our local ecotype range and the poor success in seed set seemed more closely related to season of bloom than site moisture conditions. Many of these species bloomed in the first half of the growing season and a suspected cause of low seed production was low availability of pollinators due to the cool, wet season.

Seed predation appeared to be high in big bluestem on some of our harvest sites in 1993. Apparent insect damage occurred in the inflorescence and in the culm. In prairies affected by this condition, many inflorescences did not produce viable seed.

We are also concerned about the potential spread of big bluestem smut, a non-native fungal disease believed to have started in Iowa from plantings of seed that originated in Nebraska. This disease is ultimately fatal to affected plants; symptoms include occurrence of several shortened culms among taller culms. Eventually in successive years, no normal height culms occur and the plant finally dies.

2. Wetlands

Nothing to report.

3. Forests

Nothing to report.

4. Croplands

Major changes occurred in WNT's farming plan in 1993. The biggest change was the shift from crop share to a cash rent system to simplify the administration of the program. Since WNT is mandated to convert the existing cropland to native vegetation, this system offered several advantages.

The cash rent system was designed to minimize the risk to Cooperators and still keep the rent within the general range for this area. The rent was determined using the existing yield data for each tract within the Refuge boundary, the average price per bushel of corn and the cash rent guidelines established by the Jasper County Extension Office. The resulting rent figures fell at the lower end of the cash rent scale used by Jasper County's SCS office. Rent was paid in two installments, the first 30% due in May, the remainder due in November. Total payment was based on the ASCS Planted Acres Report. The Cooperators were satisfied with the resulting rent. Average rent for farming WNT crop units was $65.00 per acre, with a range of $60.00 to $71.00. This does not reflect the $8.00 per acre they were required to pay for the crop scouting service.

Another change in the farming program included mandatory planting of buffer strips along gullies, waterways and streams. The buffer strip was required to be 100 feet on either side. Seed consisted of a mixture of grasses: Kentucky Bluegrass, Timothy, Red Clover, with oats added to give quick coverage for these areas. The seed was provided to the Cooperators and planted after regular crop planting was completed. The buffer strips accounted for approximately 136 acres converted from row crops to permanent cover.

A change from using anhydrous ammonia to liquid nitrogen was initiated, an adjustment made for operator safety and to lessen the impact on soil micro-organisms. The results were mixed, with some reluctance by the Cooperators. The cost for this form of nitrogen is higher; however, this is offset by savings in fuel and equipment costs. Liquid nitrogen is applied during the same pass as the herbicide application resulting in less soil compaction.

The last major change was a requirement to use a crop scouting service on all Refuge crop units. A firm was contracted by the Prairie City Farmers Cooperative and Refuge Cooperators paid $8.00 per acre directly to the Prairie City Co-Op. This cost was offset when figuring the use fee for the unit. The overall success of the firm hired by the Prairie City Co-Op was not very good. We had complaints of late reports and sloppy, insufficient information. Unfortunately the complaints didn't surface until after the growing season was over. The Co-Op has agreed to find a different firm in 1994 and hopefully we will have a better program.

The total of row crops on the Refuge for 1993:

Corn	1231.1 acres
Soybeans	760.3 acres
Total Crop Acres	1992.1 acres

1993 proved to be a trying year for the agricultural community in the Midwest. Record rainfall washed planted fields away or inundated them. Many farmers were faced with fields that would have been more suitable for growing rice than corn and beans. The Refuge Cooperators encountered the same obstacles. In general, fields were planted late and in some cases, had to be replanted because the seed washed out. The record amounts of rain and cool weather took its toll on the crop. Harvests yielding 50% of average were the norm. Refuge Cooperators fared a little better than many due to the higher elevations of Refuge units.

The cooler, wetter weather was favorable to vigorous weed growth and poor weed control. The Refuge made a slight adjustment in the use fee due to the inability to get units planted.

5. Grasslands

Approximately 400 acres were removed from available crop acres for conversion to native vegetation in 1993. This will be the average number of acres removed each year until farming is eventually phased out.

The record rains of 1993 played havoc with our planting plans just as they did with the farmers of the state. We were only able to get 200 of the projected 400 acres planted. The remainder we hope to put in as frost plantings during late winter or early spring. The basic method of planting consisted of using a burn down herbicide to kill off existing weeds and grasses. We used two pints per acre of Roundup (glyphosate)and one pint 2-4-D Ester per acre. We put down a nurse crop of oats using a no-till drill followed by one of the seeding methods mentioned below. The soil types and terrain at WNT prohibit even minimum tillage. We have found that the action of the no-till drill putting the nurse crop down seems sufficient in producing good seed-to-soil contact.

Several planting techniques were used: Truax No-Till Drill, Truax Broadcast Seeder, fertilizer wagon, manure spreader and a bale mulcher. A great deal of the native seed was collected using a modified bluegrass stripper. The resulting product was a very stemmy, coarse mixture of seed and chaff which doesn't feed easily through a seeder. We have tried some rather unorthodox seeders and still haven't found a good solution.

The Refuge Case 2096 pulls a Truax Broadcast Seeder and cultipactor.

To reduce the bulk of the seed, we used a chipper/shredder vacuum. This method reduced the bulk of the harvested material without doing damage to the actual seed. We were able to get even the most stemmy of harvests to pass through a Truax drill after two passes through the chipper/shredder. While this system works well for reducing the bulk of the harvest material, it is time consuming and a very labor intensive process. We need to devise a method of reducing bulk that requires only one step, which will not damage the seed and will provide a product that passes through a seed drill.

The first planting took place on June 28, 1993. We planted approximately 15 acres using a bale mulcher shooting baled prairie hay. The results of this seeding were quite amazing as we found several species of forbs coming up the first year. After the first planting, we planted at every opportunity the weather would allow. At one point, we were so frustrated with the weather and inability to get out to seed, we used a TRAX Truck to pull a broadcast seeder. We seeded 12 acres this way.The final planting was done using a manure spreader in early December. As strange as this sounds, it did lay the seed out at the rate desired and gave us a longer opportunity to get seeding done. Due to the stemmy nature of the seed material, this method proved to be very effective.

Some native remnants were harvested as hay.

Refuge Staff use a bale mulcher to plant seed and accompanying straw harvested by a seed stripper.

Of all the methods used, drilling was the fastest. However, the use of a fertilizer wagon holds promise. The main difficulty with this method is bridging of the seed. Once the seed was out of the feed door, the twin fan spreader did an excellent job of spreading the material. One advantage was not having to reduce the material bulk as much, saving a great deal of time.

The units we are planting consist of either corn or bean fields. Our intent is to concentrate on converting these areas to native vegetation first and then work on CRP units. We planted 12 acres of existing CRP, a degraded brome field. We broadcasted the seed into the brome grass to see what would happen. If it works, it could make things much easier, but we are skeptical.

Several new species were observed on prairie remnants on WNT including blue-eyed grass (*Sisyrinchium campestre*), yellow star grass (*Hypoxis hirsuta*), showy orchis (*Galearis spectabilis*), slender ladies tresses orchid (*Spiranthes cernua*), and possibly, the rare great plains ladies tresses orchid (*Spiranthes magnicamporum*).

In addition to native species present on prairie remnants at WNT, exotic weedy species were found in large concentrations in some areas. On the site known as "Coneflower Prairie", three large populations of white sweet clover occurred.

Seventy-three acres, including the prairie and adjacent WNT land, were burned by vandals during the spring of 1992. This fire apparently stimulated germination of three populations of sweet clover, one near the northern fence line, another near the south edge near the tributary to Walnut Creek and the third among the trees to the west. This year was the second year after the burn, and as a biennial, all three relatively large populations of sweet clover bloomed. Heavy rain and a lack of qualified personnel prevented use of mowing equipment at the appropriate time. We anticipate a dense population of sweet clover to establish in this area in 1994.

A pale purple coneflower struggles to compete against exotic species encroaching on a Refuge prairie remnant.

The first prairie reconstruction (1992) supported the expected complement of weeds and wildflowers. More than 40 species of native prairie plants were observed on this four acre planting around the Interim Office. Many species bloomed, resulting in a good start as an interpretive area for visitors.

Blazing star rise above the exotics in a two year old prairie reconstruction at the Refuge Interim Office.

Black-eyed susan and purple prairie clover add a splash of color near the Interim Office entrance.

The big bluestem production planting (1992) of 73 acres yielded sparse evidence of success in the first year. It is hoped that the seed may have gone into a super-dormant state and this area could yet result in a healthy stand.

6. Other Habitats

In September 1993, members of the Jasper County Conservation Board and the Iowa Department of Transportation (IDOT) met with WNT staff to discuss a joint project. This called for planting local ecotype native grasses and forbs along a five mile stretch of newly constructed highway right-of-way on the north border of the Refuge. Money for this project would come from a program sponsored by the IDOT called the *Living Roadway Trust Fund*. Combining county, state and federal agencies on a large scale project like this has not been done in Iowa before. The end result will produce many benefits: (1) protect the borders of WNT from non-local ecotype seed; (2) provide a gateway into the Refuge and Prairie City; and (3) confirm that this type of planting along a major highway is feasible and requires less maintenance.

The project requires that WNT staff provides a species list, verifies seed sources regarding ecotype and monitors the planting. Jasper County Conservation Board is going to provide contracting and financial management of the project.

In mid-December, $102,000.00 was given to proceed with this program. We are planning on a three year project; planting the first year, mowing and spot weed treatment in the second and third years to assure the planting takes.

Several new savanna plant species were added to WNT's listed flora this year. Many of these species were spring and early summer species that were not inventoried during the initial plant surveys. Such species include sedge species (*Carex spp.*), green dragon (*Arissaema dracontium*), Michigan lily (*Lilium michiganense*) and leather flower (*Clematis pitcheri*).

Savanna

Much interest has been generated in savannas as a topic. In February 1993, the first North American Oak Savanna Conference was held in Chicago, Illinois. Refuge Biologist Drobney was a participant in an effort to share information and to draft a midwest Savanna Ecosystem Recovery Plan.

During the conference, interest was generated in WNT's savannas which have mesic to wet-mesic characteristics. Most of the current information about savannas has been derived from sand savannas. Sand savannas have been more likely to survive because they are less suited to agriculture and therefore less subject to the plow. In addition, invasive woody species often tend to develop more slowly in dry sandy areas resulting in a longer time period prior to canopy closure.

In some areas on WNT, prairie cord grass and other moisture loving species occur in the oak understory on hillsides associated with seeps. In other areas, savannas occur in relatively low moist areas. WNT, therefore, is potentially an important study site that could yield a better understanding of a once common kind of midwestern oak savanna that is poorly understood and largely obliterated.

Savanna remnant in Appanoose County, will be used to enhance WNT's diversity.

7. Grazing

There was one Cooperator grazing cows and calves on two units in 1993. The units totaled 95 acres and were moderately grazed from early summer through November. Fees were based on Jasper County Extension Office figures.

There is no grazing planned in 1994. In the future, small units may be grazed for vegetation manipulation under tightly controlled parameters.

8. Haying

The reconstruction plans called for the elimination of haying in 1993. The weather during the growing season made local hay production very poor, resulting in a shortage. Because of this and the amount of hay ground available on WNT, haying was offered to Cooperators on selected units. Due to delayed cutting, only 25 acres were actually put up. The quality was inferior, but Cooperators were grateful for the opportunity.

9. Fire Management

Wildfire

The Refuge had three vandal-caused wild fires this year. On March 12, a vacant house which had been scheduled for demolition, burned down. Other buildings on this site were being used to store native grass and forb seeds which caused concern, however, they were not damaged. All the fires were responded to and extinguished by the Prairie City Volunteer Fire Department under cooperative agreement.

An arson fire engulfs the vacant "Swan Farm" house.

On March 18, a grass fire burned approximately .4 acre of road ditch. No damage occurred, in fact, this ditch produced an abundance of big bluestem and Indian grass seed this year.

The third incident, reported on April 4, was a small road ditch fire and again, invigorated the native grass.

Prescribed Burning

Four sites, totaling 83 acres, were planned as WNT's first prescribed burns. We were not able to conduct 21-HH or 21WW due to rain. 14-TCP and 9-SC burns were conducted on April 30. Participating in the burn were: R. Birger, D. Aplin, P. Drobney, B. Boot, B. Petersen and volunteer, T. Cady.

14-TCP was a ten acre prairie remnant associated with a farm pond. Fuel was primarily smooth brome with some native warm season grass concentrations. Duff was present and brome was green and growing. The fire proceeded slowly due to moist conditions and green vegetation, but it proceeded steadily.

The burn was approximately 65% complete. Though no vegetation data was gathered in 1993, the unit appears to have an increase in seed producing native grass species on the northern portion of the site where such grass species were less apparent in 1991. Populations of forbs grew and produced seed vigorously; several Michigan lilies (*Lilium michiganense*) bloomed this season. Increased plant vigor and apparent expansion of some populations of prairie species were probably the result of fire on the site, possibly in combination with the cool, wet season.

9-SC was a six acre area that supported a few species of native prairie forbs and was dominated by reed canary grass. Fuel was reed canary grass consisting of a heavy duff and of actively growing vegetation approximately 12 inches tall. Duff was extensive and the fuel was moist. The fire resulted in burning of approximately 50% of the surface fuel, though a ground layer of duff remained in many areas. Fire spread was sluggish due to moist fuel conditions and low wind speed. Fine fuels piled around the base of black willows resulted in some burning trunks, many trees were approximately 50% dead by mid-summer. Reed canary grass grew vigorously but possibly with decreased production of inflorescences. Black willows present on the site were damaged by the burn, with portions of the trees failing to produce leaves. Several elderberries also exhibited die-back.

Biologist Drobney checks humidity at burn site 9-SC to confirm conditions are within prescriptions.

Maintenance Worker Boot fires up the slide-in pump unit to lay down foam wet lines.

10. Pest Control

The Refuge required Cooperators to use crop scouting this year. Since we had such heavy rains, the bulk of the problems came in the form of weeds with very few insect problems encountered. There were several requests due to the wet weather, to use specific herbicides that were not on the Regional Approved List. They were dealt with on a case by case basis.

11. Water Rights

Nothing to report.

12. Wilderness And Special Areas

Nothing to report.

13. WPA Easement Monitoring

Nothing to report.

14. Farmers Home Administration Conservation Easements

Refer to section C.4, otherwise nothing to report.

15. Private Lands

There were eight requests for wetland restoration assistance received during 1993. Most of the sites were not feasible based on physical or economic factors. Site inspections were hampered this year due to the record rainfall and resulting flooding.

Of the sites looked at, three stood out as promising for restoration efforts. One site in Marshall County was a small area of less than ten acres that was being drained by a surface ditch. The area would require a small dike to be built to protect adjacent cropland and the filling of the surface drainage ditch. A request was made for SCS to accompany staff to do site survey work but because of the flood problems, this never happened. Attempts will be made to get this work done in early 1994.

Another site, located in Story County, consisted of a complex of very low ground on several farms, with a main county tile running through it. Due to the topography, the tile line was at most, a foot under the soil and with the high rain this year; the entire complex was flooded. There were numerous species of shore birds and waterfowl using the area when the initial inspection was made. State Private Lands Coordinator Jim Munson and Petersen toured the area in July. Our initial contact was through the Story County Pheasants Forever Chapter. Because of the site's complexity and the county tile drain running through it, we decided to contact the engineer from the Service's St. Cloud office for advice. An on-site visit was made in September to do survey work and again, contact the landowners. As of the writing of this document, we have not received word from the engineer's office on any plans.

WNT was able to assist the Polk County Conservation Board with restoration of a seven acre wetland. The county requested assistance in locating and plugging a tile line that ran through an old golf course area they owned. Maintenance Worker Boot was able to locate the tile and assist in plugging the line. This was the first wetland restoration project to be completed by WNT. This restoration will be used by the County Conservation Board in environmental education, focusing on the importance of wetlands.

The Refuge also had a project pending from the previous year. This was a restoration on ground in Jasper County. The restoration will return approximately 1.5 acres back into wetland. Because of the weather conditions this past year, we were unable to complete the work. WNT entered into a Cooperative Agreement with the Jasper County Soil and Water Conservation District. The agreement was signed in September

and the project should be completed in the summer of 1994. Under the agreement, the Soil and Water Conservation District has agreed to oversee the project.

There were several training sessions attended by ROS Petersen during the year. In January, he attended the Private Lands Coordinators Annual Meeting in Des Moines. In April, the Iowa Private Lands Office hosted Soils Training at WNT. In October, he attended a meeting on the Emergency Wetland Reserve Program.

The Emergency Wetland Reserve Program did not draw as much interest as anticipated in the central Iowa area. This program was designed to assist those individuals who had been affected by the severe flooding during 1993. There were strict requirements to be eligible for this program.

- the land had to have been flooded during 1993,
- the land had to have been cropped one of the last five years,
- the cost of the easement was less than the cost to restore the land back to crop production,
- the land had to be restorable to wetland
- at least 75% of the land was designated as farmed wetland, prior converted cropland, potential wetland or a wetland farmed under natural conditions.

Damages could be sand blowouts, dike blowouts, and/or littering from trees and brush. Site inspections were completed by Petersen and Olawsky, with assistance from SCS personnel in Jasper County (2), Polk County (4), Dallas County (5), and Greene County (6). Of all the sites examined, most were marginal prospects for this program and did not rank very high. Plans were submitted for nine total sites, most in Polk and Dallas counties.

16. Other Easements

Nothing to report.

G. WILDLIFE

1. Wildlife Diversity

Nothing to report.

2. Threatened and Endangered Species

See D 5., otherwise nothing to report.

3. Waterfowl

Nothing to report.

4. Marsh and Water Birds

Nothing to report.

5. Shorebirds, Bulls, Terns, and Allied Species

Nothing to report.

6. Raptors

Nothing to report.

7. Other Migratory Birds

Walnut Creek NWR held its first official Audubon Christmas Bird Count on Sunday, January 2, cataloguing 33 species of birds.

Canada Goose - 37
Mallard - 8
Bald Eagle - 1
Red-Tailed Hawk - 13
American Kestrel - 3
Wild Turkey - 9
Rock Dove - 4
Mourning Dove - 1
Red-Bellied Woodpecker - 6
Downy Woodpecker - 24
Hairy Woodpecker - 9
Northern Flicker - 7
Horned Lark - 24
Blue Jay - 26
American Crow - 322
Black-Capped Chickadee - 50
Tufted Titmouse - 4
White-Breasted Nuthatch - 13
Brown Creeper - 2
Cedar Waxwing - 25
Loggerhead Shrike - 1
European Starling - 460
Northern Cardinal - 146
American Tree Sparrow - 804
Song Sparrow - 1
Swamp Sparrow - 1
Dark-Eyed Junco - 207
Red-Winged Blackbird - 10
Meadowlark Sp. - 2
Common Grackle - 1
House Finch - 18
American Goldfinch - 44
House Sparrow - 858

Prior to the event, three local Audubon Chapters expressed interest in attending, as did several WNT volunteers. Only twelve people actually took part, we suspect that predictions of heavy snow and/or freezing rain dampened enthusiasm. Despite the snowy day, however, all attendants agreed that it was great fun and look forward to next year's count.

8. Game Animals

Whitetail deer, cottontail rabbits, grey and fox squirrel, bobwhite quail, pheasant and turkey make up the game animals found on WNT.

Hunting was allowed during the regular state season for all these species except turkey. During the transition between agriculture and native vegetation, the upland game bird populations should do well. Once we get a majority of the Refuge seeded to the native species, we anticipate a decline in the pheasant numbers and possibly in the numbers of quail. Deer and turkey should do well in the open grass and savanna areas.

The Refuge has not instituted any formal census or survey methods yet, we are awaiting the development of a more complete monitoring plan. In the absence of our own data, we rely on information from the Iowa Department of Natural Resources for population trends in our game animal component.

9. Marine Mammals

Nothing to report.

10. Other Resident Wildlife

No Refuge based surveys were made for game animals or other resident wildlife. The following information is excerpted from the statewide pheasant and game survey conducted by the Iowa Department of Natural Resources. It serves as an indication of populations in the area comparable to WNT.

A 30% decrease was noted in pheasant populations in Iowa relative to 1992 data. Decrease in numbers of birds in WNT's local ecotype zone was probably due, at least in part to, lack of snow cover during part of the winter and due to the wet spring in 1993. During the spring, brood numbers decreased by 37% statewide perhaps due to poor hen survival through the winter or due to poor nest success.

Though some counties in the southern portion of WNT's range produced better quail numbers than others, there was a decrease of 9% in the statewide quail roadside index in 1993 as compared to 1992. This decrease is attributed to lower counts in some regions, to light snowcover in winter and heavy rains in spring; both of which probably resulted in quail mortality.

11. Fisheries Resources

Nothing to report.

12. Wildlife Propagation and Stocking

Nothing to report.

13. Surplus Animal Disposal

Nothing to report.

14. Scientific collections.

Nothing to report.

15. Animal Control

Nothing to report.

16. Marking and Banding

Nothing to report.

17. Disease Prevention and Control

Nothing to report.

H. PUBLIC USE

1. General

Much to his frustration, planning of facilities has consumed well over 75% of Dave Aplin's time. Is this why the job series is called Outdoor Recreation Planner and not Outdoor Recreation Provider? The public use staff doubled with the addition of Refuge Ranger Shelly Sentyrz and 1993 saw an increase in programs actually relating to people.

This year, we went from theoretical to the near-real with: (1) the creation of a public use plan; (2) refinement of the interpretive storyline for indoor and outdoor exhibits; (3) transformation of interpretive story to hardware and text; and (4) the creation of a communication plan. All of which helped establish public use facility and program priorities as we build toward a Grand Opening in the spring of 1996. By the end of the year, the trails were staked and surveyed and the 30% construction drawings were submitted by the exhibit designers and reviewed by the Refuge and the Walnut Creek Development Team (TEAM).

The TEAM is made up of Landscape Architects, Dave Shaffer and Mike Marxen; Architect, Penny Saiki; and Exhibit Designer, Lisa Friedlander. They are stationed at Minnesota Valley NWR and act as Region III's liaison with the Service Engineering Center and the contractors.

2. Outdoor Classrooms - Students

Environmental Education programming and planning grew substantially during 1993. Highlights for the year included on-site and outreach programs for school children and youth groups.

On-Site Programs
Twenty-five fifth graders from Martin Luther King Elementary in Des Moines, and sixty second and fifth graders from PCM Elementary School visited the Refuge during May 1993. Twenty students from Basics and Beyond Alternative High School in Newton visited the Refuge three times. In April, forty environmental interpretation students from Iowa State University toured the Refuge. In May, twenty-five Central College biology students from Pella participated in field studies on the Refuge. During the fall seed harvest season, twenty-eight Girl Scouts and forty fifth graders involved in the Prairie City "Just Say No" Program also visited WNT.

High School students from Newton learn about prairie plant adaptations as they transplant seedlings.

Off-Site Programs
Refuge staff reached nearly 500 elementary and high school students through visits to classrooms throughout central Iowa including the communities of Earlham, Pleasantville, Guthrie Center, Cedar Falls, Tama and West Des Moines. Following an introduction to WNT, most of these students participated in prairie stewardship activities near their communities.

Students from PCM Elementary School in Prairie City, Martin Luther King Elementary in Des Moines and Stilwell Middle School in West Des Moines assisted WNT in designing exhibits for the new Visitor Center.

In October, Aplin spoke to 70 high school students from across Iowa who are creating a state-wide high school environmental network.

Fifth graders from a Des Moines school found more than they bargained for as they loosened baptisia seeds from pods. Seed eating tiny weevils, who had adapted to life in the pods, proved repulsive and irresistible.

3. Outdoor Classrooms - Teachers

Aplin and Sentyrz reached a total of 120 Environmental Educators at the February "Escape to EWALU" EE Conference, the September Iowa Academy of Science - Science Teacher's Section Convention, and at the Ottumwa, Iowa Teachers' In-Service Training in May.

4. Interpretive Foot Trails

No interpretive foot trails were in place at the end of 1993. The planning process did, however, make considerable advances in transforming black lines on a map into solid walking surfaces on the Refuge. Coordination of this process fell largely on the TEAM and ORP Aplin.

Attempts to draw the consultant landscape architects at Design Workshop and the exhibit designers at Gerard Hilferty and Assoc. into the process proved frustrating. In the end, Service personnel designed and staked the trails and wrote the interpretive stories. The problem with consultants is they will never know the Service or it's needs as well as we know ourselves. We have a tendency to put our responsibility onto the so-called experts.

By early winter, four trails totalling five miles had been staked. The trails vary in length, topography and level of interpretation. The trails include:

Overlook Trail
Interpretation within the Visitor Center encourages visitors to "get out onto the Refuge." For many, this half mile long blacktopped trail adjacent to the Visitor Center may be their first and only outdoor experience at WNT. The trail was staked in November and maintains a <5% grade change to accommodate persons with disabilities. Three interpretive stops are located along the trail. Interpretive panels telling the story of the restoration of the prairie landscape at WNT will be reinforced with audio messages for the visually impaired. It is anticipated that this will be our most used trail.

Tallgrass Trail
This two mile trail will branch off of the Overlook Trail to explore the prairie landscape in more detail. The longer distance, the crushed limestone surface and occasionally steeper grades will make this trail a somewhat more challenging experience. Visitors will hike along a prairie stream. Seven interpretive stops will take a more detailed look at the WNT restoration process.

Savanna Learning Trail
A restored bur oak savanna is featured along this half mile, crushed stone trail. The trailhead area will include parking for bus and auto traffic, an interpretive kiosk, an environmental education shelter building and a composting toilet facility. No trailside interpretation is planned.

Prairie Learning Trail
Like the Savanna Learning Trail, this two mile, crushed rock trail is designed to serve wildlife watchers as well as EE programming. Trailhead facilities will include parking for bus and auto traffic, an interpretive kiosk, an environmental education shelter building and toilet facilities. The trail will feature prairie restoration as well as a five acre shallow impoundment. Little trailside interpretation is anticipated.

5. Interpretive Tour Routes - Auto Tour Routes

No auto tour routes were in place during 1993. The Refuge Master Plan calls for the eventual development of a nine mile auto tour through the northern half of the Refuge. Much of the proposed route is on land within the acquisition boundary not currently owned by the Service.

6. Interpretive Exhibits/Demonstrations

Sow Your Wild Oats II

Almost 400 people braved a day-long rain to participate in the second annual Sow Your Wild Oats festival on May 22. The weather altered many of the planned activities, but WNT staff went on with the show. Lectures on prairie restoration, Iowa raptors and other topics were moved into the vehicle garage. Exhibitors from a variety of conservation organizations including the Iowa Prairie Network, the Nature Conservancy, the IDNR, ISU Wildlife Extension, Iowa Association of County Conservation Boards and others crowded into the Refuge maintenance building. The Carlisle Cut-off Band provided music for the second year in a row. The crowd enjoyed the event in spite of the weather.

A barred owl and a kestrel give wildlife rehabilitator, Beth Brown, their undivided attention during Sow Your Wild Oats II. Cold, continuous rain forced events indoors.

Prairie Harvest Festival

WNT staff and volunteers returned to the A.C. Morris Prairie on the afternoon and evening of September 19 for the Second Annual Prairie Seed and Feed. BBC Bluegrass band provided the entertainment during a pot-luck supper at nearby Mariposa County Park. WNT staff, volunteers and first time participants travelled to A.C. Morris Prairie to collect seed for restoration at WNT. The group of 30 participants enjoyed the event although wet and cool summer weather reduced the volume of seeds ready for harvest.

Youngsters gather forb and grass seed in the evening light on the A.C. Morris Prairie in Jasper County.

Kiosk Completed

1993 saw the completion of the interpretive Kiosk at the Interim Office site. ORP Aplin worked closely with Wilderness Graphics Inc. of Tallahassee, Florida to complete the design of the structure. Wilderness Graphics holds an Indefinite Quantities contract with Region Three. Communication on the content and design of the interpretive panels occurred via phone and fax. Over the course of the winter, the design was conceived and approved. Wilderness Graphics eventually produced attractive, well built impregnated fiberglass panels. The company did not, however, break land speed records fabricating and shipping the product. The interpretive panels were hung in September.

Traveling Exhibit

The WNT portable exhibit travelled frequently during 1993. In February, Refuge staff accompanied the exhibit to Pella,

Iowa to participate in Bald Eagle Days. The event, which attracted 3,500 visitors, is co-sponsored by the Army Corps of Engineers, the Iowa DNR non-game program and the City of Pella. The exhibit travelled to Minnesota Valley NWR in August for Prairie Days, accompanied Refuge staff to the Iowa Academy of Science Convention in Des Moines, the Marion County Native American Artifacts Show, and a dance in West Des Moines sponsored by the Central Iowa Sierra Club. Proceeds from the dance will be contributed to the new Friends of WNT Group.

7. Other Interpretive Programs

Several monthly events, referred to as "Stewardship Saturdays", were developed to invite visitors to take part in seasonal ecosystem restoration activities such as seed gathering, seed processing and tree girdling. To accommodate as many people as possible, the events began in mid-morning and continued into the afternoon.

The Saturdays' have become a balanced combination of veteran and new visitors to the Refuge. Participation has grown steadily throughout the year and currently averages 25-30 visitors per event. A focus on teamwork and informal, small-group settings have encouraged many Stewardship Saturday first-timers to pursue a continuing volunteer position with WNT.

Biologist Drobney and Refuge Volunteers process seed.

Specific events during 1993 included Sow Your Wild Oats Day II, ten seed collection dates at locations across central Iowa, and a Christmas Bird Count in conjunction with local Audubon Societies.

Refuge staff also participated in a wide variety of public events and interpretive programs during 1993 which included:

- Healing the Earth, Feb. 20
- Park Centre Retirement Community, March 18
- Sierra Club Retreat, April 3-4
- Earth Week, Des Moines Area Community College, April 21
- Earth Week, Central Iowa Sierra Club, April 21
- Chariton Rotary Club, June 18
- ISU Fish,Wildlife, and Biology Club, September 28
- Founders Garden Club, September 29
- Iowa DNR Parks Staff, September 29
- Rolling Thunder Audubon Club, October 27
- Pleasantville Careers Night, November 1

8. Hunting

Peterson and Aplin made necessary modifications to the 1992 Interim Hunting Plan and resubmitted the document to the Regional Office on April 20, 1993. The plan was published in the Federal Register on May 18, 1993.

With minor exceptions, the 1993 WNT hunt was concurrent with State of Iowa seasons and bag limits for upland game bird, squirrel and white tail deer. WNT confined all hunting to the period between October 2 and January 10, 1994. No special permits were required.

Refuge upland game bird hunting was spotty at best. Extremely wet spring and summer conditions significantly reduced bird populations throughout central Iowa. IDNR surveys reported a 35% decrease in pheasant populations from 1992 levels. Quail and gray partridge populations were similarly impacted. Cool weather and wet fields delayed corn and soybean harvests, further reducing hunter success.

Initial bird hunting pressure was fairly high. Checks made opening weekend estimated 35 vehicles and 100 hunters on October 30 and 16 vehicles and 50 hunters on October 31. Hunter reports revealed early season success was spotty with few quail and no partridge taken. Hunting pressure declined substantially during the latter part of the season.

Early pheasant season pressure yielded spotty results. Spring and summer rain reduced area pheasant population by 35%, according to IDNR.

Refuge staff predicted strong hunting pressure and solid harvest figures for the 1993 shotgun deer season. These predictions were based on the success of local hunters who harvested 23 deer on the Refuge during the 1992 season. In anticipation of a large harvest, WNT staff recruited members of the Iowa State University Fish, Wildlife, and Biology Club to operate a deer check station. Students were in place during the first three weekends of the seasons to weigh, age, and check deer for external parasites. In the end, the station became the Refuge equivalent of the Maytag repair headquarters, with only one 18 month old buck being checked during the entire season.

Actual shotgun deer season results revealed smaller hunter numbers and a meager harvest. Hunting pressure for the opening weekend of the first (antlered deer only) season was estimated at 45 hunters/day. Mid-week hunting during the first season was estimated at 5 hunters/day. Second season (either sex) hunting pressure was estimated at 20 hunters/day during the weekends and <5 hunters/day during the week. Refuge staff and "local experts" attributed poor hunting results to a number of possible causes, including:

- Disturbance of Refuge deer herd by large numbers of pheasant hunters. This theory was supported by the strong deer harvest on private lands adjacent to WNT.
- Changes in Iowa regulations. IDNR adopted an antlered deer only early season for parts of Iowa, including the Refuge, in 1993. This, in effect, reduced the efficiency of group deer drives. This technique is the most popular form of deer hunting in central Iowa. By the second (antlerless) season, deer movement patterns appeared significantly altered. This may have contributed to low hunter success.
- Low hunter efficiency. Refuge staff noted many hunters new to WNT lacked knowledge of the site and a coordinated hunting strategy. These groups appeared to disrupt deer movements without corresponding hunting success.
- Late corn harvest due to wet field. Standing corn made deer more difficult to locate.

During weekends of the deer-shotgun season, students from the Iowa State University Fish, Wildlife and Biology Club operated a Refuge deer check station.

9. <u>Fishing</u>

Nothing to report.

10. <u>Trapping</u>

Nothing to report.

11. Wildlife Observation

Nothing to report.

12. Other Wildlife Oriented Recreation

The public was allowed to gather mushrooms at WNT in 1993. Cool, wet weather provided ideal conditions for a good crop.

13. Camping

Nothing to report.

14. Picnicking

Nothing to report.

15. Off-Road Vehicles

Nothing to report.

16. Other Non-Wildlife Oriented Recreation

Nothing to report.

17. Law Enforcement

Based on his 15 years of experience with the IDNR, Petersen was granted Seasonal Refuge Officer credentials in April 1993. This doubles the LE staff.

Both Birger and Petersen attended Law Enforcement Refresher at Camp Dodge, Iowa, in late March. WNT staff established contact with local enforcement authorities and have developed good relations with IDNR enforcement, Jasper County Sheriff's officers, and Prairie City officers.

Early in 1993, a minor problem with snowmobile trespass was found, the neighbor was contacted and policy was explained. Since then, there has been no further problem.

No major problems were encountered during the hunting seasons despite high numbers of hunters concentrated during weekends. Nine "Notice of Violations" for entering closed areas or improper licenses were issued during the hunting seasons which ran from the end of October to January 10, 1994.

18. Cooperating Associations

A Cooperating Association is not yet formed at WNT. However, discussions have begun toward the formation of a Walnut Creek Friends Group. Public programs presented to conservation and civic groups by WNT staff, including the Central Iowa Chapter

of the Sierra Club, generated interest in the creation of a WNT Friends Group to support the Refuge and its programming. The first meeting of what was has come to be called the "Proto-Friends" group was held in Des Moines on November 17, at the home of Penny Thomsen. Penny is a member of the Sierra Club. Others in attendance were: Robin Fortney and Mike Smith (Sierra Club), Nancy McKlveen (Founders Garden Club), Mike Sweeney (Midwest Power and former farm manager for Redlands Inc.) and Jerry Selby (Nature Conservancy). Also in attendance were Birger and Aplin.

Other meetings were held and by the end of the year, progress had been made toward formal organization.

19. Concessions

Nothing to report.

I. EQUIPMENT AND FACILITIES

1. New Construction

The Refuge received and installed interpretive panels for the Entrance Kiosk and September. The panels were manufactured by Wilderness Graphics. Boot, Sentyrz, Aplin and Petersen all helped in the project.

WNT finally placed a long awaited Entrance Sign this May. Prior to receiving this sign, the entrance to our Interim Office had been marked with a small sign similar to a realtor's "For Sale" sign.

2. Rehabilitation

Nothing to report.

3. Major Maintenance

Brick decking at the entrance plaza of the Interim Office has proven to be a major problem. The bricks are set into a sand base which has not settled, making for a very uneven surface. Staff reworked the bricks several times to avoid unsafe conditions. In the rear area of the building, the brick work has all but washed away. The original work did not allow for rain water to run off. The contractor was recalled several times to repair the work but has proven to be incompetent and we lost a major part of the rear walk. WNT staff will repair this walk during 1994.

August, resident beekeeper Aplin dismantled the interim office siding to access a swarm of honey bees residing deep within an air handling duct. The bee extraction process required six hours and a shop-vac to complete. The queen and about one fourth of her minion survived the ordeal.

4. Equipment Utilization and Replacement

During 1993, the Refuge acquired the following pieces of equipment:

Shop Equipment
Bosch reciprocating saw, Bosch circular saw, Bosch hand held grinder, Bosch bench grinder, miscellaneous wrenches and assorted hand tools

Restoration Equipment
Land Pride 35 Series 58" roto tiller, John Deere disc mower, two Broadcast seeders, (one straight drop and one with rotary fan), Plot Thrasher, 18' rotary mower, Chipper Shredder Vacuum on trailer, Truax No-Till seed drill, Clipper Office Tester Cleaner, and two seed drying carts

Law Enforcement/Fire Equipment
Emergency light bar and dash lights and a 1,000 gallon nurse water tank

Vehicle Equipment /Motorized Equipment
Gas Boy pump, an "L" shaped fuel tank and DeeZee Tool Box for pickup; John Deere 5400 Diesel Tractor with loader arms; John Deere 955 diesel utility tractor with rotary broom/snow blower; Brush Sweeps for Caterpillar D4C crawler; and Chevrolet 1-ton pickup 4X4.

5. Communications Systems

Radios were purchased to support general refuge communications as well as the fire and law enforcement programs. Four radios are E.F. Johnson mobiles with 40 watt power and 99 channels. We also purchased six E.F. Johnson 5 watt power portables.

Along with the DOI-assigned refuge frequency, the Refuge secured permission to operate on the frequencies of the following agencies: Iowa State Patrol, Iowa Department of Natural Resources, Jasper County Sheriff's Office, Jasper County Conservation Board, Prairie City Fire Dispatch and the U.S. Army Corps of Engineers. These are the agencies we will have need to communicate with in an emergency.

6. Computer Systems

During 1993, WNT acquired several pieces of new computer equipment. A HP Color Scanjet IIC Scanner was purchased jointly with the Iowa Private Lands Office. The station also purchased an Apple Laserwriter Printer to be used with IBM and Macintosh computers. An 88C Drive (Syquest) external hard drive used for copying large files was purchased. The floppy disk for this drive will hold 88 megabytes of information verses a normal floppy drive which will hold about 1 mega byte. This will be used in the GIS system.

Geographic based Information System - GIS
This year saw the acquisition of 72 data files for a Refuge GIS. Refer to previous Annual Narratives for a history of GIS start up at WNT.

Construction of the data sets was nearly complete in the beginning of 1993 and files were transferred from the Master Plan/EIS Contractor to WNT for installation. It was soon discovered that a primary GIS rule of thumb had been overlooked in the assemblage of information--in order to manipulate the computer map files for analysis and modeling, the scales of the data sets had to match. The original computer files varied between varying scales of feet and meters. WNT GIS files were sent to Environmental Management

and Technical Center for systematic re-alignment and were returned to the Refuge in the last week of December.

Refuge Ranger Sentyrz was assigned all of the GIS duty. Her college background in GIS theory and training greatly aided the WNT transition from paper maps, colored markers and tracing paper overlays to laser printer output and high-resolution video graphics.

WNT is now using *EPPL-7* software to manipulate the original data. Thanks to Shelly's skill, the future looks much more positive.

Because most of the files were constructed in 1992, baseline data in several files was outdated by the time it reached Walnut Creek in late 1993. Land use files had changed, land ownership boundaries were now different and the proposed facility sites for WNT had been drastically transformed through the final Master Plan process. Modifications must be made before proper analysis of certain files can begin and updating these maps is a top priority. It is anticipated that the revisions will be completed early in 1994. Updated files will be saved so that in the future they may be compared to the original files. This will help to establish a cartographic timeline of Refuge development.

Eleven main GIS projects are being developed during '93-'94;

- A computer map and corresponding legend file of land ownership would be updated. Staff could view and analyze information on land acquisition sites, property lines and local land uses. Prairie planting areas could be demarcated. Management strategies for those areas could then be updated as well.

- A 10 foot contour overlay file would be used to create a map file of specific locations for proposed permanent structures, roads and trails. The file would incorporate the layout for an underground wastewater facility site.

- A map and table file of natural plant communities found on WNT would be analyzed with the contour overlay to provide information necessary to write management prescriptions for the existing natural communities.

- A Refuge map file of hydrology was to be combined with map files of soil characteristics and bedrock geology to create a geomorphological perspective. The new file would help with ecological restoration. When combined with other map files, it could help forecast future Refuge environments and would add insight to construction decisions.

- A transportation overlay of roads would be updated to show road alterations within Refuge boundaries due to restoration activities. This would aid in planning points of access to contractors, researchers and utility crews.

- The same overlay would aid in the creation of a new map file demarcating seed sources in relation to local roads and Refuge property. An attached legend file would describe in detail what plants are located at those sources and who should be contacted about seed harvesting.

- A map of the four-county area would be combined with an overlay of corresponding municipalities to provide data for seed collection. "Windows" of selected areas could be enlarged for analyses. The "windows" could then be printed as reference maps for volunteer seed collectors.

- A new map would be created from a combination of the Refuge boundary map file and road and hydrology overlays. The map would depict prairie and savanna plantings for each year, with each year represented by a different color and explained in legend and table files.

- Another new map would delineate Refuge areas open to the 1994 hunting season. It would be printed in black and white and added as a panel to the WNT hunting brochure.

- Research studies and collection of baseline data would help to create a new computer map and legend file. Each study would correspond to a color and boundary line on the map. A legend file would explain the research query, the duration of research and the research conductor(s). Individual studies might also have their own map and text files to illustrate data and details of the research. Overlays and merges with other map files could help the study to be analyzed in the context of other variables.

- The computer map showing land ownership in the area would be modified to show the map scale in square meters and in acres. This feature would aid in deciphering the amount and mixes of seed needed to plant certain WNT areas, the size of remnant native areas, the yields of farmed Refuge ground and percentage of increase of land acquisition of each year.

Although *EPPL-7* is one of the simplest GIS software packages, the program is capable of performing extremely complex data manipulations. Fairly common computer apparatus can be utilized in doing so. An IBM-compatible computer, color monitor, keyboard and printer (preferably a Laser or Color Laser model) can provide a field station with a reasonably inexpensive and powerful tool for working with geographic information. (Refer to maps in the back of this narrative.)

7. Energy Conservation

Nothing to report.

8. Other

Nothing to report.

J. OTHER ITEMS

1. Cooperative Programs

Nothing to report.

2. Other Economic Uses

Fred Ridgeway, Mitchellville, Iowa, operated a 19 hive bee yard in the northwest corner of the Refuge. This was operated under a Special Use Permit with a fee of $50.00 to cover administrative costs.

3. Items Of Interest

Iowa Fourth Congressional District Representative, Neal Smith, continued to be involved in the development of the WNT project. Mr. Smith visited the site several times during the year. In addition, he frequently requested and received briefings on progress during the year.

Regional Director, Sam Marler, escorted Dave Olsen, Assistant Director for Refuges and Wildlife, on a tour of WNT.

4. Credits

The sections on Climatic Conditions and Safety were written by Carla Dykstra. Carla was also responsible for final typing, layout, proof reading and production.

Shelly Sentryz wrote the sections on Volunteer Programs and Computer Systems.

Dave Aplin selected photographs and provided Section H. Public Use (except Law Enforcement).

Craig Olawsky provided input on Section F. 15, Private Lands.

Pauline Drobney wrote the following sections: D. 5, Research and Investigations; F. Habitat Management, Items 1, 5, 6 and 9; and G. Wildlife, Items 7 and 10.

Bernie Petersen authored Sections F. Habitat Management, Items 4, 7, 8 and 10; G. 8, Game Animals; H. 17, Law Enforcement and I. Equipment and Facilities.

Dick Birger wrote the Introduction, Highlights, Land Acquisition, Planning (except Research and Investigations), Administration (except Volunteer and Safety), and Other Items. He also did the final editing.

Those named above are responsible for all that is found of value, errors of fact or interpretation are Birger's alone.

K. FEEDBACK

The Service is undergoing an extraordinary change in its culture. An indication of the change may be in how the current categories in the Annual Narrative reflect an organization not entirely in tune with contemporary society.

The categories "Outdoor Classrooms - Students" and "Outdoor Classrooms - Teachers" reflect the shallow, circa 1958, understanding of the concept of environmental education. Outdoor Classrooms seems a passive title for the dynamic process of reaching out to a public that needs awareness of the environment and the role of the Service. Outdoor Classroom does not accurately reflect the function the Service has in helping educators. We can provide more than an outdoor space. We can provide skilled staff people and high quality activities on and off the Refuge. These headings should be combined and renamed "Environmental Education."

A case can also be made to move the section on "Volunteers" out of Administrative and into Public Use. Volunteer programs are vitally important to the success of the Service. The value of these programs has little to do with the amount of free labor generated. We need to put a stake through the heart of the myth that volunteers offer the Service something for nothing. The return on a well-run volunteer program is measured in terms of good will and support, rather than trash picked up or ducks banded. The cost to a station in administrative effort often overshadows the actual contribution of the volunteer.

Volunteer programs should be viewed as environmental education and outreach programs. A well-run program offers the public opportunities to learn and master new skills while developing relationships and a sense of belonging. Volunteer programs build a public constituency for the Refuge and the resource.

Well Said, Dick