2ND SEMI-ANNUAL REPORT FOR CONTRACT:

CTGG1 2019-3416
WSRF – North Park Irrigated Meadows Conservation Program Phase 2

for the project period through December 13th, 2020

IN COOPERATION WITH: THE COLORADO WATER CONSERVATION BOARD, COLORADO PARKS & WILDLIFE AND COLORADO STATE UNIVERSITY

Summary

Ducks Unlimited, Inc. provides this semi-annual report to the Colorado Water Conservation Board to demonstrate progress on the second phase of the North Park Irrigated Meadows Conservation Program. We are pleased to report that the project has gotten off to a successful start. Initial design work was initiated on two of the four projects included in the project. We have also met with two additional irrigators in the park to discuss project scope, benefits, and workplans. Our partners at Colorado State University and Colorado Parks & Wildlife initiated the first season of their field work assessing waterfowl population response to irrigated meadow condition in the North Platte Basin of Colorado.

The contract was fully executed on June 14th, 2019. This contract covers eight tasks to be delivered by June 30, 2024. In the past six months, we have initiated program activities, administered requisite partner and landowner contracts, performed project feasibility and design on three project sites, begun construction on one project site and performed the scientific work underpinning project assessments for two field seasons.

We look forward to continuing our progress under this contract meeting the water needs of the North Platte Basin and the State of Colorado. Please let us know if you have any questions, comments or concerns.

Kind Regards,

mreddy@ducks.org

Table 1. WSRF Grant Expenditures by Report Period and Matching Contributions by Partner.

CTGG1 2019-3416 Semi-Annual Report		WSRF BUDGET ONLY	TASK 1 Feasibility & Design BUDGET $	TASK 2 Pre-project Assessment BUDGET $	TASK 3 Construct (2020) BUDGET $	TASK 4 Assessment (Year 1) BUDGET $	TASK 5 Construct (2021) BUDGET $	TASK 6 Assessment (Year 2) BUDGET $	TASK 7 Assessment (Year 3) BUDGET $	TASK 8 Grant Admin BUDGET $
No.	*Date*	**450,600**	**52,000**	**85,000**	**50,000**	**92,000**	**50,000**	**92,000**	**22,000**	**7,600**
1	December, 2019	17,107	14,081	3,026	-	-	-	-	-	-
2	June, 2020	-	-	-	-	-	-	-	-	-
3	December, 2020	-	-	-	-	-	-	-	-	-
4	June, 2021	-	-	-	-	-	-	-	-	-
5	December, 2021	-	-	-	-	-	-	-	-	-
6	June, 2022	-	-	-	-	-	-	-	-	-
7	December, 2022	-	-	-	-	-	-	-	-	-
8	June, 2023	-	-	-	-	-	-	-	-	-
9	December, 2023	-	-	-	-	-	-	-	-	-
10	June, 2024	-	-	-	-	-	-	-	-	-
11	December, 2024	-	-	-	-	-	-	-	-	-
Total WSRF Expended		17,107	14,081	3,026	-	-	-	-	-	-
Total WSRF Remain		433,494	37,919	81,975	50,000	92,000	50,000	92,000	22,000	7,600
% Expended		4	27	4	-	-	-	-	-	-

Matching Funds by Partner	TOTAL MATCH $	TASK 1 MATCH $	TASK 2 MATCH $	TASK 3 MATCH $	TASK 4 MATCH $	TASK 5 MATCH $	TASK 6 MATCH $	TASK 7 MATCH $	TASK 8 MATCH $
	474,000	**50,000**	**81,000**	**50,000**	**81,000**	**50,000**	**81,000**	**81,000**	**-**
Ducks Unlimited, Inc.	2,765	2,765	-						
CO Parks & Wildlife	45,500	-	45,500						
CO State University	15,000	-	15,000						
Total Match Expended	63,265	2,765	60,500	-	-	-	-	-	-
Total Match Remain	410,735	47,235	20,500	50,000	81,000	50,000	81,000	81,000	-
% Expended	13	6	75	-	-	-	-	-	-

Table 2. Progress in achieving project deliverables required by Task under ***CTGG1 2019-3416***.

CTGG1 2019-3416 Semi-Annual Report		TASK 1 Feasibility & Design			TASK 2 Pre-project Assessment	TASK 3 Construct (2020)	TASK 4 Assessment (Year 1)			TASK 5 Construct (2021)	TASK 6 Assessment (Year 2)			TASK 7 Assessment (Year 3)		
		Conceptual Plans	Stamped Plansets	30-year Agreements	Report	Acres Restored	General Report	Landowner Report	Roundtable Report	Acres Restored	General Report	Landowner Report	Roundtable Report	General Report	Landowner Report	Roundtable Report
No.	***Date***	**4**	**4**	**4**	**1**	**500**	**1**	**1**	**1**	**500**	**1**	**1**	**1**	**1**	**1**	**1**
1	December, 2019	2	1	1	1	-	-	-	-	-	-	-	-	-	-	-
2	June, 2020										-	-	-	-	-	-
3	December, 2020										-	-	-	-	-	-
4	June, 2021															
5	December, 2021															
6	June, 2022															
7	December, 2022															
8	June, 2023															
9	December, 2023															
10	June, 2024															
11	December, 2024															
Deliverables Achieved		2	1	1	1	-	-	-	-	-	-	-	-	-	-	-
Deliverables Remain		2	3	3	-	500	1	1	1	500	1	1	1	1	1	1
% Achieved		50	25	25	100	-	-	-	-	-	-	-	-	-	-	-

Task 1 – Project Feasibility, Design and Permitting

***Description of Task*:** At least four irrigation and/or storage projects that flood irrigated pasture or hayland located within the North Platte Basin of Jackson County, Colorado will be identified for rehabilitation and/or expansion. Projects will be designed by Ducks Unlimited bioengineering teams such that the extent and quality of irrigated lands will be maintained an/or expanded (as allowed under decreed water rights). This task will complete conceptual planning on these four projects, complete the development of professional plansets stamped by DU's certified engineer, and the fulfillment of all required permits.

Progress Report on Task: At the time of application to the North Platte Basin Roundtable and CWCB, DU had identified four project tracts upon which to complete irrigation and storage improvements. We summarize below the progress had on each of these tracts:

1.) Newport/Walker Ditch Rehabilitation - In the last six months, DU met with USFWS and representatives of the Stateline Ranch to discuss ditch operation, review pertinent water rights decrees, rehabilitation project scope, required permitting, and the nature of project agreements;

2.) Lost Creek Ditch/Dryer Reservoir Rehabilitation – In the last six months, DU met with Colorado Open Lands and the Deline Family to review project scope, financial planning, access agreements and water rights decrees. DU met with representatives from the Deline Ranch and Colorado Open Lands (who hold conservation easements on the tracts) to discuss conceptual plans for ditch rehabilitation work and restoration of the reservoir. After that meeting, the Delines informed us that they were more comfortable with performing the work on their own and would not participate in this program. Nor further work was performed on the project. DU will work to find a replacement project with similar values, present that replacement project to the North Platte Basin Roundtable for approval and, when successful, work with CWCB staff to amend the Scope of Work to reflect the project substitution. This will push some of the work proposed under Task #1 into 2020 and 2021;

3.) Jennie Ditch Rehabilitation – During this period, DU met with the owners of the Little Grizzly Ranch which is irrigated in part by the Jennie Ditch and with Colorado Open Lands staff to discuss project scope, permitting, the financial plan for the project and the terms of the site conservation agreement; and,

4.) Sherman Ditch/Hamilton Ditch Rehabilitation - DU met with the lessee the State Land Board's Sherman Creek Ranch, representatives of the State Land Board, and representatives of Colorado Parks and Wildlife to establish the scope of rehabilitation on the Sherman and Hamilton Ditches in northeast North Park. DU developed a conceptual plan and draft planset. DU executed an agreement between the Colorado State Land Board, Colorado Parks & Wildlife and Ducks Unlimited authorizing work on the Ranch and assigning responsibilities and financial allocation to the project. DU completed and stamped the planset for the irrigation improvements.

Financial Summary: $52,000 WSRF budgeted, $15,355 expended to date which represents 30% of funds allocated to this task by CWCB.

***Deliverable Summary*:** Two of four conceptual plans completed, one of four stamped plansets completed, and one of four conservation agreements executed.

***Description of Task*:** DU, Colorado State University, and Colorado Parks & Wildlife will perform avian surveys and, on identified project tracts with landowner permission, vegetation surveys prior to project construction to document baseline habitat condition and bird use of those areas. These surveys allow us to estimate the impact of project development on irrigated meadows and explore how waterfowl use of these habitats change within and between season and with project improvements. Baseline data will greatly increase the power of any conclusion develop under our project assessments.

Progress Report on Task: Some initial field work was performed in the summer of 2019. However, most initial field work is planned for the 2020 field season. We provide here an excerpt of the report provided by CSU summarizing work performed in the 2019 field season:

STUDY SITE & METHODS: Field work takes place in the North Platte Basin in Jackson County, Colorado along the North Platte River and its tributaries. This high elevation (8800 ft) basin is dominated by salt desert shrub and sagebrush steppe interspersed by lakes, ponds, irrigation ditches, irrigated hay fields, and the tributaries of the North Platte River. Land ownership is approximately 74% public, with the US Forest Service owning the largest parcels of public land (32%) that border the valley. Arapahoe National Wildlife Refuge, several State Wildlife Areas, and privately irrigated fields encompass many of the wetlands available to breeding and migrating waterfowl in the region and especially in the state of Colorado. Hay meadows primarily consist of Timothy grass (*Phleum pretense*) interspersed with sedges (*Cyperaceae*) and rushes (*Juncaceae*). They are often lined by willows (*Salix* spp.) and other riparian plants that grow along the tributaries from which meadows are flooded.

OBJECTIVES: Our research goal is to assess the impacts of flood irrigation on breeding waterfowl in North Park. We seek to address water management uncertainties in addition to evaluating how birds breeding in intermountain basins contribute to or differ from the continental population of waterfowl. The primary components of this project include:

Objective 1: Assess waterfowl use of flood-irrigated hay meadows during migration and the breeding season on public and private lands.
Objective 2: Evaluate the impact of water infrastructure improvement projects on waterfowl and agricultural irrigated acres.
Objective 3: Evaluate cross-seasonal effects of breeding in flood-irrigated agricultural areas.

In the 2019 season, we focused on testing nest searching methods, intensively searching pre-treatment and control areas for duck nests, evaluating invertebrate productivity on pre-treatment and control areas, and marking as many birds as possible with GPS transmitters to track their movements and habitat use. Future seasons will focus on continuing to search for nests, tracking birds via GPS transmitters, and conducting thorough brood counts.

PRELIMINARY RESULTS *Search Effort:* In the first pre-treatment year, we searched 17 randomly selected plots across four ranches and Arapahoe National Wildlife Refuge within areas that were going to be impacted by irrigation projects and 29 in control areas. Plots ranged from 1.31-16.42 ha ($\bar{x}$ = 5.96 ha) and we rope dragged on foot, searched systematically, or used a drone to locate duck nests. We also opportunistically searched the perimeter of basin wetlands and wet meadows on our way to specified plots.

Invertebrate Samples: We collected nektonic invertebrate samples in most flooded hay plots, ponds, or riparian areas searched using a D-net pulled horizontally through five randomly-selected one m^2 sections of the water column from the substrate to the surface. This resulted in 175 invertebrate samples from 35 wetlands that we are currently working to sort, identify, and weigh. We took samples from 1 July to 12 August to encompass peak hatch of duck nests, during which time ducklings would be reliant on invertebrates as a primary food source.

Duck Movement: We placed 10 transmitters on hens before nesting began or during incubation and 11 transmitters on birds with broods during banding operations in August. Two of the 10 birds marked during nesting abandoned their nests immediately following transmitter deployment. Nine of the birds marked with a transmitter hatched ducklings and at least four of those broods successfully fledged at least one duckling. As of the writing of this report, nine of the marked birds are known to have died. Raw location data is displayed in Figure 1. We calculated minimum convex polygons of each bird's locations to determine an average home range size (mcp function in adehabitatHR package; Program R). Home ranges varied from 4.14-8987.41 ha from May-August 2019. We are currently working on analyzing differences in habitat use and movements for birds that had broods versus birds that were not successful in producing ducklings. We will continue to monitor their movements throughout the winter and into the next breeding season with the goal of monitoring future nesting attempts should they return to North Park.

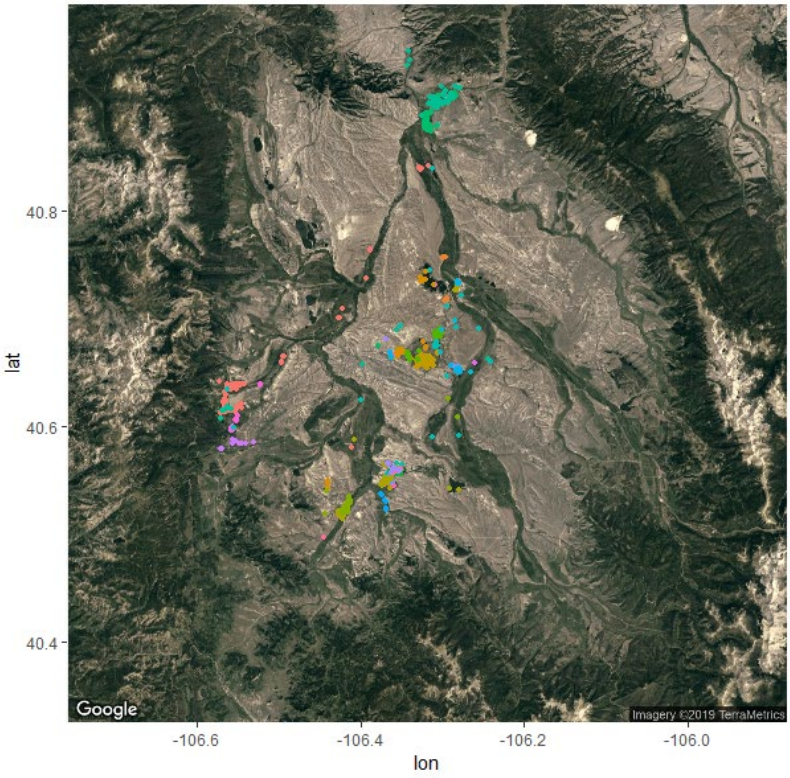

Figure 1: GPS location data from 21 marked mallards (n=14) and gadwall (n=7) females. Each color represents a different individual and the number of locations varies based on how long the transmitter had been deployed. All locations shown were taken from 20 May 2019 to 1 August 2019.

Nest Success

We located 26 nests of five species throughout the 2019 breeding season. A large portion (73.1%) of these nests were located on Arapahoe NWR and only 26.9% (*n*=7) were associated with flood-irrigated hay meadows or the tributaries that fed them. Seven nests successfully hatched at least one duckling, including one cinnamon teal nest, two gadwall nests, and four mallard nests. Seven nests failed due to investigator activity (e.g., transmitter deployment, abandoned immediately after locating the nest), three were flooded, seven were depredated, and two failed due to unknown causes.

Duck Counts and Breeding Pair Abundance

We surveyed 72 basin wetlands, 5 reservoirs, and 9 riparian transects for breeding waterfowl from 24 April 2019 until 19 July 2019. For the five large reservoirs where we conducted weekly, general counts, mean ducks/site started high, dropped off to a low in mid-June and increased until mid-July. Social status of detected ducks showed that pairs were more commonly detected than lone males early in the season but lone males increased throughout. The point where lone males outnumbered pairs is an indication of peak nest initiation date and our results showed that mallards nested first, followed by cinnamon teal, lesser scaup and gadwall. The pattern for green-winged teal was not as clear cut and probably indicates little breeding in the area. Total indicated breeding pairs for our sites were greatest at the beginning of the season and then remained relatively stable until late July. Percent open water was the best predictor of indicated breeding pairs/site followed by herbaceous emergent vegetation, and robust emergent vegetation. Percent shrub/scrub was the only variable to perform worse than the null model. We found more indicated breeding pairs at sites with more open water, less herbaceous emergent vegetation, and more robust emergent vegetation.

Brood Abundance/Productivity

We conducted brood counts on 67 sites. We observed broods of 11 duck species. Duckling abundance tended to increase throughout the monitoring period. The only model of ducklings/site that outperformed the null model was percent shrub/scrub vegetation. The number of ducklings/site increased with increasing percent shrub/scrub vegetation although we observed a limited amount of variation in shrub/scrub vegetation among sites. Duckling:pair ratio ranged from 0.00-4.35 and averaged 0.71 (SE=0.10). Brood:pair ratio ranged from 0.00-1.63 and averaged 0.15 (SE=0.03).

DISCUSSION

The 2019 field season was characterized by heavy and frequent snowfall until at least the average peak nest initiation date of waterfowl (mid to late May). North Park received approximately 8 inches of snow on 21 June, destroying a majority of active duck nests. Overall bird numbers were low, and we believe nests were frequently abandoned due to snow or flooded due to high river levels during runoff, especially in early nesting species like mallards. We accomplished all planned objectives listed in the original proposal, but we did not locate as many nests as expected and did not capture as many females as planned before they initiated nests. We will focus our efforts on decoy trapping early in the 2020 field season and, barring extreme weather conditions, expect to deploy all GPS transmitters before nests are initiated. We used 2019 as a pilot season to determine plot placement and the best search

methods within different habitat types. We plan to search more plots in future years and improve efficiency to collect high quality, abundant data.

Financial Summary: $85,000 WSRF budgeted, $33,494 expended to date which represents 39% of funds allocated to this task by CWCB.

***Deliverable Summary*:** The one required report has been written which will be updated in fall of 2020 to reflect this second season of pre-assessment work.

Task 3 – Project Construction (2020)

***Description of Task*:** DU staff will put out to bid, contract, manage construction and complete work on at least two irrigated meadows projects within the North Platte Basin of Jackson County, CO. This will include the Newport/Walker Ditch Rehabilitation on Arapaho NWR and the Lost Creek Ditch/Dryer reservoir Rehabilitation on the Parkview Ranch. The intent of this task is to secure irrigation on at least 500 acres of irrigated meadows and maintain storage of water in at least 30 acres of reservoir that also serves as breeding waterfowl habitat. Rehabilitation will proceed through the installation of fish-friendly, beaver-proof headgates, the placement of new diversion structures, and the re-building of ditch, culvert, and pipeline structures such that water losses in conveyance are minimized and irrigated lands receive as much water as allowed.

Progress Report on Task: None to report.

Financial Summary: $50,000 WSRF budgeted, $0 expended to date which represents 0% of funds allocated to this task by CWCB.

***Deliverable Summary*:** None to report.

***Description of Task*:** DU, CSU, and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings.

Progress Report on Task: None to report.

Financial Summary: $92,000 WSRF budgeted, $0 expended to date which represents 0% of funds allocated to this task by CWCB.

***Deliverable Summary*:** None to report.

Task 5 – Project Construction (2021)

***Description of Task*:** DU staff will put out to bid, contract, manage construction and complete work on at least two irrigated meadows projects within the North Platte Basin of Jackson County, CO. This will include the Jennie Ditch Rehabilitation on Little Grizzly Creek Ranch and the Sherman Ditch/Hamilton Ditch Rehabilitation on the Sherman Ranch. The intent of this task is to secure irrigation on at least 500 acres of irrigated meadows and maintain storage of water in at least 30 acres of reservoir that also serves as breeding waterfowl habitat. Rehabilitation will proceed through the installation of fish-friendly, beaver-proof headgates, the placement of new diversion structures, and the re-building of ditch, culvert, and pipeline structures such that water losses in conveyance are minimized and irrigated lands receive as much water as allowed.

Progress Report on Task: None to Report.

Financial Summary: $50,000 WSRF budgeted, $0 expended to date which represents 0% of funds allocated to this task by CWCB.

***Deliverable Summary*:** None to report.

***Description of Task*:** DU, CSU and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post-construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings. CSU staff will also produce at least one outreach article or other item suitable for media summarizing project findings in light of the impact irrigated meadows in the North Platte Basin have on populations of waterfowl.

Progress Report on Task: None to report.

Financial Summary: $92,000 WSRF budgeted, $0 expended to date which represents 0% of funds allocated to this task by CWCB.

***Deliverable Summary*:** None to report.

***Description of Task*:** DU, CSU and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post-construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings. CSU staff will produce at least two outreach articles or other item suitable for media summarizing project findings in light of the impact irrigated meadows in the North Platte Basin have on populations of waterfowl. At least one of these items will be targeted for media outlets within Jackson County. At least one other item will be targeted for general media outlets covering water and wildlife issues in the State of Colorado. DU and CSU staff will produce at least two sets of Best Management Practices to be distributed to landowners and conservation practitioners in the Basin and elsewhere in the state. These Best Management Practices will translate project assessment findings about waterfowl use and land productivity into prescriptions for management of irrigated lands similar to those included in the study.

Progress Report on Task: None to report.

Financial Summary: $22,000 WSRF budgeted, $0 expended to date which represents 0% of funds allocated to this task by CWCB.

***Deliverable Summary*:** None to report.

Task 8 – Indirect Costs (Project Administration)

***Description of Task*:** Oversight of the activities for the proper allocation of grant funds, activities and reporting assuring timely delivery of grant deliverables. DU staff will manage financial planning for each of the tasks presented in the workplan, will manage project timelines, produce reports and correspondence to partners and CWCB staff.

Progress Report on Task: None to report.

Financial Summary: $7,600 WSRF budgeted, $0 expended to date which represents 0% of funds allocated to this task by CWCB.

***Deliverable Summary*:** None to report.

DUCKS UNLIMITED

2ND SEMI-ANNUAL REPORT FOR CONTRACT:

CTGG1 2019-3416
WSRF – North Park Irrigated Meadows Conservation Program Phase 2

for the project period through June 13th, 2020

IN COOPERATION WITH: THE COLORADO WATER CONSERVATION BOARD, COLORADO PARKS & WILDLIFE AND COLORADO STATE UNIVERSITY

Summary

Ducks Unlimited, Inc. provides this semi-annual report to the Colorado Water Conservation Board to demonstrate progress on the second phase of the North Park Irrigated Meadows Conservation Program. The contract was fully executed on June 14th, 2019 and identifies eight tasks to be completed by Ducks Unlimited, Inc. and our partners by June 30, 2024.This report covers the period from June 14TH, 2019 through June 13TH, 2020.

We are pleased to report that – despite some noteworthy difficulties presented during the report period – we have made significant progress on both the construction and project assessment aspects of this program. In the past 12+ Months, we have initiated program activities, administered requisite partner and landowner contracts, performed project feasibility and design on three project sites, begun construction on one project site and performed the scientific work underpinning project assessments for two field seasons. Our progress to date is remarkable given the novel circumstances we had to deal with (including reluctant landowners, injured staff and global pandemics). We are confident that despite these challenges we will complete the tasks specified in the project workplan. However, public health restrictions on movement and employment imposed by the COVID-19 outbreak in late winter, spring and summer of this report period may have impacts on our ability to provide all materials and deliverables (especially the project assessment work) within the specified project period. At this time of reporting, we are still working with our partners to assess the full impact of the pandemic on our work; especially our timelines. We will make a full report with recommendations in our next semi-annual report.

We look forward to continuing our progress under this contract meeting the water needs of the North Platte Basin and the State of Colorado. Please let us know if you have any questions, comments or concerns.

Kind Regards,

mreddy@ducks.org

Table 1. WSRF Grant Expenditures by Report Period and Matching Contributions by Partner.

CTGG1 2019-3416 Semi-Annual Report		WSRF BUDGET ONLY	TASK 1 Feasibility & Design BUDGET $	TASK 2 Pre-project Assessment BUDGET $	TASK 3 Construct (2020) BUDGET $	TASK 4 Assessment (Year 1) BUDGET $	TASK 5 Construct (2021) BUDGET $	TASK 6 Assessment (Year 2) BUDGET $	TASK 7 Assessment (Year 3) BUDGET $	TASK 8 Grant Admin BUDGET $
No.	***Date***	**450,600**	**52,000**	**85,000**	**50,000**	**92,000**	**50,000**	**92,000**	**22,000**	**7,600**
1	December, 2019	17,106	14,081	3,026	-	-	-	-	-	-
2	June, 2020	64,989	6,370	33,647	-	1,352	23,620	-	-	-
3	December, 2020	-	-	-	-	-	-	-	-	-
4	June, 2021	-	-	-	-	-	-	-	-	-
5	December, 2021	-	-	-	-	-	-	-	-	-
6	June, 2022	-	-	-	-	-	-	-	-	-
7	December, 2022	-	-	-	-	-	-	-	-	-
8	June, 2023	-	-	-	-	-	-	-	-	-
9	December, 2023	-	-	-	-	-	-	-	-	-
10	June, 2024	-	-	-	-	-	-	-	-	-
11	December, 2024	-	-	-	-	-	-	-	-	-
Total WSRF Expended		82,096	20,451	36,673	-	1,352	23,620	-	-	-
Total WSRF Remain		368,504	31,549	48,327	50,000	90,649	26,380	92,000	22,000	7,600
% Expended		18	39	43	-	1	47	-	-	-

Matching Funds by Partner	**TOTAL MATCH $**	**TASK 1 MATCH $**	**TASK 2 MATCH $**	**TASK 3 MATCH $**	**TASK 4 MATCH $**	**TASK 5 MATCH $**	**TASK 6 MATCH $**	**TASK 7 MATCH $**	**TASK 8 MATCH $**
	474,000	**50,000**	**81,000**	**50,000**	**81,000**	**50,000**	**81,000**	**81,000**	**-**
Ducks Unlimited, Inc.	86,554	37,585	-	-	-	48,969	-	-	-
CO Parks & Wildlife	84,000	-	66,000	-	18,000	-	-	-	-
CO State University	30,000	-	15,000	-	15,000	-	-	-	-
Total Match Expended	200,554	37,585	81,000	-	33,000	48,969	-	-	-
Total Match Remain	273,446	12,415	-	50,000	48,000	1,031	81,000	81,000	-
% Expended	42	75	100	-	41	98	-	-	-

Table 2. Progress in achieving project deliverables required by Task under ***CTGG1 2019-3416***.

CTGG1 2019-3416 Semi-Annual Report		TASK 1 Feasibility & Design			TASK 2 Pre-project Assessment	TASK 3 Construct (2020)	TASK 4 Assessment (Year 1)			TASK 5 Construct (2021)	TASK 6 Assessment (Year 2)			TASK 7 Assessment (Year 3)		
		Conceptual Plans	Stamped Plansets	30-year Agreements	Report	Acres Restored	General Report	Landowner Report	Roundtable Report	Acres Restored	General Report	Landowner Report	Roundtable Report	General Report	Landowner Report	Roundtable Report
No.	*Date*	**4**	**4**	**4**	**1**	**500**	**1**	**1**	**1**	**500**	**1**	**1**	**1**	**1**	**1**	**1**
1	December, 2019	2	1	1	1	-	-	-	-	-	-	-	-	-	-	-
2	June, 2020	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-
3	December, 2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	June, 2021															
5	December, 2021															
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7	December, 2022															
8	June, 2023															
9	December, 2023															
10	June, 2024															
11	December, 2024															
Deliverables Achieved		3	1	2	1	-	-	-	-	-	-	-	-	-	-	-
Deliverables Remain		1	3	2	-	500	1	1	1	500	1	1	1	1	1	1
% Achieved		75	25	50	100	-	-	-	-	-	-	-	-	-	-	-

Task 1 – Project Feasibility, Design and Permitting

***Description of Task*:** At least four irrigation and/or storage projects that flood irrigated pasture or hayland located within the North Platte Basin of Jackson County, Colorado will be identified for rehabilitation and/or expansion. Projects will be designed by Ducks Unlimited bioengineering teams such that the extent and quality of irrigated lands will be maintained an/or expanded (as allowed under decreed water rights). This task will complete conceptual planning on these four projects, complete the development of professional plansets stamped by DU's certified engineer, and the fulfillment of all required permits.

Progress Report on Task: At the time of application to the North Platte Basin Roundtable and CWCB, DU had identified four project tracts upon which to complete irrigation and storage improvements. We summarize below the progress had on each of these tracts:

1.) Newport/Walker Ditch Rehabilitation - In 2019, DU met with USFWS and representatives of the Stateline Ranch to discuss rehabilitation project scope, develop a site conservation agreement, and agree upon a conceptual plan for the project. We also began our topographic survey of the ditch diversion structure and appurtenant facilities. Unfortunately, during this process our surveyor accidentally tipped his GPS ATV rover, breaking his shoulder in the process. This interruption of required data gathering persisted into the spring when COVID-19 public health restrictions prevented further travel by our survey crews from our Bismarck office. We must, therefore, rely on our Colorado engineering team to perform the work. They are scheduled to commence and finish in the fall whereupon the rest of the design and permitting work can be accomplished;

2.) Lost Creek Ditch/Dryer Reservoir Rehabilitation – Project cancelled. Please refer to Semi-annual Report #1;

3.) Jennie Ditch Rehabilitation - DU met with the owners of the Little Grizzly Ranch which is irrigated in part by the Jennie Ditch, with Colorado Open Lands staff, and with representatives of the Routt National Forest to discuss Jennie Ditch rehabilitation scope, develop and execute a 30-year Site Conservation Agreement, and establish a timeline for project delivery. Early snowfall and the afore mentioned survey accident prevented us from completing our surface modeling of the project area. We will commence this work in late summer and fall of 2020. We have begun the process of negotiating a special use permit with the USFS and do not foresee any issues with permission to begin project delivery in 2021; and,

Headgate on Jennie Ditch, Little Grizzly Ranch, North Park.

4.) Sherman Ditch/Hamilton Ditch Rehabilitation - DU met with the lessee the State Land Board's Sherman Creek Ranch, representatives of the State Land Board, and representatives of Colorado

Parks and Wildlife to establish the scope of rehabilitation on the Sherman and Hamilton Ditches in northeast North Park. Survey work was completed and a project design made. A stamped planset with project design, specifications and standards was produced and is available to CWCB upon request. All required permits were pulled and the project was put out to bid mid-year 2019. Please refer to Task 5 Project Construction (2021) for more information regarding construction of this irrigated meadow project.

Financial Summary: $52,000 WSRF budgeted, $20,451 expended to date which represents 39% of funds allocated to this task by CWCB.

***Deliverable Summary*:** Three of four conceptual plans completed, one of four stamped plansets completed, and one of four conservation agreements executed.

DU staff inspect a diversion off of Sherman Creek on the State Land Board's Sherman Creek Ranch in North Park, Jackson County, Colorado.

Task 2 – Pre-project Assessments (2019-20)

***Description of Task*:** DU, Colorado State University, and Colorado Parks & Wildlife will perform avian surveys and, on identified project tracts with landowner permission, vegetation surveys prior to project construction to document baseline habitat condition and bird use of those areas. These surveys allow us to estimate the impact of project development on irrigated meadows and explore how waterfowl use of these habitats change within and between season and with project improvements. Baseline data will greatly increase the power of any conclusion develop under our project assessments.

Progress Report on Task: Although, as previously reported, some initial field work was performed in the summer of 2019. However, most initial field work is planned for the 2020 field season, which has not yet been completed at the time of this report. Please refer to Semi-annual Report #1 for a summary of the pre-Project assessments performed by Colorado State University and Colorado Parks and Wildlife research teams in 2019. Ducks Unlimited, Inc. successfully executed an agreement with Colorado State University on May 1st, 2020. This agreement allows the parties to utilize CWCB funds on project assessment activities.

Financial Summary: $85,000 WSRF budgeted, $36,673 expended to date which represents 43% of funds allocated to this task by CWCB.

***Deliverable Summary*:** The one required report has been written which will be updated in fall of 2020 to reflect this second season of pre-assessment work.

Casey Setash, Colorado State University PhD candidate and crew member with hen mallards prior to harnessing the birds with a GPS transmitter used to track bird use of irrigated meadows and wetlands in North Park, Jackson County, Colorado.

***Description of Task*:** DU staff will put out to bid, contract, manage construction and complete work on at least two irrigated meadows projects within the North Platte Basin of Jackson County, CO. This will include the Newport/Walker Ditch Rehabilitation on Arapaho NWR and the Lost Creek Ditch/Dryer reservoir Rehabilitation on the Parkview Ranch. The intent of this task is to secure irrigation on at least 500 acres of irrigated meadows and maintain storage of water in at least 30 acres of reservoir that also serves as breeding waterfowl habitat. Rehabilitation will proceed through the installation of fish-friendly, beaver-proof headgates, the placement of new diversion structures, and the re-building of ditch, culvert, and pipeline structures such that water losses in conveyance are minimized and irrigated lands receive as much water as allowed.

Progress Report on Task: While feasibility, design and permitting work continues on the Newport/Walker Ditch Rehabilitation project on Arapaho NWR, no construction has commenced and is unlikely to commence in 2020 as planned. Our inability to backfill engineering positions vacated during the pandemic has resulted in a lengthening of expected project delivery timelines. We expect that this project will be delivered in late summer and fall of 2021. Instead of this project we began construction on the Sherman Creek Ranch projects, Sherman Creek Ditch and Hamilton Ditch, as we were able to move project contracting and permitting along faster on that tract.

The Deline Ranch projects, Lost Creek Ditch and Dryer Reservoir Restoration, were cancelled by the landowner. So, construction cannot commence and will not be completed. A substitute project will be nominated to the Basin Roundtable for further consideration and, upon approval by the BRT and CWCB staff, planned for delivery in 2021 or 2022.

Financial Summary: $50,000 WSRF budgeted, $0 expended to date which represents 0% of funds allocated to this task by CWCB.

***Deliverable Summary*:** None to report.

Task 4 – Post-project Assessments & Outreach (2020-21)

***Description of Task*:** DU, CSU, and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings.

Progress Report on Task: CSU and CPW researchers have begun their assessments for the 2020 field season. A full report of this work will be available in the 3rd semi-annual report to be provided in December of 2020.

Financial Summary: $92,000 WSRF budgeted, $1,352 expended to date which represents 1% of funds allocated to this task by CWCB.

***Deliverable Summary*:** None to report.

***Description of Task*:** DU staff will put out to bid, contract, manage construction and complete work on at least two irrigated meadows projects within the North Platte Basin of Jackson County, CO. This will include the Jennie Ditch Rehabilitation on Little Grizzly Creek Ranch and the Sherman Ditch/Hamilton Ditch Rehabilitation on the Sherman Ranch. The intent of this task is to secure irrigation on at least 500 acres of irrigated meadows and maintain storage of water in at least 30 acres of reservoir that also serves as breeding waterfowl habitat. Rehabilitation will proceed through the installation of fish-friendly, beaver-proof headgates, the placement of new diversion structures, and the re-building of ditch, culvert, and pipeline structures such that water losses in conveyance are minimized and irrigated lands receive as much water as allowed.

Progress Report on Task: Construction on the Jennie Ditch Rehabilitation project is still slated to occur in 2021. Construction on the Sherman Ditch and Hamilton Ditch projects was advanced and commenced in late summer and fall of 2019. Most of the work has been completed on this project with only a couple weeks' worth of earth-moving postponed to late this summer due to excess flooding on the project site this spring.

Financial Summary: $50,000 WSRF budgeted, $23,620 expended to date which represents 47% of funds allocated to this task by CWCB.

***Deliverable Summary*:** None of the 500 acres of irrigated meadow restoration promised has been delivered during the report period. We anticipate project completion before the next report is due in October.

Glen E. Sessions and Sons' employees install irrigation infrastructure in November, 2019 on the Sherman Creek Ranch in North Park, Jackson County, Colorado.

***Description of Task*:** DU, CSU and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post-construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings. CSU staff will also produce at least one outreach article or other item suitable for media summarizing project findings in light of the impact irrigated meadows in the North Platte Basin have on populations of waterfowl.

Progress Report on Task: None to report.

Financial Summary: $92,000 WSRF budgeted, $0 expended to date which represents 0% of funds allocated to this task by CWCB.

***Deliverable Summary*:** None to report.

***Description of Task*:** DU, CSU and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post-construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings. CSU staff will produce at least two outreach articles or other item suitable for media summarizing project findings in light of the impact irrigated meadows in the North Platte Basin have on populations of waterfowl. At least one of these items will be targeted for media outlets within Jackson County. At least one other item will be targeted for general media outlets covering water and wildlife issues in the State of Colorado. DU and CSU staff will produce at least two sets of Best Management Practices to be distributed to landowners and conservation practitioners in the Basin and elsewhere in the state. These Best Management Practices will translate project assessment findings about waterfowl use and land productivity into prescriptions for management of irrigated lands similar to those included in the study.

Progress Report on Task: None to report.

Financial Summary: $22,000 WSRF budgeted, $0 expended to date which represents 0% of funds allocated to this task by CWCB.

***Deliverable Summary*:** None to report.

Task 8 – Indirect Costs (Project Administration)

***Description of Task*:** Oversight of the activities for the proper allocation of grant funds, activities and reporting assuring timely delivery of grant deliverables. DU staff will manage financial planning for each of the tasks presented in the workplan, will manage project timelines, produce reports and correspondence to partners and CWCB staff.

Progress Report on Task: None to report.

Financial Summary: $7,600 WSRF budgeted, $0 expended to date which represents 0% of funds allocated to this task by CWCB.

***Deliverable Summary*:** None to report.

DUCKS UNLIMITED

3RD SEMI-ANNUAL REPORT FOR CONTRACT:

CTGG1 2019-3416
WSRF – North Park Irrigated Meadows Conservation Program Phase 2

for the project period through December 13th, 2020

IN COOPERATION WITH: THE COLORADO WATER CONSERVATION BOARD, COLORADO PARKS & WILDLIFE AND COLORADO STATE UNIVERSITY

Summary

Ducks Unlimited, Inc. provides this semi-annual report to the Colorado Water Conservation Board to demonstrate progress on the second phase of the North Park Irrigated Meadows Conservation Program. The contract was fully executed on June 14th, 2019 and identifies eight tasks to be completed by Ducks Unlimited, Inc. and our partners by June 30, 2024.This report covers the period from June 14TH, 2019 through December 13TH, 2020.

We are pleased to report that work continues on three of the four projects included in the grant. The Sherman Creek Ranch project is complete. Work continues on design and permitting on the Jennie Ditch and Newport Ditch projects. Also, we have identified a fourth project to substitute for the project cancelled in 2019. Details on the Legal Tender Ditch Repair project are included here as well as projected budget changes. We anticipate that all irrigated meadow improvements funded under the grant to be completed by December of 2022. Waterfowl use of irrigated meadow assessments continued in 2020. Both Colorado State University and Colorado Parks & Wildlife used reduced field crews to accommodate restrictions emplaced under COVID-19 protocols by federal, state, and local jurisdictions. These limitations and overall dry climate in the Park have provided challenging conditions for the Assessments.

We look forward to continuing our progress under this contract meeting the water needs of the North Platte Basin and the State of Colorado. please let us know if you have any questions, comments or concerns.

Kind Regards,

mreddy@ducks.org

Table 1. WSRF Grant Expenditures by Report Period and Matching Contributions by Partner.

CTGG1 2019-3416 Semi-Annual Report		WSRF BUDGET ONLY	TASK 1 Feasibility & Design BUDGET $	TASK 2 Pre-project Assessment BUDGET $	TASK 3 Construct (2020) BUDGET $	TASK 4 Assessment (Year 1) BUDGET $	TASK 5 Construct (2021) BUDGET $	TASK 6 Assessment (Year 2) BUDGET $	TASK 7 Assessment (Year 3) BUDGET $	TASK 8 Grant Admin BUDGET $
No.	***Date***	**450,600**	**52,000**	**85,000**	**50,000**	**92,000**	**50,000**	**92,000**	**22,000**	**7,600**
1	December, 2019	17,106	14,081	3,026	-	-	-	-	-	-
2	June, 2020	64,989	6,370	33,647	-	1,352	23,620	-	-	-
3	December, 2020	3,073	459	-	-	714	-	-	-	1,900
4	June, 2021	-	-	-	-	-	-	-	-	-
5	December, 2021	-	-	-	-	-	-	-	-	-
6	June, 2022	-	-	-	-	-	-	-	-	-
7	December, 2022	-	-	-	-	-	-	-	-	-
8	June, 2023	-	-	-	-	-	-	-	-	-
9	December, 2023	-	-	-	-	-	-	-	-	-
10	June, 2024	-	-	-	-	-	-	-	-	-
11	December, 2024	-	-	-	-	-	-	-	-	-
Total WSRF Expended		85,169	20,910	36,673	-	2,066	23,620	-	-	1,900
Total WSRF Remain		365,431	31,090	48,327	50,000	89,935	26,380	92,000	22,000	5,700
% Expended		19	40	43	-	2	47	-	-	25

Matching Funds by Partner	TOTAL MATCH $	TASK 1 MATCH $	TASK 2 MATCH $	TASK 3 MATCH $	TASK 4 MATCH $	TASK 5 MATCH $	TASK 6 MATCH $	TASK 7 MATCH $	TASK 8 MATCH $
	474,000	**50,000**	**81,000**	**50,000**	**81,000**	**50,000**	**81,000**	**81,000**	**-**
Ducks Unlimited, Inc.	305,961	37,585	2,765	-	3,070	262,541	-	-	-
CO Parks & Wildlife	114,300	-	66,000	-	48,300	-	-	-	-
CO State University	41,000	-	15,000	-	26,000	-	-	-	-
Total Match Expended	461,261	37,585	83,765	-	77,370	262,541	-	-	-
Total Match Remain	12,739	12,415	(2,765)	50,000	3,630	(212,541)	81,000	81,000	-
% Expended	97	75	103	-	96	525	-	-	-

Table 2. Progress in achieving project deliverables required by Task under ***CTGG1 2019-3416***.

CTGG1 2019-3416 Semi-Annual Report		TASK 1 Feasibility & Design			TASK 2 Pre-project Assessment	TASK 3 Construct (2020)	TASK 4 Assessment (Year 1)			TASK 5 Construct (2021)	TASK 6 Assessment (Year 2)			TASK 7 Assessment (Year 3)		
		Conceptual Plans	Stamped Plansets	30-year Agreements	Report	Acres Restored	General Report	Landowner Report	Roundtable Report	Acres Restored	General Report	Landowner Report	Roundtable Report	General Report	Landowner Report	Roundtable Report
No.	*Date*	**4**	**4**	**4**	**1**	**500**	**1**	**1**	**1**	**500**	**1**	**1**	**1**	**1**	**1**	**1**
1	December, 2019	2	1	1	1	-	-	-	-	-	-	-	-	-	-	-
2	June, 2020	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-
3	December, 2020	1	-	-	-	-	1	1	-	375	-	-	-	-	-	-
4	June, 2021															
5	December, 2021															
6	June, 2022															
7	December, 2022															
8	June, 2023															
9	December, 2023															
10	June, 2024															
11	December, 2024															
Deliverables Achieved		4	1	2	1	-	1	1	-	375	-	-	-	-	-	-
Deliverables Remain		-	3	2	-	500	-	-	1	125	1	1	1	1	1	1
% Achieved		100	25	50	100	-	100	100	-	75	-	-	-	-	-	-

Task 1 – Project Feasibility, Design and Permitting

***Description of Task*:** At least four irrigation and/or storage projects that flood irrigated pasture or hayland located within the North Platte Basin of Jackson County, Colorado will be identified for rehabilitation and/or expansion. Projects will be designed by Ducks Unlimited bioengineering teams such that the extent and quality of irrigated lands will be maintained an/or expanded (as allowed under decreed water rights). This task will complete conceptual planning on these four projects, complete the development of professional plansets stamped by DU's certified engineer, and the fulfillment of all required permits.

Progress Report on Task: At the time of application to the North Platte Basin Roundtable and CWCB, DU had identified four project tracts upon which to complete irrigation and storage improvements. We summarize below the progress had on each of these tracts:

1.) Newport/Walker Ditch Rehabilitation – Project topographic surveys have been completed and surface models of the headgate area and ditch course have been developed. At this time no further work on the Walker Ditch is contemplated as the scope of identified work on the Newport Ditch is extensive enough to require all available resources. We have coordinated visits with both FWS staff and with representatives of the private landowners who also utilize the ditch. A review of decreed water rights on the ditch has been undertaken to understand legal limits and current administrative status of the Ditch. Conceptual plans have been developed and reviewed by FWS and private landowners;

2.) Lost Creek Ditch/Dryer Reservoir Rehabilitation – Project cancelled. Please refer to Semi-annual Report #1;

3.) Jennie Ditch Rehabilitation – Project topographic surveys have been completed and surface models generated on the Jennie Ditch project site. We have executed a 30-year Site Conservation Agreement with the landowner, Little Grizzly Creek Ranch, and have secured matching funds for the project, a draft project plan has been created by DU engineers, and we have met with USFS personnel to discuss project permitting and delivery on USFS lands that carry the Jennie Ditch;

4.) Sherman Ditch/Hamilton Ditch Rehabilitation – All project feasibility and design work has been completed for this project. Please see Task 5 for more information on project construction; and,

5.) Legal Tender Ditch Rehabilitation – In partnership with Colorado Parks & Wildlife and two private landowners, we began investigations on the Legal Tender Ditch in northwestern North Park near Lake John as a potential substitute project for the cancelled Lost Creek/Dryer Reservoir projects. As a ditch that carries both irrigation water supplies and storage for Lake John, we believe that this project may serve as a suitable substitute for the cancelled work. In 2021, we will continue to develop the project and present our findings to the North Platte Basin Roundtable to recruit their support prior to submission to the CWCB for permission to substitute the project into this grant (as directed by Craig Godbout prior to his departure from the CWCB).

Financial Summary: $52,000 WSRF budgeted, $20,910 expended to date which represents 40% of funds allocated to this task by CWCB.

***Deliverable Summary*:** All four conceptual plans completed, one of four stamped plansets completed, and one of four conservation agreements executed.

Task 2 – Pre-project Assessments (2019-20)

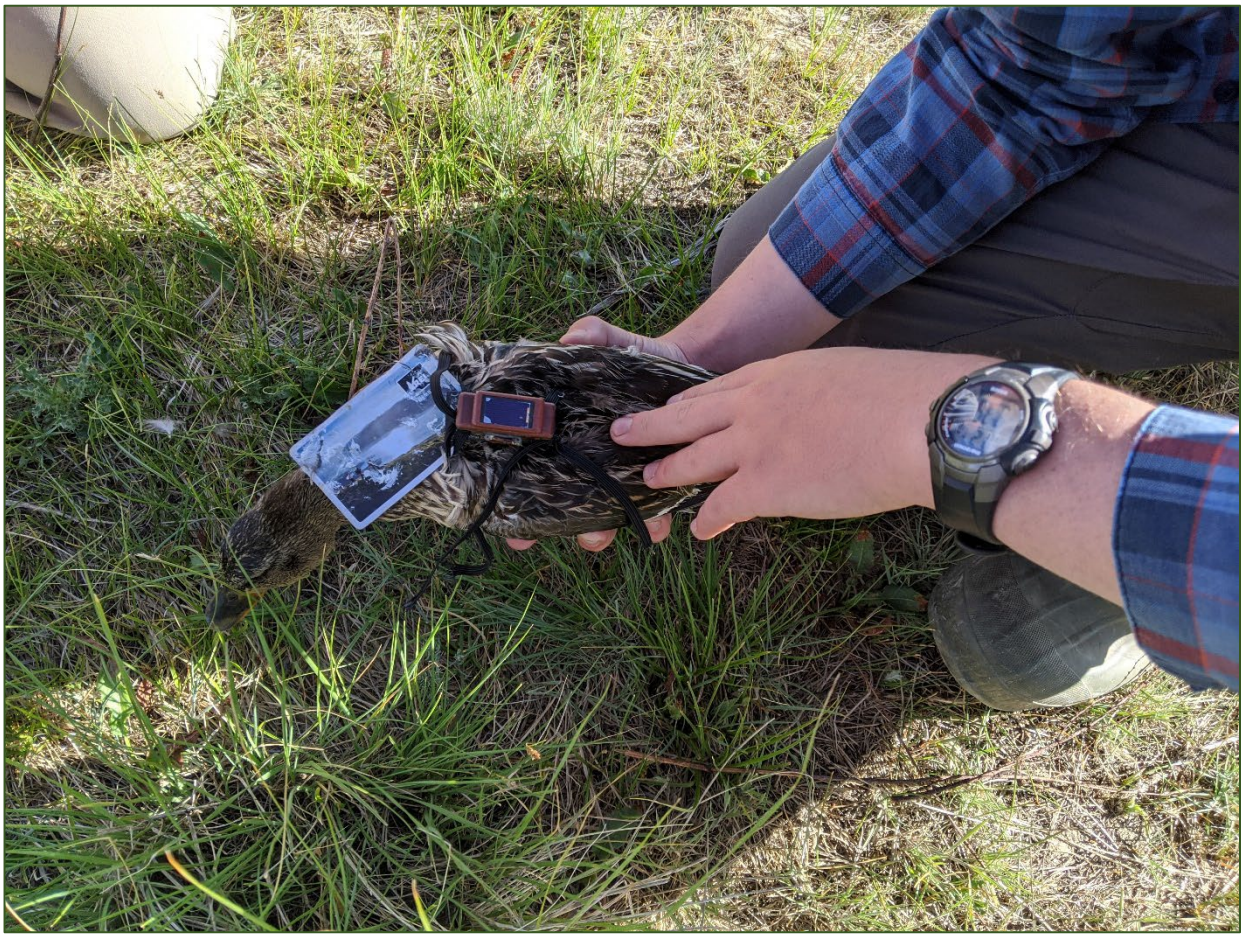
***Description of Task*:** DU, Colorado State University, and Colorado Parks & Wildlife will perform avian surveys and, on identified project tracts with landowner permission, vegetation surveys prior to project construction to document baseline habitat condition and bird use of those areas. These surveys allow us to estimate the impact of project development on irrigated meadows and explore how waterfowl use of these habitats change within and between season and with project improvements. Baseline data will greatly increase the power of any conclusion develop under our project assessments.

Progress Report on Task: No additional work on this Task was performed during the project period. Assessment work in the report period was accomplished under Task 4.

Financial Summary: $85,000 WSRF budgeted, $36,673 expended to date which represents 43% of funds allocated to this task by CWCB.

***Deliverable Summary*:** The one required report has been written as reported in the previous semi-annual report.

Hen mallard harnessed with a GPS transmitter used to track bird use of irrigated meadows and wetlands in North Park, Jackson County, Colorado.



Task 3 – Project Construction (2020)

***Description of Task*:** DU staff will put out to bid, contract, manage construction and complete work on at least two irrigated meadows projects within the North Platte Basin of Jackson County, CO. This will include the Newport/Walker Ditch Rehabilitation on Arapaho NWR and the Lost Creek Ditch/Dryer reservoir Rehabilitation on the Parkview Ranch. The intent of this task is to secure irrigation on at least 500 acres of irrigated meadows and maintain storage of water in at least 30 acres of reservoir that also serves as breeding waterfowl habitat. Rehabilitation will proceed through the installation of fish-friendly, beaver-proof headgates, the placement of new diversion structures, and the re-building of ditch, culvert, and pipeline structures such that water losses in conveyance are minimized and irrigated lands receive as much water as allowed.

Progress Report on Task: None to Report.

Financial Summary: $50,000 WSRF budgeted, $0 expended to date which represents 0% of funds allocated to this task by CWCB.

***Deliverable Summary*:** None to report.

Task 4 – Post-project Assessments & Outreach (2020-21)

***Description of Task*:** DU, CSU, and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings.

Progress Report on Task: CSU and CPW researchers have completed the field component of their assessments for the 2020 field season. Data analysis and evaluation continues through fall and winter of 2020. CSU has produced a general report on the field season, has produced a set of landowner reports for the field season, and is in the process of drafting a report to the Roundtable. Further, CSU staff have produced a couple of articles describing their research for publication in local and regional media. A full package of Assessment reports will be submitted with the 4th semi-annual report to be provided June of 2021.

Financial Summary: $92,000 WSRF budgeted, $2,066 expended to date which represents 2% of funds allocated to this task by CWCB.

***Deliverable Summary*:** One of one General Reports and one of one Landowner Reports have been published. A report to the North Platte Basin Roundtable is being drafted and will be submitted when we can attend the BRT meeting in spring of 2021.

Field crews assist in tracking waterfowl on a wetland complex in North Park, Jackson County, Colorado..

***Description of Task*:** DU staff will put out to bid, contract, manage construction and complete work on at least two irrigated meadows projects within the North Platte Basin of Jackson County, CO. This will include the Jennie Ditch Rehabilitation on Little Grizzly Creek Ranch and the Sherman Ditch/Hamilton Ditch Rehabilitation on the Sherman Ranch. The intent of this task is to secure irrigation on at least 500 acres of irrigated meadows. Rehabilitation will proceed through the installation of fish-friendly, beaver-proof headgates, the placement of new diversion structures, and the re-building of ditch, culvert, and pipeline structures such that water losses in conveyance are minimized and irrigated lands receive as much water as allowed.

Progress Report on Task: Construction on the Jennie Ditch Rehabilitation project has been postponed to summer/fall of 2022. This is due to our continued efforts to deal with the engineering bottleneck presented by the economic and social impacts of the COVID-19 pandemic. DU engineering crews have moved the project forward as described under Task 1, but do not have the capacity to deliver the project in the upcoming construction season for North Park given the other projects slated for construction in the area next year.

Construction on the Sherman Ditch and Hamilton Ditch projects was completed in summer of 2020. In order to ensure that the extent and quality of irrigated meadows on the Ranch were improved, DU, in partnership with the Colorado State Land Board, Colorado Parks & Wildlife, and the lease of the Ranch, installed 18 turnout structures, moved more than 7,000 cubic yards of dirt rehabilitating structures, ditches and other structures, rehabilitated two diversion structures and developed two wetland impoundments in critical areas of the wet meadow complex.

Financial Summary: $50,000 WSRF budgeted, $23,620 expended to date which represents 47% of funds allocated to this task by CWCB. We anticipate that all CWCB funds dedicated tot his task will be expended by December of 2022.

***Deliverable Summary*:** 375 of the 500 acres of irrigated meadow restoration promised has been delivered during the report period. We expect the remaining acres to be delivered by December of 2022.

***Description of Task*:** DU, CSU and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post-construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings. CSU staff will also produce at least one outreach article or other item suitable for media summarizing project findings in light of the impact irrigated meadows in the North Platte Basin have on populations of waterfowl.

Progress Report on Task: None to report.

Financial Summary: $92,000 WSRF budgeted, $0 expended to date which represents 0% of funds allocated to this task by CWCB.

***Deliverable Summary*:** None to report.

***Description of Task*:** DU, CSU and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post-construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings. CSU staff will produce at least two outreach articles or other item suitable for media summarizing project findings in light of the impact irrigated meadows in the North Platte Basin have on populations of waterfowl. At least one of these items will be targeted for media outlets within Jackson County. At least one other item will be targeted for general media outlets covering water and wildlife issues in the State of Colorado. DU and CSU staff will produce at least two sets of Best Management Practices to be distributed to landowners and conservation practitioners in the Basin and elsewhere in the state. These Best Management Practices will translate project assessment findings about waterfowl use and land productivity into prescriptions for management of irrigated lands similar to those included in the study.

Progress Report on Task: None to report.

Financial Summary: $22,000 WSRF budgeted, $0 expended to date which represents 0% of funds allocated to this task by CWCB.

***Deliverable Summary*:** None to report.

Task 8 – Indirect Costs (Project Administration)

***Description of Task*:** Oversight of the activities for the proper allocation of grant funds, activities and reporting assuring timely delivery of grant deliverables. DU staff will manage financial planning for each of the tasks presented in the workplan, will manage project timelines, produce reports and correspondence to partners and CWCB staff.

Progress Report on Task: DU staff have developed project financial plan software and developed new project report templates to standardize and make more efficient the reporting process.

Financial Summary: $7,600 WSRF budgeted, $1,900 expended to date which represents 25% of funds allocated to this task by CWCB.

***Deliverable Summary*:** None to report.

4TH SEMI-ANNUAL REPORT FOR CONTRACT:

CTGG1 2019-3416
WSRF – North Park Irrigated Meadows Conservation Program Phase 2

for the project period through Jun 13th, 2021

IN COOPERATION WITH: THE COLORADO WATER CONSERVATION BOARD, COLORADO PARKS & WILDLIFE AND COLORADO STATE UNIVERSITY

Summary

Ducks Unlimited, Inc. provides this fourth semi-annual report to the Colorado Water Conservation Board to demonstrate progress on the second phase of the North Park Irrigated Meadows Conservation Program. The contract was fully executed on June 14th, 2019 and identifies eight tasks to be completed by Ducks Unlimited, Inc. and our partners by June 30th, 2024.This report covers the period from June 14th, 2019 through June 13th, 2021.

We are pleased to report significant progress in achieving the aims of the program. We have completed or nearly completed the design phase on four irrigated meadow projects in North Park. We have completed construction on the Sherman Creek Ranch project and look forward to the construction of the Newport Ditch and Legal Tender Ditch projects later this year. The final project is on track to be delivered in 2022.

Our partners, Colorado Parks & Wildlife and Colorado State University, continue their assessment of waterfowl use of irrigated meadows in North Park. They have started their second full field season since the project began and have adjusted their approach to compensate for the poor field conditions, ie. drought, and continuing impact of COVID-19 restrictions on their ability to perform field work. This season's field work will conclude in August, whereupon the requisite reports will be drafted and made available in the next semi-annual report.

To date, DU has expended nearly $172k of the $450.6k allocated to the program by the WSRF. This represent thirty-eight percent of the award. We and our partners have, in the same period of time, expended $566.6k in match performing both construction and assessment work. We have restored 375 acres and produced a number of designs, plansets and reports related to project activities.

We look forward to continuing our progress under this contract meeting the water needs of the North Platte Basin and the State of Colorado. Please let us know if you have any questions, comments or concerns.

Kind Regards,

mreddy@ducks.org

Cover Photo: Photograph of the de-stabilized bank of the Legal Tender Ditch in Jackson County, Colorado that will be re-shaped and reinforced to ensure water supply continues to 500 acres of irrigated lands and 575 acres of reservoir in North Park.

Table 1. WSRF Grant Expenditures by Report Period and Matching Contributions by Partner.

CTGG1 2019-3416 Semi-Annual Report		WSRF BUDGET ONLY	TASK 1 Feasibility & Design BUDGET $	TASK 2 Pre-project Assessment BUDGET $	TASK 3 Construct (2020) BUDGET $	TASK 4 Assessment (Year 1) BUDGET $	TASK 5 Construct (2021) BUDGET $	TASK 6 Assessment (Year 2) BUDGET $	TASK 7 Assessment (Year 3) BUDGET $	TASK 8 Grant Admin BUDGET $
No.	***Date***	**450,600**	**52,000**	**85,000**	**50,000**	**92,000**	**50,000**	**92,000**	**22,000**	**7,600**
1	December, 2019	16,259	13,234	3,026	-	-	-	-	-	-
2	June, 2020	65,114	6,370	33,647	-	1,352	23,745	-	-	-
3	December, 2020	37,955	5,274	-	-	31,305	519	-	-	857
4	June, 2021	53,420	11,681	-	-	40,696	-	-	-	1,043
5	December, 2021	-	-	-	-	-	-	-	-	-
6	June, 2022	-	-	-	-	-	-	-	-	-
7	December, 2022	-	-	-	-	-	-	-	-	-
8	June, 2023	-	-	-	-	-	-	-	-	-
9	December, 2023	-	-	-	-	-	-	-	-	-
10	June, 2024	-	-	-	-	-	-	-	-	-
11	December, 2024	-	-	-	-	-	-	-	-	-
Total WSRF Expended		172,749	36,560	36,673	-	73,352	24,264	-	-	1,900
Total WSRF Remain		277,851	15,440	48,327	50,000	18,648	25,736	92,000	22,000	5,700
% Expended		38	70	43	-	80	49	-	-	25

Matching Funds by Partner	TOTAL MATCH $	TASK 1 MATCH $	TASK 2 MATCH $	TASK 3 MATCH $	TASK 4 MATCH $	TASK 5 MATCH $	TASK 6 MATCH $	TASK 7 MATCH $	TASK 8 MATCH $
	474,000	**50,000**	**81,000**	**50,000**	**81,000**	**50,000**	**81,000**	**81,000**	**-**
Ducks Unlimited, Inc.	244,009	47,410	2,765	-	16,339	177,495	-	-	-
CO Parks & Wildlife	271,829	48,042	66,000	-	57,900	99,887	-	-	-
CO State University	50,750	-	15,000	-	35,750	-	-	-	-
Total Match Expended	566,588	95,453	83,765	-	109,989	277,381	-	-	-
Total Match Remain	(92,588)	(45,453)	(2,765)	50,000	(28,989)	(227,381)	81,000	81,000	-
% Expended	120	191	103	-	136	555	-	-	-

Table 2. Progress in achieving project deliverables required by Task under ***CTGG1 2019-3416***.

CTGG1 2019-3416 Semi-Annual Report		TASK 1 Feasibility & Design			TASK 2 Pre-project Assessment	TASK 3 Construct (2020)	TASK 4 Assessment (Year 1)			TASK 5 Construct (2021)	TASK 6 Assessment (Year 2)			TASK 7 Assessment (Year 3)		
		Conceptual Plans	Stamped Plansets	30-year Agreements	Report	Acres Restored	General Report	Landowner Report	Roundtable Report	Acres Restored	General Report	Landowner Report	Roundtable Report	General Report	Landowner Report	Roundtable Report
No.	*Date*	**4**	**4**	**4**	**1**	**500**	**1**	**1**	**1**	**500**	**1**	**1**	**1**	**1**	**1**	**1**
1	December, 2019	2	1	1	1	-	-	-	-	-	-	-	-	-	-	-
2	June, 2020	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-
3	December, 2020	1	-	-	-	-	1	1	-	375	-	-	-	-	-	-
4	June, 2021	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	December, 2021															
6	June, 2022															
7	December, 2022															
8	June, 2023															
9	December, 2023															
10	June, 2024															
11	December, 2024															
Deliverables Achieved		4	1	2	1	-	1	1	-	375	-	-	-	-	-	-
Deliverables Remain		(0)	3	2	-	500	-	-	1	125	1	1	1	1	1	1
% Achieved		103	25	50	100	-	100	100	-	75	-	-	-	-	-	-

***Description of Task*:** At least four irrigation and/or storage projects that flood irrigated pasture or hayland located within the North Platte Basin of Jackson County, Colorado will be identified for rehabilitation and/or expansion. Projects will be designed by Ducks Unlimited bioengineering teams such that the extent and quality of irrigated lands will be maintained an/or expanded (as allowed under decreed water rights). This task will complete conceptual planning on these four projects, complete the development of professional plansets stamped by DU's certified engineer, and the fulfillment of all required permits.

Progress Report on Task: At the time of application to the North Platte Basin Roundtable and CWCB, DU had identified four project tracts upon which to complete irrigation and storage improvements. We summarize below the progress had on each of these tracts and include a summary of our feasibility work on a substitute project:

1.) Newport/Walker Ditch Rehabilitation – In the past six months survey and design work continued on the Newport Ditch project. DU performed several site inspections and detailed surveys to ensure design parameters and project scope are appropriate to achieve objectives. We also had two meetings (one on site and one online) with the two major ditch owners, USFWS and Stateline Ranch to ensure that our plans meet the needs of those irrigators. Final design was achieved (please see project plan on page 15) and, by the end of the reporting period, DU engineers had drafted a final planset that needs only approval from landowners prior to being stamped and included in a bid request package to be distributed in mid-summer of 2021. DU continues to work with CPW and the USFWS to ensure all permits are in place prior to project construction in late summer and fall of 2021;

2.) Lost Creek Ditch/Dryer Reservoir Rehabilitation – Project cancelled. Please refer to Semi-annual Report #1;

3.) Jennie Ditch Rehabilitation – Having completed our survey work on the Little Grizzly Creek Ranch and adjacent National Forest lands carrying the Jennie Ditch, we continued our conceptual planning on the project. Based on the surface topographic model developed from our survey, we identified the work that needs be completed to ensure the Ditch will fully irrigate the pasture and wet meadows under its decreed amount (please see project conceptual plan on page 16). In this reporting period, DU sought and received approval of the conceptual plan from both Mr. Robert Fenwick-Smith, owner of the Ranch, and Colorado Open Lands, holder of the conservation easement on the tract. Based on this approval, DU can now present the conceptual design to the U.S. Forest Service, who have regulatory authority over much of the ditch as it diverts and runs across Routt National Forest lands. DU will work with COL and the USFS to ensure the project is fully permitted and prepare to construct the Ditch rehabilitation in summer and fall of 2022;

4.) Sherman Ditch/Hamilton Ditch Rehabilitation – All project feasibility and design work has been completed for this project. Please see Task 5 for more information on construction of the completed project; and,

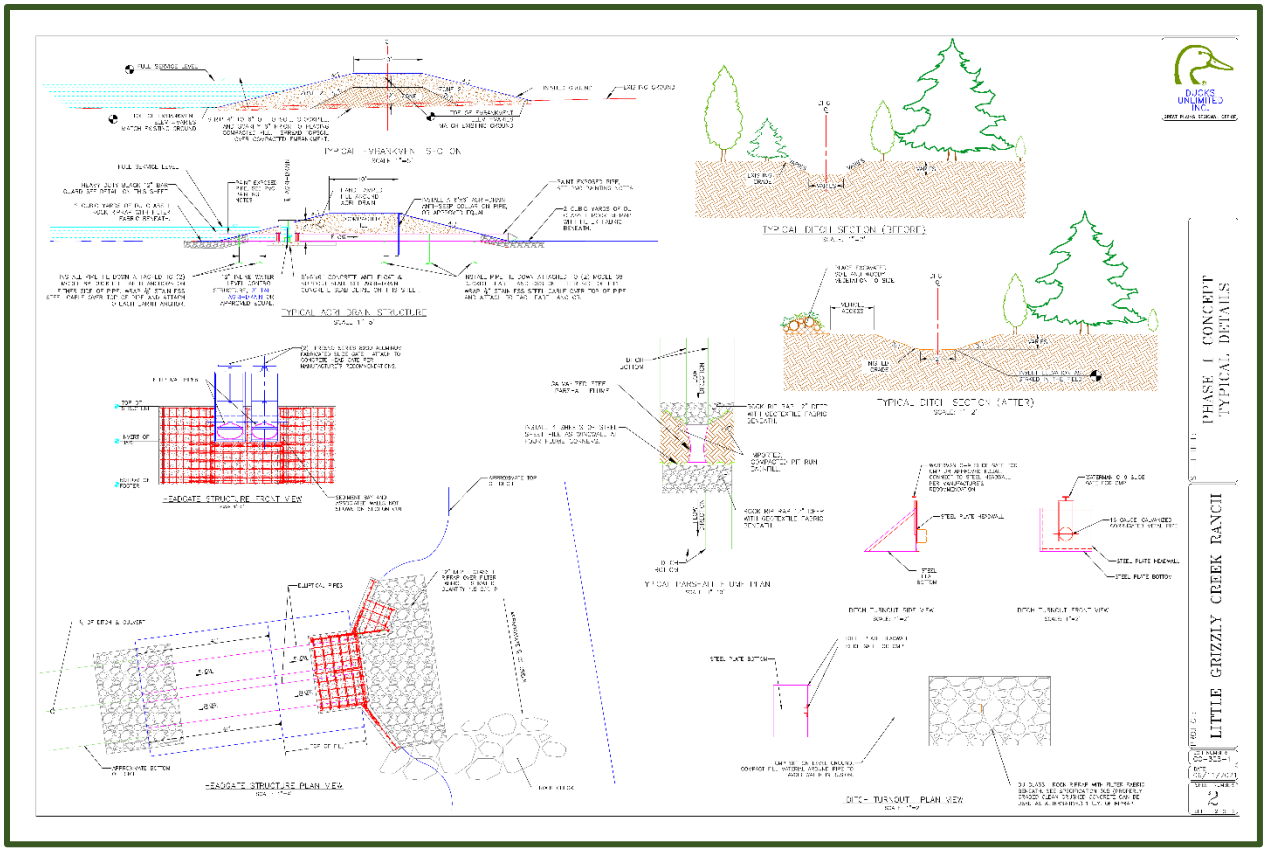
5.) Legal Tender Ditch Rehabilitation – As reported previously, DU has identified the Legal Tender Ditch Repair project as a suitable replacement project for the Lost Creek Ditch/Dryer Reservoir Rehabilitation project that was cancelled. DU continued to develop the project, performing multiple site visits and surveys to properly scope and design the project. DU's bio-engineering team has developed a design that will ensure the two private irrigators and CPW can divert, convey and use the decreed water under the Legal Tender. The ditch will safely convey 64 cfs to at least 500 acres of irrigated wetlands and wet meadows and hundred of acre feet of water per year to the 575-acre Lake John, an important fishery and

public recreation site in the area. DU has finished survey and design and has drafted a preliminary planset (please see project plan on page 17). An agreement with the ditch parties has been drafted and is currently being routed for execution. The preliminary planset is under final review by the ditch parties and, upon their approval, will be stamped and included in a distributed bid package leading to project delivery later this summer and fall. DU presented the Legal Tender Ditch to the North Platte Basin Roundtable as a potential substitute project where the idea garnered support (if not official approval which they did not allow themselves the authority to possess).

Financial Summary: $52,000 WSRF budgeted, $36,560 expended to date which represents 70% of funds allocated to this task by CWCB.

***Deliverable Summary*:** All four conceptual plans completed, one of four stamped plansets completed, and two of four conservation agreements executed.

Excerpt from the Little Jennie Ditch Rehabilitation Project Plan showing specifications of structures, ditches, and levees planned for the project area. Ducks Unlimited, Inc., 2021.



***Description of Task*:** DU, Colorado State University, and Colorado Parks & Wildlife will perform avian surveys and, on identified project tracts with landowner permission, vegetation surveys prior to project construction to document baseline habitat condition and bird use of those areas. These surveys allow us to estimate the impact of project development on irrigated meadows and explore how waterfowl use of these habitats change within and between season and with project improvements. Baseline data will greatly increase the power of any conclusion develop under our project assessments.

Progress Report on Task: No additional work on this Task was performed during the project report period. Assessment work in the report period was accomplished under Task 4. This Task is complete.

Financial Summary: $85,000 WSRF budgeted, $36,673 expended to date which represents 43% of funds allocated to this task by CWCB.

***Deliverable Summary*:** The one required report has been written.

Technician assessing hen mallard on a wetland complex in North Park, Jackson County, Colorado.

Task 3 – Project Construction (2020)

***Description of Task*:** DU staff will put out to bid, contract, manage construction and complete work on at least two irrigated meadows projects within the North Platte Basin of Jackson County, CO. This will include the Newport/Walker Ditch Rehabilitation on Arapaho NWR and the Lost Creek Ditch/Dryer Reservoir Rehabilitation on the Parkview Ranch. The intent of this task is to secure irrigation on at least 500 acres of irrigated meadows and maintain storage of water in at least 30 acres of reservoir that also serves as breeding waterfowl habitat. Rehabilitation will proceed through the installation of fish-friendly, beaver-proof headgates, the placement of new diversion structures, and the re-building of ditch, culvert, and pipeline structures such that water losses in conveyance are minimized and irrigated lands receive as much water as allowed.

Progress Report on Task: None to Report.

Financial Summary: $50,000 WSRF budgeted, $0 expended to date which represents 0% of funds allocated to this task by CWCB.

***Deliverable Summary*:** None to report.

Newport Ditch Headgate on Pinkham Creek in North Park, Jackson County, Colorado. This headgate will be replaced with a modern structure capable of diverting the decreed amount of flow onto the Chandler Unit or Arapaho National Wildlife Refuge in North Park, Colorado. Ducks Unlimited, Inc., 2021.

***Description of Task*:** DU, CSU, and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings.

Progress Report on Task: CSU and CPW have, despite deleterious field conditions and continued restrictions imposed by the COVID-19 pandemic, continued to perform assessments of waterfowl use of wet meadows in the North Platte River Basin. Equipment, crew and logistical support have been secured for the 2021 field season and pair counts, nest searches and banding have begun.

Financial Summary: $92,000 WSRF budgeted, $73,352 expended to date which represents 80% of funds allocated to this task by CWCB.

***Deliverable Summary*:** One of one General Reports and one of one Landowner Reports have been published. A report to the North Platte Basin Roundtable is being drafted and will be submitted when we can attend the BRT meeting in fall of 2021, having been pushed from the spring and summer agenda by continued Roundtable deliberations concerning the Water Plan and BIP updates.

Captured image of a raven attacking and depredating the nest of a mallard on a wet meadow in North Park, Jackson County, Colorado. Photo courtesy of Colorado Parks and Wildlife, 2021.

***Description of Task*:** DU staff will put out to bid, contract, manage construction and complete work on at least two irrigated meadows projects within the North Platte Basin of Jackson County, CO. This will include the Jennie Ditch Rehabilitation on Little Grizzly Creek Ranch and the Sherman Ditch/Hamilton Ditch Rehabilitation on the Sherman Ranch. The intent of this task is to secure irrigation on at least 500 acres of irrigated meadows. Rehabilitation will proceed through the installation of fish-friendly, beaver-proof headgates, the placement of new diversion structures, and the re-building of ditch, culvert, and pipeline structures such that water losses in conveyance are minimized and irrigated lands receive as much water as allowed.

Progress Report on Task: Construction on the Jennie Ditch Rehabilitation project has been postponed to summer/fall of 2022. This is due to our continued efforts to deal with the engineering bottleneck presented by the economic and social impacts of the COVID-19 pandemic. DU engineering crews have moved the project forward as described under Task 1, but do not have the capacity to deliver the project in the upcoming construction season for North Park given the other projects slated for construction in the area next year.

Construction on the Sherman Ditch and Hamilton Ditch projects was completed in summer of 2020

Financial Summary: $50,000 WSRF budgeted, $24,264 expended to date which represents 49% of funds allocated to this task by CWCB. We anticipate that all CWCB funds dedicated tot his task will be expended by December of 2022.

***Deliverable Summary*:** 375 of the 500 acres of irrigated meadow restoration promised has been delivered during the report period. We expect the remaining acres to be delivered by December of 2022.

Photograph of the irrigated meadows and wetlands irrigated by the Jennie Ditch on the Little Grizzly Ranch in North Park, Colorado. Ducks Unlimited, Inc., 2021.

***Description of Task*:** DU, CSU and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post-construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings. CSU staff will also produce at least one outreach article or other item suitable for media summarizing project findings in light of the impact irrigated meadows in the North Platte Basin have on populations of waterfowl.

Progress Report on Task: None to report.

Financial Summary: $92,000 WSRF budgeted, $0 expended to date which represents 0% of funds allocated to this task by CWCB.

***Deliverable Summary*:** None to report.

Task 7 – Post-project Assessments & Outreach (2022)

***Description of Task*:** DU, CSU and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post-construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings. CSU staff will produce at least two outreach articles or other item suitable for media summarizing project findings in light of the impact irrigated meadows in the North Platte Basin have on populations of waterfowl. At least one of these items will be targeted for media outlets within Jackson County. At least one other item will be targeted for general media outlets covering water and wildlife issues in the State of Colorado. DU and CSU staff will produce at least two sets of Best Management Practices to be distributed to landowners and conservation practitioners in the Basin and elsewhere in the state. These Best Management Practices will translate project assessment findings about waterfowl use and land productivity into prescriptions for management of irrigated lands similar to those included in the study.

Progress Report on Task: None to report.

Financial Summary: $22,000 WSRF budgeted, $0 expended to date which represents 0% of funds allocated to this task by CWCB.

***Deliverable Summary*:** None to report.

Task 8 – Indirect Costs (Project Administration)

***Description of Task*:** Oversight of the activities for the proper allocation of grant funds, activities and reporting assuring timely delivery of grant deliverables. DU staff will manage financial planning for each of the tasks presented in the workplan, will manage project timelines, produce reports and correspondence to partners and CWCB staff.

Progress Report on Task: DU staff have developed project financial plan software and developed new project report templates to standardize and make more efficient the reporting process.

Financial Summary: $7,600 WSRF budgeted, $1,900 expended to date which represents 25% of funds allocated to this task by CWCB.

***Deliverable Summary*:** None to report.

Proposed changes to project period: None to request.

Proposed changes to project deliverables:

Task 1. None to report.

Task 2. None to report.

Task 3. Task deliverables will remain the same, but we request authorization to proceed with the replacement of the Lost Ditch/Darcy Reservoir Project with the Legal Tender Ditch Repair project. This project will achieve the same benefits and contribute the same – if not more – to the achievement of Basin Implementation Plan objectives and Colorado Water Plan goals. The Legal Tender Ditch is currently confronted with partial abandonment of its irrigation water rights. The work proposed here will ensure that the two private irrigators on the ditch will be able to safely continue to utilize the full decreed water right, in turn ensuring that the extent and quality of wet meadow habitats in North Park is maintained. Also, the Legal Tender Ditch conveys water to Lake John; one of the most important recreational, flat water fisheries in the State of Colorado. We will armor, re-shape and reinforce the ditch course and embankments to ensure water supply continues to 500 acres of irrigated lands and 575 acres of reservoir in North Park. Absent the work proposed here, ditch degradation threatens managers ability to effectively manage that fishery, threatening the wildlife there and the recreational activities that depend upon them. We have the support of the ditch owners, Colorado Parks & Wildlife and the North Platte Basin Roundtable to utilize WSRF dollars on this project. DU will contribute at least $312,000 in match to the project; nearly $125,000 of which will come from the owners of the ditch.

Task 4. None to report.

Task 5. None to report.

Task 6. None to report.

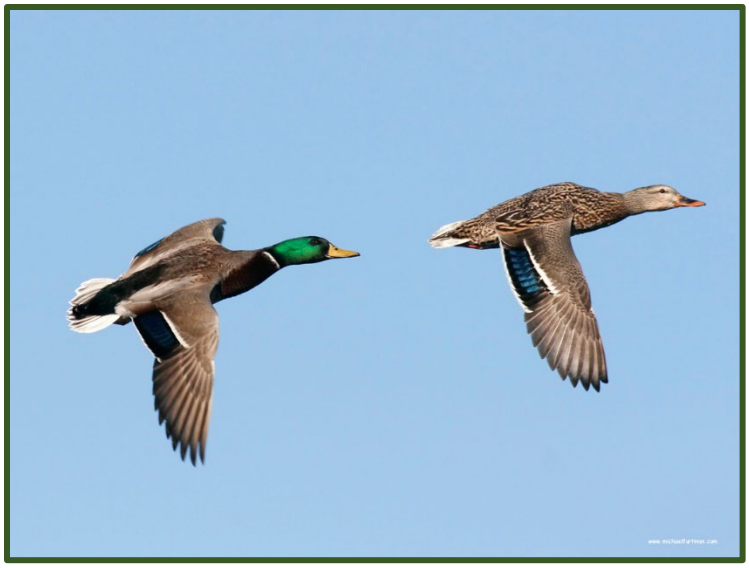
Task 7. None to report.

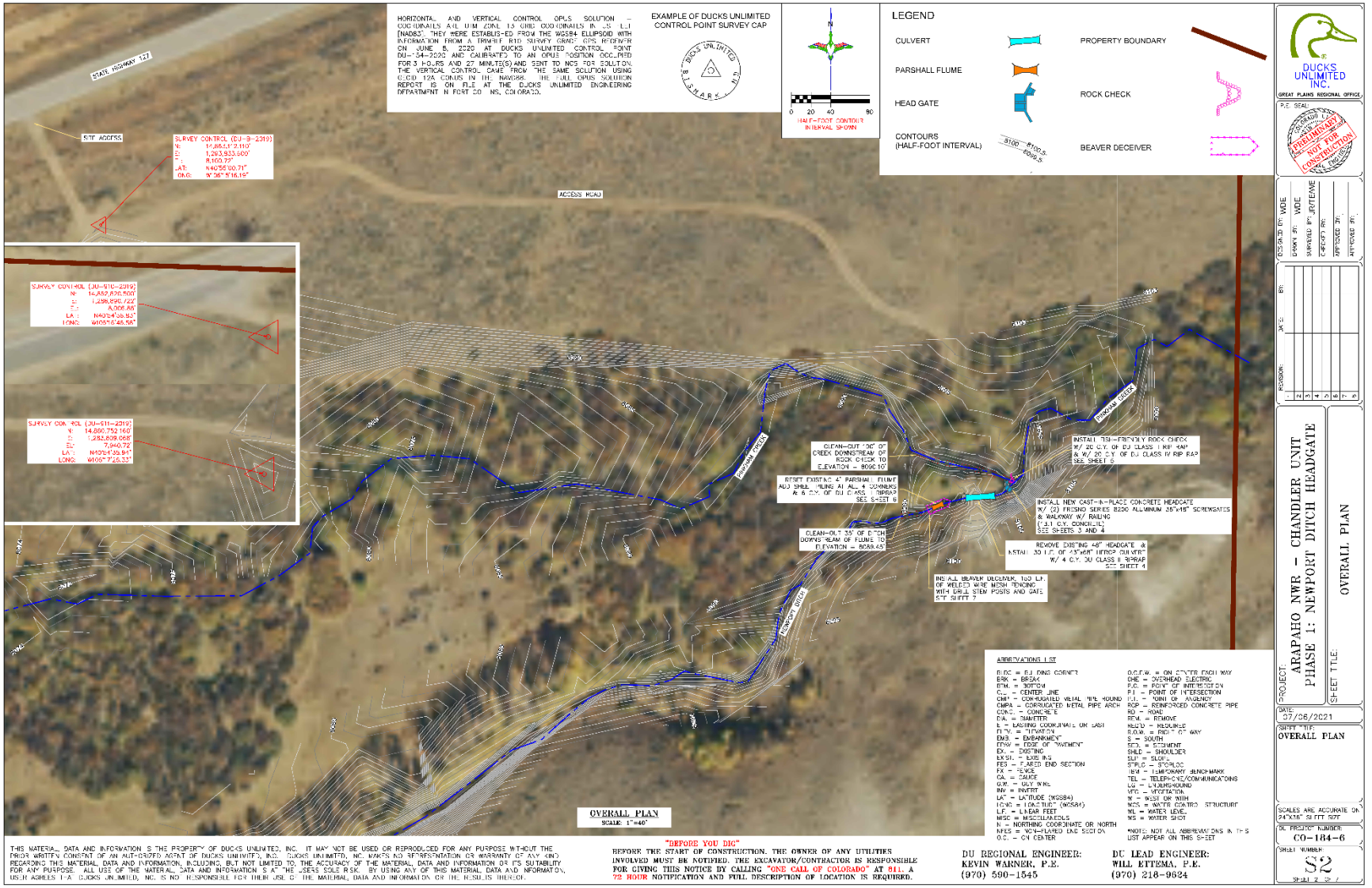
Task 8. None to report.

Proposed changes to project budget:

Task	CTGG1-2019-3406 Proposed Changes to WSRF Project Budget ($)						
	Original Allocation	Expended to Date	% Spent	Proposed Allocation	Δ	% Δ	Justification
1	52,000	36,560	70	36,885	(15,115)	-29	Design on four projects is almost complete and grant $ may be better allocated to allow full scope of work under Task 3
2	85,000	36,673	43	36,673	(48,327)	-57	Grant agreements were not completed until mid-way through this Task's period.

Task	CTGG1-2019-3406 Proposed Changes to WSRF Project Budget ($)						
	Original Allocation	Expended to Date	% Spent	Proposed Allocation	Δ	% Δ	Justification
							Unused funds were re-allocated to remaining Assessment Tasks.
3	50,000	--	0	73,457	23,457	47	Expansion of scope and addition of larger substitute project require re-allocation of available funds to this Task from Tasks 1 and 5.
4	92,000	73,352	80	92,000	--	0	No change
5	50,000	24,264	49	41,658	(8,342)	-17	Available matching funds from partners allow re-allocation of these funds to projects in Task 2 that are in need of additional funds.
6	92,000	--	0	116,000	24,000	26	Hardships from COVID-19 and poor field conditions require higher level of expenditures in later years of the Assessment work.
7	22,000	--	0	46,327	24,327	111	Hardships from COVID-19 and poor field conditions require higher level of expenditures in later years of the Assessment work.
8	7,600	1,900	25	7,600	--	0	No change
Total	450,600	172,249	25	450,600	--	--	No overall change




HORIZONTAL AND VERTICAL CONTROL OPUS SOLUTION – COORDINATES ARE UTM ZONE 13 GRID COORDINATES IN US FEET (NAD83). THEY WERE ESTABLISHED FROM THE WGS84 ELLIPSOID WITH INFORMATION FROM A TRIMBLE R10 SURVEY GRADE GPS RECEIVER ON JUNE 5, 2020 AT DUCKS UNLIMITED CONTROL POINT DU-134-2020 AND CALIBRATED TO AN OPUS POSITION OCCUPIED FOR 3 HOURS AND 27 MINUTE(S) AND SENT TO NGS FOR SOLUTION. THE VERTICAL CONTROL CAME FROM THE SAME SOLUTION USING G-GEO 12A CONUS IN THE NAVD88. THE FULL OPUS SOLUTION REPORT IS ON FILE AT THE DUCKS UNLIMITED ENGINEERING DEPARTMENT IN FORT COLLINS, COLORADO.
EXAMPLE OF DUCKS UNLIMITED CONTROL POINT SURVEY CAP
DUCKS UNLIMITED BENCHMARK
LEGEND
CULVERT
PARSHALL FLUME
HEAD GATE
CONTOURS (HALF-FOOT INTERVAL)
PROPERTY BOUNDARY
ROCK CHECK
BEAVER DECEIVER
HALF-FOOT CONTOUR INTERVAL SHOWN
STATE HIGHWAY 127
SITE ACCESS
ACCESS ROAD
SURVEY CONTROL (DU-9-2019)
SURVEY CONTROL (DU-910-2019)
SURVEY CONTROL (DU-911-2019)
PAWNEE CREEK
CLEAN-OUT 100' OF CREEK DOWNSTREAM OF ROCK CHECK TO ELEVATION = 8096.10'
RESET EXISTING 4' PARSHALL FLUME AND SHELL LINING AT ALL 4 CORNERS & 6 C.Y. OF DU CLASS IV RIPRAP SEE SHEET 6
CLEAN-OUT 35' OF DITCH DOWNSTREAM OF FLUME TO ELEVATION = 8088.45'
INSTALL BEAVER DECEIVER, 150 L.F. OF WELDED WIRE MESH FENCING WITH DRILL STEM POSTS AND GATE SEE SHEET 7
INSTALL FISH-FRIENDLY ROCK CHECK W/ 20 C.Y. OF DU CLASS I RIP RAP & W/ 20 C.Y. OF DU CLASS IV RIP RAP SEE SHEET 6
INSTALL NEW CAST-IN-PLACE CONCRETE HEADGATE W/ (2) FRESNO SERIES 8200 ALUMINUM 36"x48" SCREWGATES & WALKWAY W/ RAILING (3.1 C.Y. CONCRETE) SEE SHEETS 3 AND 4
REMOVE EXISTING 48" HEADGATE & INSTALL 30 L.F. OF 48"ø RCP CULVERT W/ 4 C.Y. DU CLASS II RIPRAP SEE SHEET 4
OVERALL PLAN
SCALE: 1"=40'
ABBREVIATIONS LIST
DUCKS UNLIMITED INC.
GREAT PLAINS REGIONAL OFFICE
P.E. SEAL:
PRELIMINARY NOT FOR CONSTRUCTION
DESIGNED BY: WDE
DRAWN BY: WDE
SURVEYED BY: JATTEMA
CHECKED BY:
APPROVED BY:
APPROVED BY:
DATE:
BY:
REVISION:
PROJECT: ARAPAHO NWR – CHANDLER UNIT PHASE 1: NEWPORT DITCH HEADGATE
SHEET TITLE: OVERALL PLAN
DATE: 07/06/2021
SHEET TITLE: OVERALL PLAN
SCALES ARE ACCURATE ON 24"X36" SHEET SIZE
DU PROJECT NUMBER: CO-184-6
SHEET NUMBER: S2
SHEET 2 OF 7
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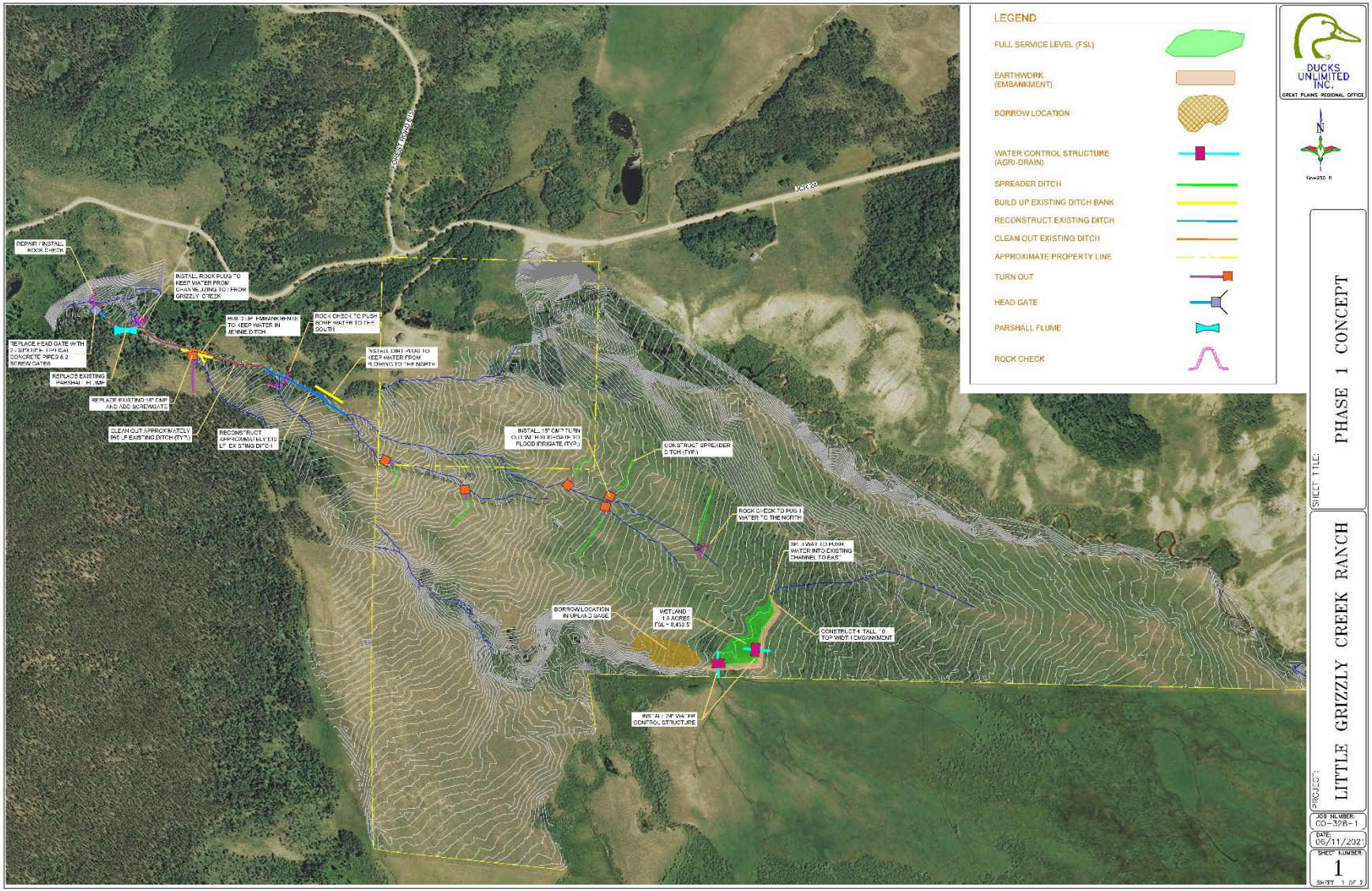
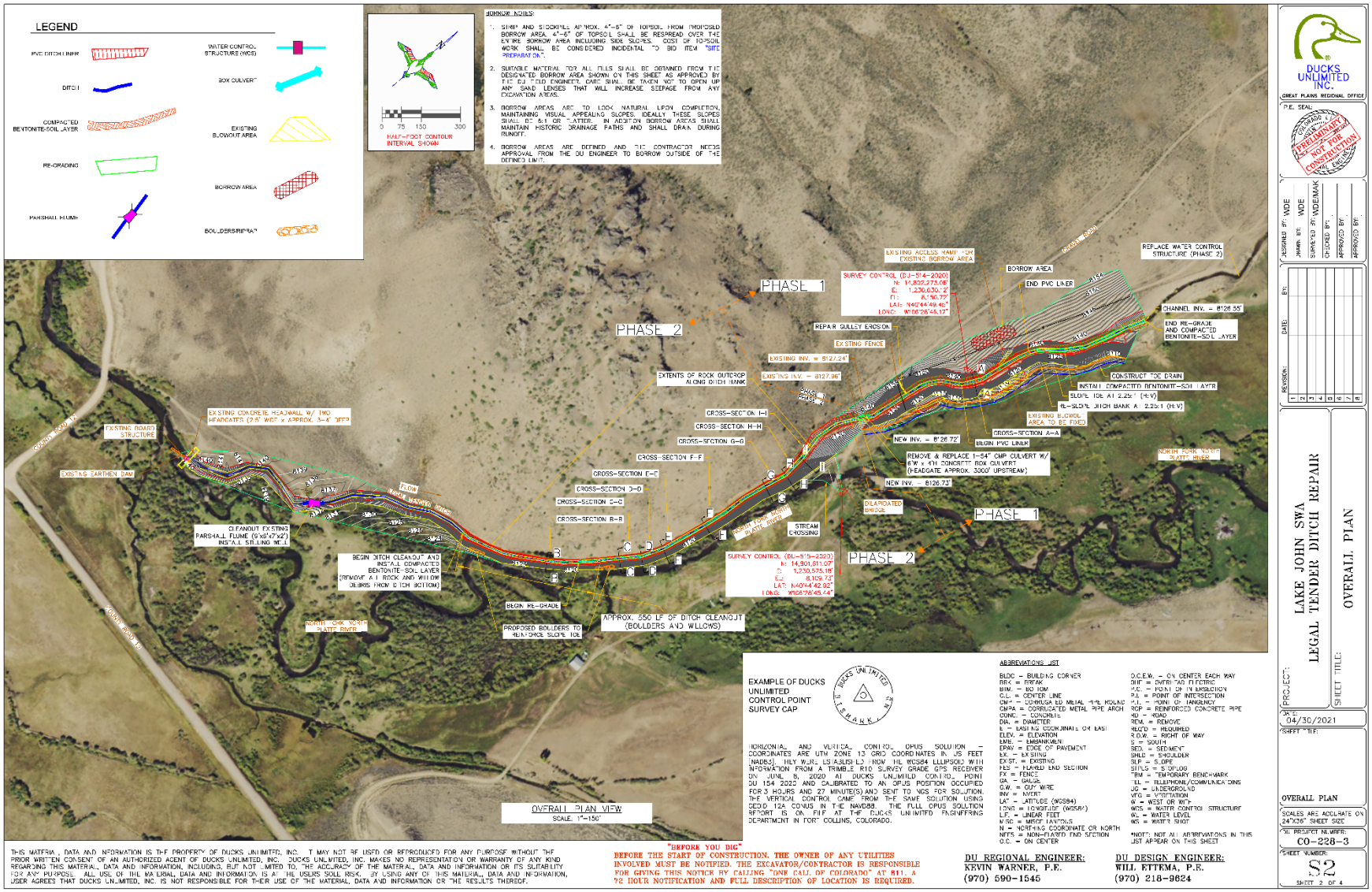
"BEFORE YOU DIG"
BEFORE THE START OF CONSTRUCTION, THE OWNER OF ANY UTILITIES INVOLVED MUST BE NOTIFIED. THE EXCAVATOR/CONTRACTOR IS RESPONSIBLE FOR GIVING THIS NOTICE BY CALLING "ONE CALL OF COLORADO" AT 811, A 72 HOUR NOTIFICATION AND FULL DESCRIPTION OF LOCATION IS REQUIRED.
DU REGIONAL ENGINEER:
KEVIN WARNER, P.E.
(970) 590-1545
DU LEAD ENGINEER:
WILL ETTEMA, P.E.
(970) 218-9624


LEGEND
FULL SERVICE LEVEL (FSL)
EARTHWORK (EMBANKMENT)
BORROW LOCATION
WATER CONTROL STRUCTURE (AGRI-DRAIN)
SPREADER DITCH
BUILD UP EXISTING DITCH BANK
RECONSTRUCT EXISTING DITCH
CLEAN OUT EXISTING DITCH
APPROXIMATE PROPERTY LINE
TURN OUT
HEAD GATE
PARSHALL FLUME
ROCK CHECK
DUCKS UNLIMITED INC.
GREAT PLAINS REGIONAL OFFICE
N
SHEET TITLE:
PHASE 1 CONCEPT
PROJECT:
LITTLE GRIZZLY CREEK RANCH
JOB NUMBER:
CO-328-1
DATE:
06/11/2021
SHEET NUMBER:
1
SHEET 1 OF 2


LEGEND
PVC DITCH LINER
DITCH
COMPACTED BENTONITE-SOIL LAYER
RE-GRADING
PARSHALL FLUME
WATER CONTROL STRUCTURE (WCS)
BOX CULVERT
EXISTING BLOWOUT AREA
BORROW AREA
BOULDERS/RIPRAP
0 75 150 300
HALF-FOOT CONTOUR INTERVAL SHOWN
BORROW NOTES:
1. STRIP AND STOCKPILE APPROX. 4"-6" OF TOPSOIL FROM PROPOSED BORROW AREA. 4"-6" OF TOPSOIL SHALL BE RESPREAD OVER THE ENTIRE BORROW AREA INCLUDING SIDE SLOPES. COST OF TOPSOIL WORK SHALL BE CONSIDERED INCIDENTAL TO BID ITEM "SITE PREPARATION."
2. SUITABLE MATERIAL FOR ALL FILLS SHALL BE OBTAINED FROM THE DESIGNATED BORROW AREA SHOWN ON THIS SHEET AS APPROVED BY THE DU FIELD ENGINEER. CARE SHALL BE TAKEN NOT TO OPEN UP ANY SAND LENSES THAT WILL INCREASE SEEPAGE FROM ANY EXCAVATION AREAS.
3. BORROW AREAS ARE TO LOOK NATURAL UPON COMPLETION, MAINTAINING VISUAL APPEALING SLOPES. IDEALLY THESE SLOPES SHALL BE 5:1 OR FLATTER. IN ADDITION BORROW AREAS SHALL MAINTAIN HISTORIC DRAINAGE PATHS AND SHALL DRAIN DURING RUNOFF.
4. BORROW AREAS ARE DEFINED AND THE CONTRACTOR NEEDS APPROVAL FROM THE DU ENGINEER TO BORROW OUTSIDE OF THE DEFINED LIMIT.
EXISTING ACCESS RAMP FOR EXISTING BORROW AREA
REPLACE WATER CONTROL STRUCTURE (PHASE 2)
BORROW AREA
END PVC LINER
PHASE 1
PHASE 2
SURVEY CONTROL (DU-SP4-2020)
N: 14,802,273.08'
E: 1,230,630.2'
EL: 8,190.79'
LAT: N40°44'49.45"
LONG: W106°28'45.17"
CHANNEL INV. = 8126.55'
END RE-GRADE AND COMPACTED BENTONITE-SOIL LAYER
REPAIR GULLEY EROSION
EXISTING FENCE
EXISTING INV. = 8127.24'
EXISTING INV. = 8127.96'
EXTENTS OF ROCK OUTCROP ALONG DITCH BANK
CONSTRUCT TOE DRAIN
INSTALL COMPACTED BENTONITE-SOIL LAYER
SLOPE TOE AT 2.25:1 (H:V)
RT-SLOPE DITCH BANK @ 2.25:1 (H:V)
EXISTING BLOWOUT AREA TO BE FILLED
CROSS-SECTION A-A
NEW INV. = 8126.72'
BEGIN PVC LINER
CROSS-SECTION I-I
CROSS-SECTION H-H
CROSS-SECTION G-G
CROSS-SECTION F-F
CROSS-SECTION E-E
CROSS-SECTION D-D
CROSS-SECTION C-C
CROSS-SECTION B-B
REMOVE & REPLACE 1-54" CMP CULVERT W/ 8'W x 4'H CONCRETE BOX CULVERT (HEADGATE APPROX. 3000' UPSTREAM)
NEW INV. = 8126.73'
NORTH FORK SOUTH PLATTE RIVER
DILAPIDATED BRIDGE
STREAM CROSSING
EXISTING CONCRETE HEADWALL W/ TWO HEADGATES (2.5' WIDE x APPROX. 3-4' DEEP)
EXISTING ROAD/ STRUCTURE
EXISTING EARTHEN DAM
CLEANOUT EXISTING PARSHALL FLUME (9'6"x7'x2') INSTALL STILLING WELL
BEGIN DITCH CLEANOUT AND INSTALL COMPACTED BENTONITE-SOIL LAYER (REMOVE ALL ROCK AND WILLOW DEBRIS FROM DITCH BOTTOM)
SURVEY CONTROL (DU-SP5-2020)
N: 14,801,611.07'
E: 1,230,575.18'
EL: 8,109.73'
LAT: N40°44'42.92"
LONG: W106°28'45.44"
BEGIN RE-GRADE
PROPOSED BOULDERS TO REINFORCE SLOPE TOE
APPROX. 550 LF OF DITCH CLEANOUT (BOULDERS AND WILLOWS)
NORTH FORK SOUTH PLATTE RIVER
OVERALL PLAN VIEW
SCALE: 1"=150'
EXAMPLE OF DUCKS UNLIMITED CONTROL POINT SURVEY CAP
HORIZONTAL AND VERTICAL CONTROL OPUS SOLUTION – COORDINATES ARE UTM ZONE 13 GRID COORDINATES IN US FEET (NAD83). HILY WERE ESTABLISHED FROM THE NGS84 ELLIPSOID WITH INFORMATION FROM A TRIMBLE R10 SURVEY GRADE GPS RECEIVER ON JUNE 5, 2020 AT DUCKS UNLIMITED CONTROL POINT DU 154 2020 AND CALIBRATED TO AN OPUS POSITION OCCUPIED FOR 3 HOURS AND 27 MINUTE(S) AND SENT TO NGS FOR SOLUTION. THE VERTICAL CONTROL CAME FROM THE SAME SOLUTION USING GEOID 12A CONUS IN THE NAVD88. THE FULL OPUS SOLUTION REPORT IS ON FILE AT THE DUCKS UNLIMITED ENGINEERING DEPARTMENT IN FORT COLLINS, COLORADO.
ABBREVIATIONS LIST
BLDG = BUILDING CORNER
BRK = BRINK
BM. = BENCH MARK
C.L. = CENTER LINE
CMP = CORRUGATED METAL PIPE ROUND
CMPA = CORRUGATED METAL PIPE ARCH
CONC. = CONCRETE
DIA. = DIAMETER
E = EASING COORDINATE OR EAST
ELEV. = ELEVATION
EMB. = EMBANKMENT
EPAV = EDGE OF PAVEMENT
EX. = EXISTING
EXIST. = EXISTING
FES = FLARED END SECTION
FX = FENCE
GA. = GAUGE
G.W. = GUY WIRE
INV. = INVERT
LAT. = LATITUDE (WGS84)
LONG = LONGITUDE (WGS84)
L.F. = LINEAR FEET
MISC = MISCELLANEOUS
N = NORTHING COORDINATE OR NORTH
NFES = NON-FLARED END SECTION
O.C. = ON CENTER
O.C.E.W. = ON CENTER EACH WAY
OHP = OVERHEAD ELECTRIC
P.C. = POINT OF CURVATURE
P.I. = POINT OF INTERSECTION
P.T. = POINT OF TANGENCY
RCP = REINFORCED CONCRETE PIPE
RD = ROAD
REM. = REMOVE
REQ'D = REQUIRED
R.O.W. = RIGHT OF WAY
S = SOUTH
SED. = SEDIMENT
SHLD = SHOULDER
SLP = SLOPE
STILL = STILLING
TBM = TEMPORARY BENCHMARK
TEL = TELEPHONE/COMMUNICATIONS
UG = UNDERGROUND
VEG = VEGETATION
W = WEST OR WITH
WCS = WATER CONTROL STRUCTURE
WL = WATER LEVEL
WS = WATER SHOT
*NOTE: NOT ALL ABBREVIATIONS IN THIS LIST APPEAR ON THIS SHEET
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BEFORE THE START OF CONSTRUCTION, THE OWNER OF ANY UTILITIES INVOLVED MUST BE NOTIFIED. THE EXCAVATOR/CONTRACTOR IS RESPONSIBLE FOR GIVING THIS NOTICE BY CALLING "UNK CALL OF COLORADO" AT 811, A 72 HOUR NOTIFICATION AND FULL DESCRIPTION OF LOCATION IS REQUIRED.
DU REGIONAL ENGINEER:
KEVIN WARNER, P.E.
(970) 590-1545
DU DESIGN ENGINEER:
WILL ETTEMA, P.E.
(970) 218-9624
DUCKS UNLIMITED INC.
GREAT PLAINS REGIONAL OFFICE
P.E. SEAL:
PRELIMINARY NOT FOR CONSTRUCTION
DESIGNED BY:
DRAWN BY:
SURVEYED BY:
CHECKED BY:
APPROVED BY:
APPROVED BY:
REVISION:
DATE:
BY:
PROJECT:
LAKE JOHN SWA
LEGAL TENDER DITCH REPAIR
SHEET TITLE:
OVERALL PLAN
DATE:
04/30/2021
SHEET TITLE:
OVERALL PLAN
SCALES ARE ACCURATE ON 24"X36" SHEET SIZE
DU PROJECT NUMBER:
CO-228-3
SHEET NUMBER:
S2
SHEET 2 OF 4

DUCKS UNLIMITED

5TH SEMI-ANNUAL REPORT FOR CONTRACT:

CTGG1 2019-3416
WSRF – North Park Irrigated Meadows Conservation Program Phase 2

for the project period through December 14th, 2021

IN COOPERATION WITH: THE COLORADO WATER CONSERVATION BOARD, COLORADO PARKS & WILDLIFE AND COLORADO STATE UNIVERSITY

Summary

Ducks Unlimited, Inc. provides this fifth semi-annual report to the Colorado Water Conservation Board to demonstrate progress on the second phase of the North Park Irrigated Meadows Conservation Program. The contract was fully executed on June 14th, 2019 and identifies eight tasks to be completed by Ducks Unlimited, Inc. and our partners by June 30th, 2024.This report covers the period from June 14th, 2019 through December 14th, 2021.

We are pleased to report significant progress in achieving the aims of the program. We have completed the design phase on three of four irrigated meadow projects in North Park; and the fourth is nearly complete pending input from the U.S. Forest Service. We have completed construction on the Sherman Creek Ranch project, the Newport Ditch Rehabilitation project, and look forward to the completion of the Legal Tender Ditch project later this year. The final project is on track to be delivered in 2022.

Our partners, Colorado Parks & Wildlife and Colorado State University, continue their assessment of waterfowl use of irrigated meadows in North Park. They have completed their second full field season since the project began and have adjusted their approach to compensate for the poor field conditions, ie. drought, and continuing impact of COVID-19 restrictions on their ability to perform field work. We include their summary report for last field season. DU and CSU will provide an update of assessment activities to the North Platte Basin Roundtable at one of their regular meetings in the Spring of 2022.

To date, DU has expended nearly $246.5k of the $450.6k allocated to the program by the WSRF. This represent fifty-five percent (55%) of the award. We and our partners have, in the same period of time, expended $679.2k in match performing both construction and assessment work. We have conserved 1,125 acres of North Platte Basin irrigated lands and produced a number of designs, plansets and reports related to project activities.

We look forward to continuing our progress under this contract meeting the water needs of the North Platte Basin and the State of Colorado. Please let us know if you have any questions, comments or concerns.

Kind Regards,

mreddy@ducks.org

Cover Photo: Photograph of the newly constructed Legal Tender Ditch in Jackson County, Colorado. This work will ensure that water supply continues to 500 acres of irrigated lands and 575 acres of reservoir in North Park.

Table 1. WSRF Grant Expenditures by Report Period and Matching Contributions by Partner.

CTGG1 2019-3416 Semi-Annual Report		WSRF BUDGET ONLY	TASK 1 Feasibility & Design BUDGET $	TASK 2 Pre-project Assessment BUDGET $	TASK 3 Construct (2020) BUDGET $	TASK 4 Assessment (Year 1) BUDGET $	TASK 5 Construct (2021) BUDGET $	TASK 6 Assessment (Year 2) BUDGET $	TASK 7 Assessment (Year 3) BUDGET $	TASK 8 Grant Admin BUDGET $
No.	***Date***	**450,600**	**36,885**	**36,673**	**73,457**	**92,000**	**41,658**	**116,000**	**46,327**	**7,600**
1	December, 2019	17,106	14,081	3,026	-	-	-	-	-	-
2	June, 2020	64,989	6,778	33,647	-	1,352	23,212	-	-	-
3	December, 2020	37,254	5,092	-	-	31,305	-	-	-	857
4	June, 2021	53,453	10,861	-	853	40,695	-	-	-	1,043
5	December, 2021	73,728	72	-	73,656	-	-	-	-	-
6	June, 2022	-	-	-	-	-	-	-	-	-
7	December, 2022	-	-	-	-	-	-	-	-	-
8	June, 2023	-	-	-	-	-	-	-	-	-
9	December, 2023	-	-	-	-	-	-	-	-	-
10	June, 2024	-	-	-	-	-	-	-	-	-
11	December, 2024	-	-	-	-	-	-	-	-	-
Total WSRF Expended		246,530	36,885	36,673	74,509	73,352	23,212	-	-	1,900
Total WSRF Remain		204,069	0	-	(1,052)	18,649	18,446	116,000	46,327	5,700
% Expended		55	100	100	101	80	56	-	-	25

Matching Funds by Partner	TOTAL MATCH $	TASK 1 MATCH $	TASK 2 MATCH $	TASK 3 MATCH $	TASK 4 MATCH $	TASK 5 MATCH $	TASK 6 MATCH $	TASK 7 MATCH $	TASK 8 MATCH $
	474,000	**50,000**	**81,000**	**50,000**	**81,000**	**50,000**	**81,000**	**81,000**	**-**
Ducks Unlimited, Inc.	296,143	47,410	2,765	105,930	16,339	123,699	-	-	-
CO Parks & Wildlife	332,259	48,042	66,000	26,956	57,900	133,361	-	-	-
CO State University	50,750	-	15,000	-	35,750	-	-	-	-
Total Match Expended	679,153	95,453	83,765	132,886	109,989	257,060	-	-	-
Total Match Remain	(205,153)	(45,453)	(2,765)	(82,886)	(28,989)	(207,060)	81,000	81,000	-
% Expended	143	191	103	266	136	514	-	-	-

Table 2. Progress in achieving project deliverables required by Task under ***CTGG1 2019-3416***.

CTGG1 2019-3416 Semi-Annual Report		TASK 1 Feasibility & Design			TASK 2 Pre-project Assessment	TASK 3 Construct (2020)	TASK 4 Assessment (Year 1)			TASK 5 Construct (2021)	TASK 6 Assessment (Year 2)			TASK 7 Assessment (Year 3)		
		Conceptual Plans	Stamped Plansets	30-year Agreements	Report	Acres Restored	General Report	Landowner Report	Roundtable Report	Acres Restored	General Report	Landowner Report	Roundtable Report	General Report	Landowner Report	Roundtable Report
No.	*Date*	**4**	**4**	**4**	**1**	**500**	**1**	**1**	**1**	**500**	**1**	**1**	**1**	**1**	**1**	**1**
1	December, 2019	2	1	1	1	-	-	-	-	-	-	-	-	-	-	-
2	June, 2020	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-
3	December, 2020	1	-	-	-	-	1	1	-	375	-	-	-	-	-	-
4	June, 2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	December, 2021		2	2	-	750	-	-	-	-	1	-	-	-	-	-
6	June, 2022															
7	December, 2022															
8	June, 2023															
9	December, 2023															
10	June, 2024															
11	December, 2024															
Deliverables Achieved		4	3	4	1	750	1	1	-	375	1	-	-	-	-	-
Deliverables Remain		-	1	-	-	(250)	-	-	1	125	-	1	1	1	1	1
% Achieved		100	75	100	100	150	100	100	-	75	100	-	-	-	-	-

Task 1 – Project Feasibility, Design and Permitting

***Description of Task*:** At least four irrigation and/or storage projects that flood irrigated pasture or hayland located within the North Platte Basin of Jackson County, Colorado will be identified for rehabilitation and/or expansion. Projects will be designed by Ducks Unlimited bioengineering teams such that the extent and quality of irrigated lands will be maintained an/or expanded (as allowed under decreed water rights). This task will complete conceptual planning on these four projects, complete the development of professional plansets stamped by DU's certified engineer, and the fulfillment of all required permits.

Progress Report on Task: At the time of application to the North Platte Basin Roundtable and CWCB, DU had identified four project tracts upon which to complete irrigation and storage improvements. We summarize below the progress had on each of these tracts and include a summary of our feasibility work on a substitute project:

1.) Newport Ditch Rehabilitation – In the past six months DU completed all survey, design, and permitting work for the Newport/Walker Ditch Rehabilitation project. A final construction planset was drafted and stamped by DU engineers allowing us to put the project out to bid for construction in late summer of 2021;

2.) Lost Creek Ditch/Dryer Reservoir Rehabilitation – Project cancelled. Please refer to Semi-annual Report #1;

3.) Jennie Ditch Rehabilitation – Most of the design work has been completed on the Jennie Ditch Rehabilitation project on Little Grizzly Creek Ranch. We are currently working with the USFS to permit the ditch rehabilitation as a good portion of the work will be completed on USFS land. The USFS is supportive of the idea, but there is some concern on their part as to the exact course of the established ditch easement within which we would be allowed to perform the irrigation rehabilitation work. Upon final determination of this course, DU will complete our construction planset and put the project out to bid for delivery in Fall of 2022;

4.) Sherman Ditch/Hamilton Ditch Rehabilitation – All project feasibility and design work has been completed for this project. Please see Task 5 for more information on construction of the completed project; and,

5.) Legal Tender Ditch Rehabilitation – All project survey, design, and permitting work was completed for the Lake Johan State Wildlife Area – Legal Tender Ditch repair project. DU's engineers drafted and stamped a professional construction planset and successfully placed the project out to bid in late summer of 2021.

Financial Summary: $36,885 WSRF budgeted, $36,885 expended to date which represents 100% of funds allocated to this task by CWCB.

***Deliverable Summary*:** All four conceptual plans completed, three of four stamped plansets completed, and four of four conservation agreements executed.

***Description of Task*:** DU, Colorado State University, and Colorado Parks & Wildlife will perform avian surveys and, on identified project tracts with landowner permission, vegetation surveys prior to project construction to document baseline habitat condition and bird use of those areas. These surveys allow us to estimate the impact of project development on irrigated meadows and explore how waterfowl use of these habitats change within and between season and with project improvements. Baseline data will greatly increase the power of any conclusion develop under our project assessments.

Progress Report on Task: No additional work on this Task was performed during the project report period. Assessment work in the report period was accomplished under Task 4. This Task is complete.

Financial Summary: $36,673 WSRF budgeted, $36,673 expended to date which represents 100% of funds allocated to this task by CWCB.

***Deliverable Summary*:** The one required report has been written.

Technician assessing hen mallard on a wetland complex in North Park, Jackson County, Colorado.

***Description of Task*:** DU staff will put out to bid, contract, manage construction and complete work on at least two irrigated meadows projects within the North Platte Basin of Jackson County, CO. This will include the Newport Ditch Rehabilitation on Arapaho NWR and the Lost Creek Ditch/Dryer Reservoir Rehabilitation on the Parkview Ranch. The intent of this task is to secure irrigation on at least 500 acres of irrigated meadows and maintain storage of water in at least 30 acres of reservoir that also serves as breeding waterfowl habitat. Rehabilitation will proceed through the installation of fish-friendly, beaver-proof headgates, the placement of new diversion structures, and the re-building of ditch, culvert, and pipeline structures such that water losses in conveyance are minimized and irrigated lands receive as much water as allowed.

Progress Report on Task: The Lost Creek Ditch/Dryer Reservoir Rehabilitation project was cancelled; please refer to Semi-annual Report #1 for more information. That project was substituted with the Legal Tender Ditch Rehabilitation project. We began construction on both projects to be delivered under this Task in late summer and early autumn of 2021.

The Newport Ditch Rehabilitation project was successfully bid by Morningstar Custom Builders, a Colorado construction firm that has built may irrigation rehabilitation projects for DU. Construction work began in mid-autumn of 2021 and was completed in December of 2021.

Photo 1. Photograph of the first elements of construction on the new Newport Ditch headgate.	
Photo 2. A photograph of site conditions upon commencement of construction of the Newport Ditch Rehabilitation project. The photograph shows the site where installation of a repaired Parshall Flume with Beaver Deceiver was to be installed.	

NEWPORT DITCH REHABILITATION CONTINUED

Photo 3. Photograph of Daniel Miles owner and operator of Morningstar Custom Builders inspecting the framework for the in situ concrete pour founding the headgate for the Newport Ditch on the Chandler Unit of Arapaho National Wildlife Refuge in North Park, Jackson County, Colorado.	
Photo 4. A photograph of construction activities on the Newport Ditch Rehabilitation project building a new headgate and other infrastructure on Pinkham Creek as it runs through the Chandler Unit of Arapaho National Wildlife Refuge in North Park, Jackson County, Colorado.	
Photo 5. Earth-moving activities behind the new headgate diversion for the Newport Ditch on the Chandler Unit of Arapaho National Wildlife Refuge in North Park, Jackson County, Colorado. The area behind the gate is being cleared to accept a new culvert and ditch run into the measurement device required by Colorado's Division of Water Resources to document use of the water allocated under the Ditch's decrees.	

NEWPORT DITCH REHABILITATION CONTINUED

Photo 6. A photo showing the ditch run from the diversion headgate through a new culvert (allowing access to most of the Refuge) and to the flagged point in the foreground where the rehabilitated Parshall Flume and 'Beaver Deceiver' will be installed, allowing measurement of diverted water flows.	
Photo 7. A photograph of the newly installed headgate diversion, culvert, and Parshall Flume in North Park, Jackson County, Colorado. The contractors are beginning the installation of the inverted-v, rock vane check that provides a fish-friendly means of raising the water in Pinkham Creek to elevations divertible by Newport Ditch.	
Photo 8. A photograph showing additional work on the fish-friendly rock check installed in Pinkham Creek. The installation allows for stream connectivity while elevating the stream to levels divertible by Ditch water users. Flow through the rock ensures that fish can travel upstream and downstream of the diversion with minimal trouble.	

NEWPORT DITCH REHABILITATION CONTINUED	
Photo 9. A photograph showing the Parshall Flume as rehabilitated and installed on the Newport Ditch.	
Photo 10. A photograph showing the installation of a 'Beaver Deceiver' around the Parshall Flume measurement device. Installation of this device allows for more efficient management of ditch flow by Refuge managers as beaver impacts (i.e., plugging of the ditch bottleneck at this pinch point) are prevented.	
Photo 11. A photograph of the completed Newport Ditch Rehabilitation Project on Pinkham Creek at the Chandler Unit of Arapaho National Wildlife Refuge in North Park, Jackson County, Colorado.	

The Legal Tender Ditch Rehabilitation project was successfully bid by Glen E. Sessions and Sons, a contractor local to Jackson County, Colorado. Construction work began in August of 2021 and continued through the end of the report period.

Photo 1. Aerial drone imagery of construction work being performed on the Lake Johan SWA – Legal Tender Ditch Rehabilitation project. The photo shows the re-alignment and re-sloping of the portion of the Ditch that had recently experienced blowouts.	
Photo 2. Aerial drone imagery of the re-shaping of the Legal Tender Ditch in North Park, Jackson County, Colorado. The Ditch provides irrigation water to two ranches and provides water to Lake John, an important fishery in northern Colorado.	
Photo 3. Imagery of earth-moving equipment working on the Legal Tender Ditch Rehabilitation project in North Park, Jackson County, Colorado. The image taken is of the portion of the ditch that experienced bank instability.	

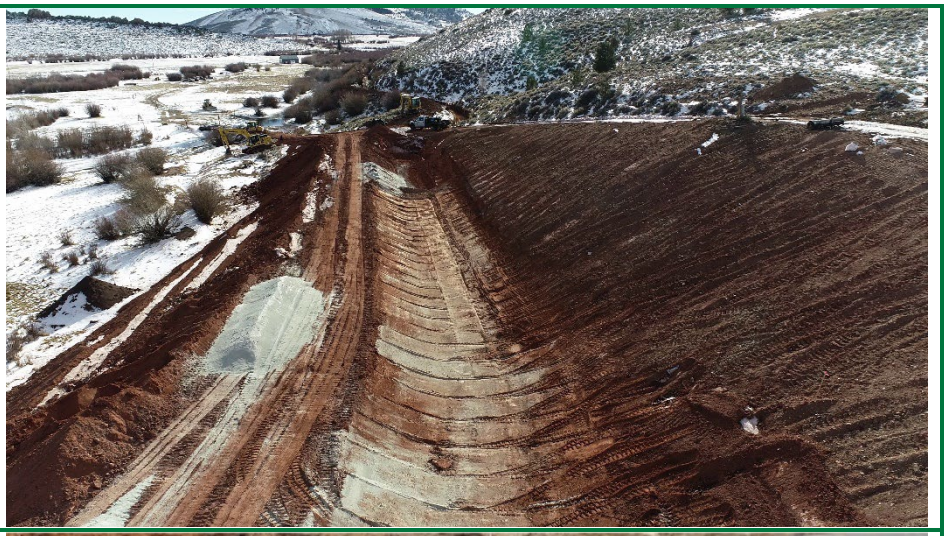
Photo 4. A photograph of a completed portion of the Legal Tender Ditch Rehabilitation project. The Ditch has recontoured slopes and channel, a polypropylene impermeable ditch liner, and a bentonite seal.	
Photo 5. Employees of George E. Sessions & Sons construction firm stitch together panels of impermeable polypropylene ditch liner in a critical run of the Ditch that had experienced piping and bank instability.	

Photo 6. Construction of a steel bridge with abutments replacing an undersized and misplaced culvert that restricted flow in the Legal Tener Ditch. The new bridge will remove these obstacles, increasing ditch flow, allowing ditch users to more efficiently irrigate without endangering the integrity of the ditch.

Photo 7. A photograph of work continuing on the new steel bridge crossing the Legal Tender Ditch in North Park, Jackson County, Colorado.

Photo 8. A photograph showing the technique of 'keying-in' panels of polypropylene fabric that seals the ditch bottom. This fabric was placed in runs of the Ditch that experienced excessive piping and bank instability, leading to a bank blow-out in 2019. This fabric and an overlying seal of bentonite earthen fill will prevent this bank stability and protect the Ditch during normal operations. This will allow for the irrigation of hay meadows and pasture on two ranches and protect the ability of CPW to fill Lake John, an important trout fishery in North Park.

Financial Summary: $73,457 WSRF budgeted, $74,509 expended to date which represents 101% of funds allocated to this task by CWCB.

***Deliverable Summary*:** Seven hundred and fifty (750) acres of irrigated upland, wet meadow, and wetlands were conserved under the Newport Ditch Rehabilitation project. This represents 150% of the acres to be conserved under Task 3. Please see the map of North Platte River Basin irrigated acres conserved under this Task included with Exhibit C on page 33.

***Description of Task*:** DU, CSU, and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings.

Progress Report on Task: CSU and CPW completed field work .

Financial Summary: $92,000 WSRF budgeted, $73,352 expended to date which represents 80% of funds allocated to this task by CWCB.

***Deliverable Summary*:** One of one General Reports and one of one Landowner Reports have been published. A report to the North Platte Basin Roundtable is being drafted and will be submitted when we can attend the BRT meeting in fall of 2021, having been pushed from the spring and summer agenda by continued Roundtable deliberations concerning the Water Plan and BIP updates.

Captured image of a raven attacking and depredating the nest of a mallard on a wet meadow in North Park, Jackson County, Colorado. Photo courtesy of Colorado Parks and Wildlife, 2021.

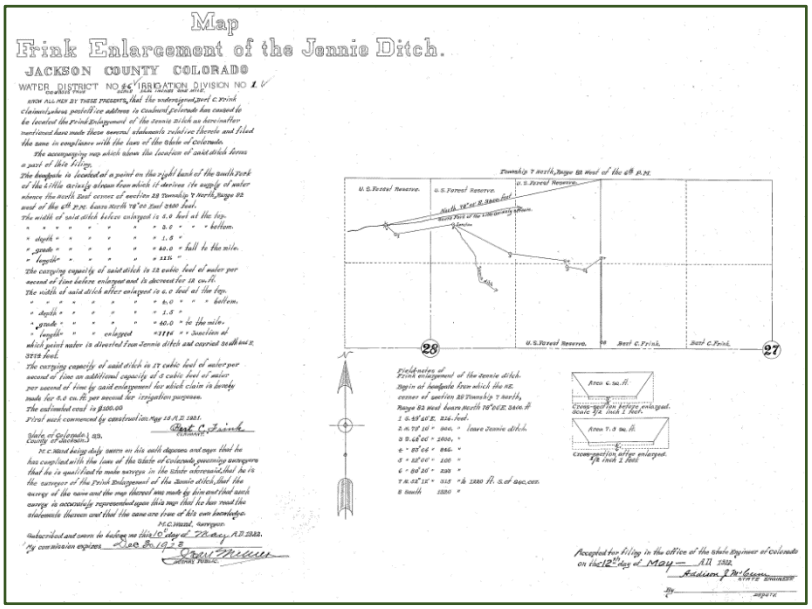
***Description of Task*:** DU staff will put out to bid, contract, manage construction and complete work on at least two irrigated meadows projects within the North Platte Basin of Jackson County, CO. This will include the Jennie Ditch Rehabilitation on Little Grizzly Creek Ranch and the Sherman Ditch/Hamilton Ditch Rehabilitation on the Sherman Ranch. The intent of this task is to secure irrigation on at least 500 acres of irrigated meadows. Rehabilitation will proceed through the installation of fish-friendly, beaver-proof headgates, the placement of new diversion structures, and the re-building of ditch, culvert, and pipeline structures such that water losses in conveyance are minimized and irrigated lands receive as much water as allowed.

Progress Report on Task: Construction on the Jennie Ditch Rehabilitation project has been postponed to summer/fall of 2022. DU is working with Colorado Open Lands and the U.S. Forest Service to permit construction of ditch improvements on the Routt National Forest (where the diversion for the Jennie Ditch is located). The location of the present diversion and ditch course do not match U.S. Forest Service records and maps illustrating the position of the ditch easement on Forest Service lands (see map below). Forest Service staff need to establish the legal description of this easement so that DU engineers can complete their design, draft the construction planset, and put the project out to bid in the summer of 2022. These permitting meetings have occupied our time on the project for most of the winter of 2021-22. We anticipate resolution of the matter in late spring of 2022.

Construction on the Sherman Ditch and Hamilton Ditch projects was completed in summer of 2020

Financial Summary: $50,000 WSRF budgeted, $24,264 expended to date which represents 49% of funds allocated to this task by CWCB. We anticipate that all CWCB funds dedicated tot his task will be expended by December of 2022.

***Deliverable Summary*:** 375 of the 500 acres of irrigated meadow restoration promised has been delivered during the report period. We expect the remaining acres to be delivered by December of 2022.


Map
Frink Enlargement of the Jennie Ditch.
JACKSON COUNTY COLORADO

Map of the Frink Enlargement of the Jennie Ditch. This map is appended to the Forest Service's easement allowing operation and maintenance of the Jennie Ditch. The lines plotted on this map, relative to section lines, do not match the current course of the Ditch. This conflict must be resolved prior to the Forest Service allowing the planned ditch rehabilitation work to be performed on federal lands under their management.

***Description of Task*:** DU, CSU and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post-construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings. CSU staff will also produce at least one outreach article or other item suitable for media summarizing project findings in light of the impact irrigated meadows in the North Platte Basin have on populations of waterfowl.

Progress Report on Task: CSU and CPW continued their assessment work in the 2021 field season and are performing data management and analysis. Please refer to the research report that follows.

Financial Summary: $92,000 WSRF budgeted, $0 expended to date which represents 0% of funds allocated to this task by CWCB.

***Deliverable Summary*:** One progress report follows.

PRODUCTIVITY OF BREEDING WATERFOWL ON WORKING LANDS IN A FLOOD IRRIGATED SYSTEM

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Dr. Adam Behney
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ABSTRACT

Flood-irrigated working lands are a component of many wetland communities throughout the Intermountain West and, when managed properly, have the potential to act as breeding habitat for a variety of waterfowl. Whether they attract and benefit breeding waterfowl or act as an ecological trap remains untested, however. We are studying the ways in which one flood-irrigated system, the North Platte Basin in Colorado, impacts breeding waterfowl and how birds that breed there go on to contribute to the population at a larger scale. Specifically, we are assessing whether projects that restore flood irrigation infrastructure, thus maintaining or expanding the number of irrigated acres, increase waterfowl use and improve reproductive success. In 2021, we searched 131 plots averaging 8.58 ha and located 40 nests of six species. We collected 571 invertebrate samples from various wetland types throughout the summer. We conducted three rounds of counts of breeding duck pairs across 68 basin wetlands, 18 hay meadows, 13 riparian transects, and 13 irrigation ditch and three rounds of brood counts across 74 wetlands in North Park. Basin wetlands and reservoirs held the highest numbers of breeding pairs and ducklings, and preliminary results are beginning to reveal that they also held the highest abundance and diversity of invertebrates.

PROJECT RATIONALE

Similar to agricultural production, the sustainable management of waterfowl populations across the western United States inherently depends on limited water availability. Both endeavors are increasingly challenged by municipal demands for water, drought, and changes in the seasonality of precipitation (Johnson et al. 2005). Healthy wetlands for wildlife can be sustained in conjunction with the needs of agricultural producers on working lands (Blevins 2015), but the multifaceted importance of water management is rarely quantified (Petrie et al. 2013). Information pertaining to the multiple benefits of water management practices might bring to light the larger societal importance of sound water management, and thereby allow natural resource managers to allocate resources more efficiently and effectively by directing them towards the practices with demonstrated advantages for both wildlife and agricultural producers.

The North Platte Basin in north-central Colorado (hereafter North Park) is a model system to evaluate benefits and trade-offs of hydrological manipulations that benefit both agricultural producers and wildlife. Not only are waterfowl and water management already being conducted by federal and state agencies and NGOs like Ducks Unlimited, but the North Platte Basin is also representative of many working lands throughout the Intermountain West. Approximately 84% of all wetland habitats in the North Platte Basin are privately owned, a majority of which are irrigated pastures and hayfields (Lemly and Gilligan 2012). Reminiscent of agricultural practices that were common 50-100 years ago, agricultural producers in the North Platte Basin do not use center-pivot irrigation, which has drastic effects on hydrological regimes, water tables, wetlands, and stream flows. Cereal grain agriculture has not replaced hay production, and the haylands are irrigated via flood irrigation. Although flood irrigation may lead to somewhat more evapotranspiration of water than center-pivot sprinklers (Brown

2008, Eldeiry et al. 2015, Lu et al. 2017), it more closely resembles natural stream and river flood regimes and is thought to be more beneficial for wildlife, water table recharge, and evaporative cooling of return flow water during cool nights at high elevation. Most important for agricultural producers, flood irrigation could significantly enhance the quality and quantity of forage production for livestock while maintaining sustainable levels of soil moisture through drought years (Wallace 2000, Brown 2008).

As water resources become diverted for urban municipal uses and the increasing frequency of drought reduces water availability in the semi-arid West, it is believed that the North Platte Basin may begin to play a significant role in the production of waterfowl on a statewide or even a flyway scale (Kirkman 1956, Szymczak 1986, Colorado Division of Wildlife 1989, Gilbert et al. 1996, Sanders 1997, Runge 2011). Private organizations such as Ducks Unlimited have established partnerships with many landowners in the North Platte Basin and are continuing conservation initiatives focused on refurbishing irrigation infrastructure to benefit both waterfowl and agricultural producers. We are taking advantage of these manipulations of flood irrigation infrastructure and delivery to examine the benefits and trade-offs for migrating waterfowl, locally breeding waterfowl, wetland productivity, and other ecosystem services within and across drainages. Specifically, we are conducting an observational study on waterfowl productivity and habitat use within flood-irrigated working lands. This project has the potential to elucidate the impacts of working lands on waterfowl throughout the entirety of their annual cycle and how their demography might be impacted by future climate change. Determining the effects of breeding habitat management on waterfowl across seasons and life stages will provide waterfowl conservationists with a better understanding regarding the cross-seasonal nature of habitat suitability and the nuances of birds' requirements within these habitats.

STUDY SITE & METHODS

Field work takes place in the North Platte Basin in Jackson County, Colorado along the North Platte River and its tributaries. This high elevation (8800 ft) basin is dominated by salt desert shrub and sagebrush steppe interspersed by lakes, ponds, irrigation ditches, irrigated hay fields, and the tributaries of the North Platte River. Land ownership is approximately 74% public, with the US Forest Service owning the largest parcels of public land (32%) that border the valley. Arapahoe National Wildlife Refuge, several State Wildlife Areas, and privately irrigated fields encompass many of the wetlands available to breeding and migrating waterfowl in the region and especially in the state of Colorado. Hay meadows primarily consist of Timothy grass (*Phleum pretense*) interspersed with sedges (*Cyperaceae*) and rushes (*Juncaceae*). They are often surrounded by willows (*Salix* spp.) and other riparian plants that grow along the tributaries from which meadows are flooded.

OBJECTIVES

Our research goal is to assess the impacts of flood irrigation on breeding waterfowl in North Park. We seek to address water management uncertainties in addition to evaluating how birds breeding in intermountain basins contribute to or differ from the continental population of waterfowl. The primary components of this project include:

Objective 1: Assess waterfowl use of flood-irrigated hay meadows during migration and the breeding season on public and private lands. Specifically, compare nest density, nest survival, and brood habitat use across wetland types (e.g., hay meadows, irrigation ditches, riparian areas, basin wetlands, and reservoirs).

Objective 2: Evaluate the impact of water infrastructure improvement projects on waterfowl and agricultural irrigated acres. Specifically, evaluate whether the construction of irrigation infrastructure (e.g., ditches, headgates, etc.) and the subsequent increase in irrigated acres impacts nest density, nest survival, and brood habitat use in those wetland areas.

Objective 3: Evaluate cross-seasonal effects of breeding in flood-irrigated agricultural areas.

In the 2021 season, we focused on intensively searching private and public lands for duck nests, evaluating invertebrate productivity throughout the breeding season, and conducting counts of breeding waterfowl pairs on select bodies of water. We focused less on deploying GPS transmitters than in previous years because it has proven relatively unsuccessful, and we wanted to spend as much time as possible locating nests across habitat types. The final field season (2022) will continue these efforts to increase our sample of nests as much as possible.

PRELIMINARY RESULTS

Search Effort and Nest Site Selection

We searched 131 plots across three privately-owned ranches, Arapahoe National Wildlife Refuge, Lake John State Wildlife Area, and Hebron Slough Waterfowl Area within areas that were managed via flood irrigation. Plots ranged from 0.45-123.55 ha ($\bar{x}$ = 8.58 ha) and we rope-dragged on foot, dragged chains using ATVs, or searched systematically to locate duck nests. Plots consisted of flooded and dry hay meadows (n=18), flooded and dry uncut/nongrazed meadows interspersed with shrubs (n=75), expanses of shrub/scrub (primarily greasewood and basin sagebrush; n=3)), irrigation ditches (n=6), reservoir perimeters (n=4), and the perimeter of riparian areas (n=23). Preliminary results indicate that the top three observed nesting species (mallards, gadwall, and cinnamon teal) all selected nest sites with high visual obstruction (i.e., high vegetation density surrounding the nest), indicating that tall, dense ground vegetation may be important for nesting ducks. We did not detect an effect of the other measured covariates (e.g., percent of each of the following at the nest site: litter, grass, forbs, shrubs, sedges, or rushes) on where each of these three species selected nest sites.

Nest Density and Nest Survival

We located 40 nests of six species throughout the 2021 breeding season. A large portion (82.5%, *n*=33) of these nests were located on Arapahoe NWR while 15% (*n*=6) were associated with working lands and 2.5% (*n*=1) were located at Lake John State Wildlife Area. Over the four years the study has been taking place, nest density has been highest in different habitat types each year. Typically riparian areas (mean = 1.09 nests/ha), irrigation ditches (mean = 0.58 nests/ha), and graminoid meadows (mean = 0.42 nests/ha) have exhibited the highest density of nests across all years. Nest density was highest in riparian areas (3.14 nests/ha) in 2021, followed by hay meadows (0.31 nests/ha), irrigation ditches (0.33 nests/ha), graminoid meadows interspersed by shrubs (0.15 nests/ha), purely graminoid meadows (0.13 nests/ha), and shrub-scrub habitat (0 nests/ha). Future analyses will explore how nest density is impacted by local weather conditions and whether that might explain the disparity between densities within the same habitat type across years. Only six nests successfully hatched at least one duckling in 2021, and most nests were depredated by nest predators (e.g., common raven, coyote, etc.). Nest survival did not vary by habitat type and averaged 0.28 (SE = 0.17) across species and habitats.

Invertebrate Samples

We collected nektonic invertebrate samples in flooded hay plots, basin wetlands (i.e. ponds), reservoirs, irrigation ditches, and riparian areas using two-liter activity traps placed at the water's surface for 48 hours every two weeks. We planned to collect 135 samples during each sampling occasion, but water availability (i.e., whether a wetland had water in it during a given sampling occasion) limited the number of samples we could collect. We collected 571 total samples throughout the summer of a possible 810. Samples are currently being processed to identify invertebrates down to taxonomic family and count individuals in each sample. Preliminary results from 2020 samples reveal temporal shifts in invertebrate abundance and taxonomic richness across habitat types and indicate reservoirs and basin wetlands hold the highest diversity and abundance of invertebrates (Figures 1 & 2).

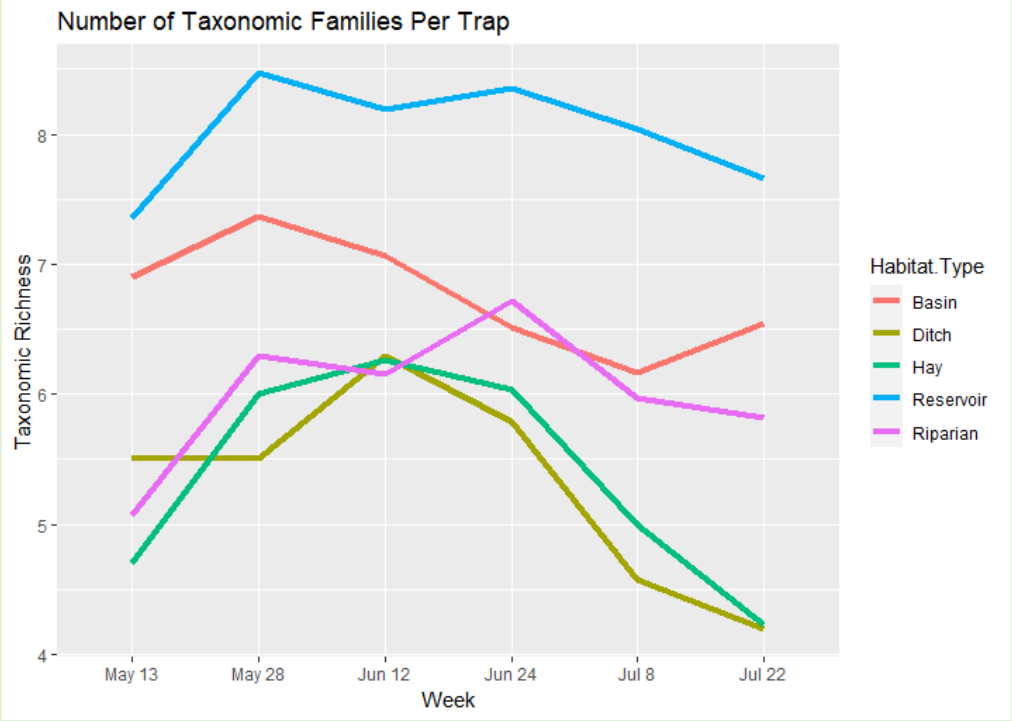

Figure 1: The taxonomic richness observed in invertebrate traps placed in five different habitat types throughout North Park. Taxonomic richness refers to the number of unique taxonomic families observed in each trap.

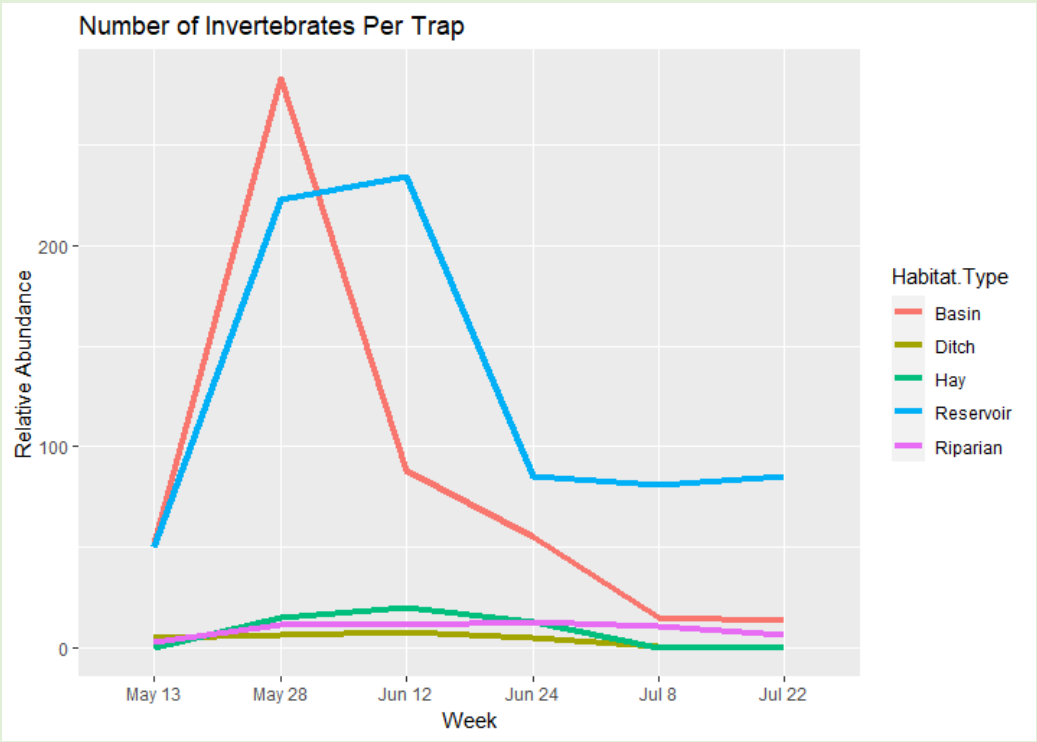

Figure 2: Relative abundance of invertebrates observed in invertebrate traps placed in five different habitat types throughout North Park.

Mallard Movement

We placed one GPS transmitter on one nesting mallard (Figure 3, northernmost points) and two GPS transmitters on mallard hens during August banding efforts. As of the writing of this report, the nesting mallard had migrated to the southeast border of Colorado along the Arkansas river, and the other two had migrated to Aurora and Greeley, CO. One mallard female marked with a transmitter during 2020 returned to North Park to nest in 2021 (farthest east points in Figure 3), but we did not have access to the property to monitor the assumed nest. Very few of the transmitters deployed in 2020 continued transmitting into 2021, but it is unknown whether the birds died or the transmitters failed. GPS locations are still undergoing preliminary analysis, and will be used to assess habitat use of breeding females and movement patterns of females with broods.

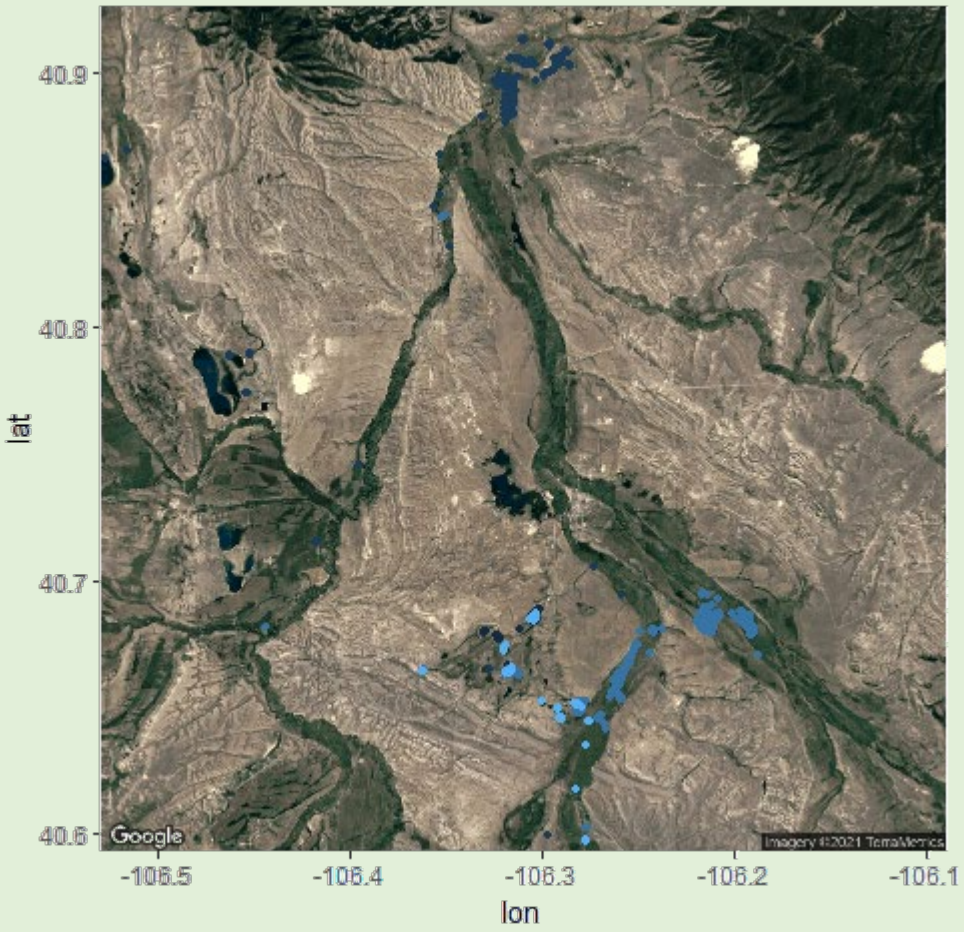

Figure 3: GPS data from four ducks breeding in North Park, CO during 2021. Each color represents a unique individual and GPS points were taken hourly during daylight hours.

Detection Probability

We conducted 147 dependent double observer surveys on basin wetlands in 2021. Out of 2,086 duck detections during these surveys, 36 were missed by the primary observer. The most parsimonious model of detection probability allowed detectability to vary among observers (two groups: obs A, B, C vs. obs D) and linearly with group size. Detection probability was 0.993 and 0.974 for the two levels of observer held constant at mean group

size. Detectability increased with group size (β_{group} = 0.28 ± 0.15). We conducted 113 independent double observer surveys on riparian areas, irrigation ditches, and hay fields. Out of 258 duck detections, 20 were missed by an observer. The best model of detection probability allowed detectability to vary among habitat types, species (3 groups: small dabbling duck, larger dabbling duck, diving duck), and linearly with group size. Estimated detection probabilities were generally high, ranging from 0.91 to 1.00. Detectability decreased with group size (β_{group} = -0.59 ± 0.18).

We conducted 199 independent double observer surveys for broods. Out of 1,394 duckling detections 518 were missed by an observer. The only model of brood detection probability to outperform the null model included wetland type. Detection ± SE was greatest in hay meadows (1.0 ± 0.00), followed by riparian (0.98 ± 0.02), basin (0.77 ± 0.01), and reservoirs (0.70 ± 0.04).

Breeding Duck and Pair Abundance

At 5 large reservoirs, we conducted 3 rounds of duck counts between 23-Apr and 15-Jun. Duck abundance decreased throughout the survey period. We conducted duck pair counts on 68 basin wetlands, 18 hay meadows, 13 riparian transects, and 13 irrigation ditch transects from 22-Apr until 18-Jun. Summed across all sites, we observed 3,765 total indicated breeding pairs, including 1,049 gadwall, 648 mallards, 501 northern shovelers, 322 American wigeon, and 319 lesser scaup. We modeled pair abundance separately for these five species in addition to all ducks combined. For all ducks combined, gadwall, and mallards, a cubic effect of day was the most parsimonious time trend model. For northern shovelers, a linear time trend was best and for lesser scaup, a quadratic time trend was best, whereas the null model outperformed any time trend for American wigeon. Total pair abundance across species was relatively stable throughout the breeding season but decreased in June, while individual species temporal trends were more variable. We then added vegetation variables to the best time trend model. For all ducks, gadwall, mallard, and northern shoveler, percent open water was the best habitat variable and was positively related to pair abundance. For American wigeon and lesser scaup, scrub/shrub vegetation was best and negatively related to pair abundance.

Brood Abundance/Productivity

We conducted 201 brood counts at 74 sites from 12-Jul until 16-Aug. We observed broods of 12 duck species with gadwall being the most common followed by mallard, and cinnamon teal. Summed across sites we observed 1459 ducklings (267 broods). On average, we conducted three brood surveys per site. Similar to the analysis for pair counts, we modeled duckling abundance for all duck species combined. For the species-specific analyses, an excess of zero counts necessitated modeling presence/absence of broods rather than duckling abundance for mallards, gadwall, and northern shovelers. For all ducks combined, date in quadratic form was the best temporal trend of duckling abundance, which peaked in early August. Percent of the site that was flooded positively influenced duckling abundance, whereas percent herbaceous vegetation negatively impacted abundance. Gadwall duckling abundance peaked in late July, decreased, and then increased again in mid-August, whereas,mallard duckling abundance had a more gradual peak in late July. Percent herbaceous vegetation was the best habitat variable predicting mallard duckling presence. Percent submergent vegetation was best in predicting gadwall and northern shoveler duckling

presence. The probability of mallard ducklings being present on a site decreased with percent herbaceous vegetation, indicating open water may be important for ducklings. Gadwall and northern shoveler duckling presence increased with percent submergent vegetation on a site.

Mean brood-pair ratio was greatest for cinnamon teal and least for lesser scaup. Overall mean ± SD brood-pair ratio was 0.15 ± 0.37 and duckling pair ratio was 0.86 ± 2.24.

TIMELINE AND FUTURE PLANS

All data are undergoing preliminary analyses and data collection for this project will continue through 2022. We will continue to locate nests, monitor broods, and sample invertebrates across habitat types in order to determine the most effective ways to manage water for agricultural producers and breeding waterfowl. This information will be summarized to create a set of best management practices for landowners and land managers throughout the region.

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***Description of Task*:** DU, CSU and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post-construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings. CSU staff will produce at least two outreach articles or other item suitable for media summarizing project findings in light of the impact irrigated meadows in the North Platte Basin have on populations of waterfowl. At least one of these items will be targeted for media outlets within Jackson County. At least one other item will be targeted for general media outlets covering water and wildlife issues in the State of Colorado. DU and CSU staff will produce at least two sets of Best Management Practices to be distributed to landowners and conservation practitioners in the Basin and elsewhere in the state. These Best Management Practices will translate project assessment findings about waterfowl use and land productivity into prescriptions for management of irrigated lands similar to those included in the study.

Progress Report on Task: None to report.

Financial Summary: $22,000 WSRF budgeted, $0 expended to date which represents 0% of funds allocated to this task by CWCB.

***Deliverable Summary*:** None to report.

A Ducks Unlimited, Inc. Biologist "candles' a duck egg to determine the developmental stage of the duckling. This is done to identify the probable hatch date of the nest, allowing researchers to determine nest fate.

Task 8 – Indirect Costs (Project Administration)

***Description of Task*:** Oversight of the activities for the proper allocation of grant funds, activities and reporting assuring timely delivery of grant deliverables. DU staff will manage financial planning for each of the tasks presented in the workplan, will manage project timelines, produce reports and correspondence to partners and CWCB staff.

Progress Report on Task: DU staff have developed project financial plan software and developed new project report templates to standardize and make more efficient the reporting process.

Financial Summary: $7,600 WSRF budgeted, $1,900 expended to date which represents 25% of funds allocated to this task by CWCB.

***Deliverable Summary*:** None to report.

Synopsis of Option Request or Other Proposed Project Changes

Proposed changes to project period: None to request.

Proposed changes to project deliverables: None to report.

Proposed changes to project budget:

	CTGG1-2019-3406 Proposed Changes to WSRF Project Budget ($)							
Task	Approved Allocation	Expended to Date	Allocation Remain	% Spent	Proposed Allocation	Δ	% Δ	Justification
Total	**450,600**	**246,530**	**204,070**	**54.71**	**450,600**			
1	36,885	36,885	-	100.00	36,885	-	-	no change
2	36,673	36,673	-	100.00	36,673	-	-	no change
3	73,457	74,509	(1,052)	101.43	74,509	1,052	1.43	a small increase in allocated expense for these two projects
4	92,000	73,352	18,649	79.73	73,352	(18,649)	(20.27)	reduced crew size and changes in assessment protocol requires shift of resources from this task (year) to subsequent filed seasons.
5	41,658	23,212	18,446	55.72	40,606	(1,052)	(2.53)	a small decrease in allocated expense to pay for increase in completed project expenses in Task 2, to be offset with secured partner match.
6	116,000	-	116,000	-	116,000	-	-	no change
7	46,327	-	46,327	-	64,976	18,649	40.26	to expend un-spent funds from previous year's assessments
8	7,600	1,900	5,700	25.00	7,600	-	-	no change

DUCKS UNLIMITED
2111 MIDPOINT DRIVE, SUITE 1
FORT COLLINS, CO 80525

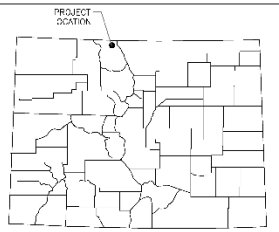
DUCKS UNLIMITED

PROJECT

ANWR NEWPORT DITCH HEADGATE REPLACEMENT CO-184-6

LOCATED IN SECTION 22,
TOWNSHIP T11N, RANGE R79W,
6TH P.M., JACKSON COUNTY, COLORADO

IN COOPERATION WITH
USFWS, SUNCOR, NAWCA & NFWF

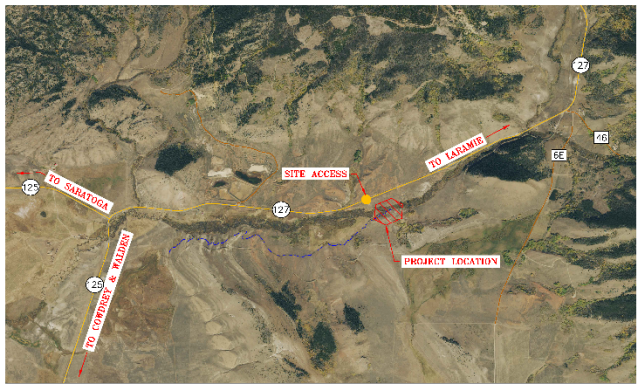


PLAN INDEX

ESTIMATED QUANTITIES

MOBILIZATION:	1 L.S.
SITE PREPARATION:	1 L.S.
WATER CONTROL STRUCTURES – SUPPLY & INSTALL:	1 EA.
CONCRETE HEADGATE STRUCTURE (13.1 C.Y.)	1 EA.
36"x48" SLIDE GATES FRESNO SERIES 8200 ALUMINUM	2 EA.
WALKWAY W/ HANDRAIL	1 EA.
MEASURING DEVICE – SUPPLY & PLACE:	
STILLING BASIN FOR EXISTING PARSHALL FLUME	1 EA.
BEAVER DECEIVER – SUPPLY & PLACE:	
DRILL STEM POSTS & WELDED WIRE MESH FENCING WITH GATE (150 L.F.)	1 L.S.
ROCK RIPRAP – SUPPLY & PLACE:	
DU CLASS IV ROCK RIP RAP (ROCK CHECK)	20 C.Y.–P
DU CLASS II ROCK RIP RAP (ROCK CHECK)	20 C.Y.–P
DU CLASS II ROCK RIP RAP (PARSHALL FLUME)	6 C.Y.–P
ROCK: PITRUN (PARSHALL FLUME)	10 C.Y.–P
REMOVAL OF EXISTING STRUCTURE (DISPOSE OFFSITE):	
EXISTING HEADGATE	1 EA.
EXISTING CMP CULVERT	1 EA.

C.Y.–P – "PAYMENT WILL BE BASED ON THE PLAN QUANTITY" LISTED ABOVE.



PAVED ROAD
DIRT ROAD

LOCATION MAP
SCALE: 1" = 2,300'

PAVED ROAD
DIRT ROAD

VICINITY MAP
NOT TO SCALE

SPECIFICATIONS

"BEFORE YOU DIG"
BEFORE THE START OF CONSTRUCTION, THE OWNER OF ANY UTILITIES INVOLVED MUST BE NOTIFIED. THE EXCAVATOR/CONTRACTOR IS RESPONSIBLE FOR GIVING THIS NOTICE BY CALLING "ONE CALL OF COLORADO" AT 811. A 72 HOUR NOTIFICATION AND FULL DESCRIPTION OF LOCATION IS REQUIRED.

DU REGIONAL ENGINEER:
KEVIN WARNER, P.E.
(970) 590-1545

DU CONSTRUCTION ENGINEER:
WILL ETTEMA, P.E.
(970) 218-9624

DUCKS UNLIMITED INC.
GREAT PLAINS REGIONAL OFFICE

P.E. SEAL

PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED BY: WDH
DRAWN BY: WDE
SURVEYED BY: JR
CHECKED BY: KDW
APPROVED BY:

REVISION | BY | DATE

PROJECT: ARAPAHO NWR – CHANDLER UNIT PHASE 1: NEWPORT DITCH HEADGATE

SHEET TITLE: TITLE & LOCATION

DATE: 05/30/2021

SHEET TITLE: TITLE PAGE & LOCATION MAP

SCALES ARE ACCURATE ON 24"X36" SHEET SIZE

DU PROJECT NUMBER: CO-184-6

SHEET NUMBER: 1
SHEET 1 OF 7


OVERALL PLAN
SCALE: 1"=40'
HALF-FOOT CONTOUR INTERVAL SHOWN
LEGEND
CULVERT
PARSHALL FLUME
HEAD GATE
ROCK CHECK
BEAVER DECEIVER
ACCESS ROAD
PINKHAM CREEK
PHASE 1: NEWPORT DITCH HEADGATE REPLACEMENT
INSTALL 30 L.F. 43"x68" HERCP CULVERT SEE DETAILS SHEET 9
INSTALL FISH-FRIENDLY ROCK CHECK W/ 20 C.Y. OF DU CLASS II RIP RAP & W/ 20 C.Y. OF DU CLASS IV RIP RAP SEE DETAILS SHEET 5
REMOVE EX. 48" HEADGATE & INSTALL NEW CAST-IN-PLACE CONCRETE HEADGATE W/ (2) FRESNO SERIES 8200 ALUMINUM 36"x48" SCREWGATES & WALKWAY & RAILING (13.1 C.Y. CONCRETE) SEE DETAILS SHEETS 3 & 4
INSTALL BEAVER DECEIVER, 150 L.F. OF WELDED WIRE MESH FENCING WITH DRILL STEM POSTS AND GATE SEE DETAILS SHEET 7
ADD SHEET PILING & 6 C.Y. OF DU CLASS II RIPRAP EXISTING 4' PARSHALL FLUME SEE DETAILS SHEET 6
PHASE 1
PHASE 2
PHASE 2: NEWPORT DITCH REPAIR
NEWPORT DITCH
ABBREVIATIONS LIST
BLDG = BUILDING CORNER
BRK = BREAK
BTM. = BOTTOM
C.L. = CENTER LINE
CMP = CORRUGATED METAL PIPE ROUND
CMPA = CORRUGATED METAL PIPE ARCH
CONC. = CONCRETE
DIA. = DIAMETER
E = EASTING COORDINATE OR EAST
ELEV. = ELEVATION
EMB. = EMBANKMENT
EPAV = EDGE OF PAVEMENT
EX. = EXISTING
EXIST. = EXISTING
FES = FLARED END SECTION
FSL = FULL SERVICE LEVEL
GA. = GAUGE
G.W. = GUY WIRE
INV = INVERT
LAT = LATITUDE (WGS84)
LONG = LONGITUDE (WGS84)
L.F. = LINEAR FEET
MISC = MISCELLANEOUS
N = NORTHING COORDINATE OR NORTH
NFES = NON-FLARED END SECTION
O.C. = ON CENTER
O.C.E.W. = ON CENTER EACH WAY
OHE = OVERHEAD ELECTRIC
P.C. = POINT OF INTERSECTION
P.I. = POINT OF INTERSECTION
P.T. = POINT OF TANGENCY
RCP = REINFORCED CONCRETE PIPE
RD = ROAD
REM. = REMOVE
REQ'D = REQUIRED
R.O.W. = RIGHT OF WAY
S = SOUTH
SED. = SEDIMENT
SHLD = SHOULDER
SLP = SLOPE
STPLG = STOPLOG
TBM = TEMPORARY BENCHMARK
TEL = TELEPHONE/COMMUNICATOINS
UG = UNDERGROUND
VEG = VEGETATION
W = WEST OR WITH
WCS = WATER CONTROL STRUCTURE
WL = WATER LEVEL
WS = WATER SHOT
*NOTE: NOT ALL ABBREVIATIONS IN THIS LIST APPEAR ON THIS SHEET
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GREAT PLAINS REGIONAL OFFICE
P.E. SEAL:
PRELIMINARY NOT FOR CONSTRUCTION
DESIGNED BY: WDE
DRAWN BY: WDE
SURVEYED BY: JR
CHECKED BY: KJW
APPROVED BY:
APPROVED BY:
REVISION: DATE: BY:
PROJECT:
ARAPAHO NWR – CHANDLER UNIT
PHASE 1: NEWPORT DITCH HEADGATE
SHEET TITLE:
OVERALL PLAN
DATE:
06/30/2021
SHEET TITLE:
OVERALL PLAN
SCALES ARE ACCURATE ON 24"X36" SHEET SIZE
DU PROJECT NUMBER:
CO-184-6
SHEET NUMBER:
S2
SHEET 2 OF 7

DUCKS UNLIMITED

2114 MIDPOINT DRIVE, SUITE 1
FORT COLLINS, CO 80525

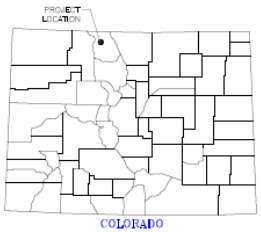
DUCKS UNLIMITED

PROJECT

LAKE JOHN SWA
LEGAL TENDER DITCH REPAIR
CO-228-3

LOCATED IN NW 1/4 OF SE 1/4 OF SECTION 15
TOWNSHIP 9N, RANGE 81W, 6TH P.M.,
JACKSON COUNTY, COLORADO

IN COOPERATION WITH
BEAR CREEK, SILVER SPUR, CPW, & NAWCA



PLAN INDEX

ESTIMATED QUANTITIES

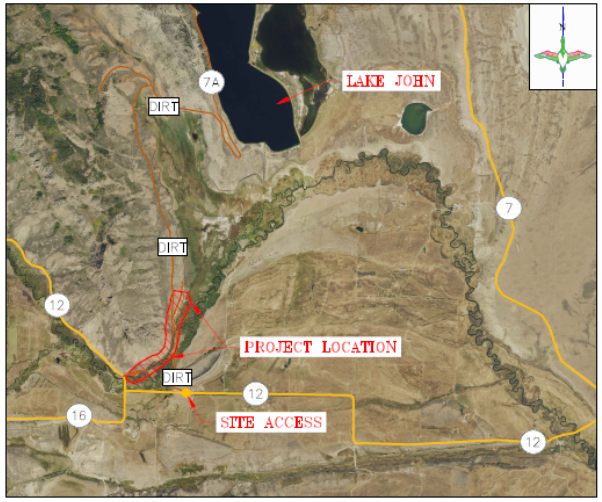
MOBILIZATION:	1 L.S.
SITE PREPARATION & WILLOW TREATMENT/REMOVAL:	1 L.S.
EXCAVATION:	
REPLACE ROCKY SOIL (TOP 8 INCHES)	204 C.Y.-A
RE-GRADE DITCH BOTTOM (2,554 L.F.)	2,140 L.F.-A
CONSTRUCTED TOPOGRAPHY:	
RE-SHAPE/RE-ALIGN DITCH (233 L.F., BORROW FROM HILLSIDE	16,860 L.F.-A
DITCH LINING MATERIALS - SUPPLY & PLACE:	
IMPERVIOUS RPE DITCH LINER	1,223 L.F.-A
IMPERVIOUS BENTONITE-SOIL LAYER	3,085 L.F.-A
CULVERT & HEADWALL - SUPPLY & INSTALL:	
INSTALL 8'Wx5'H CONCRETE BOX CULVERT (24 L.F.) W/ HEADWALLS	1 EA.
ROCK RIPRAP - SUPPLY & PLACE:	
DU CLASS II ROCK RIPRAP W/ FILTER FABRIC (FOR BOX CULVERT)	5 C.Y.-P
DU CLASS II ROCK RIPRAP (TO REPAIR GULLEY EROSION & ARMOR CATTLE CROSSING)	60 C.Y.-P
MISCELLANEOUS - REMOVE & DISPOSE OFF-SITE:	
ALL PIPES	1 EA.

L.F.-A - PAYMENT WILL BE BASED ON ACTUAL QUANTITY EXCAVATED, FILLED, RE-GRADED, CLEANED OUT, OR SUPPLIED AND INSTALLED

C.Y.-P - PAYMENT WILL BE BASED ON THE PLAN QUANTITY LISTED ABOVE. ** INCLUDES 20% FOR SHRINKAGE.

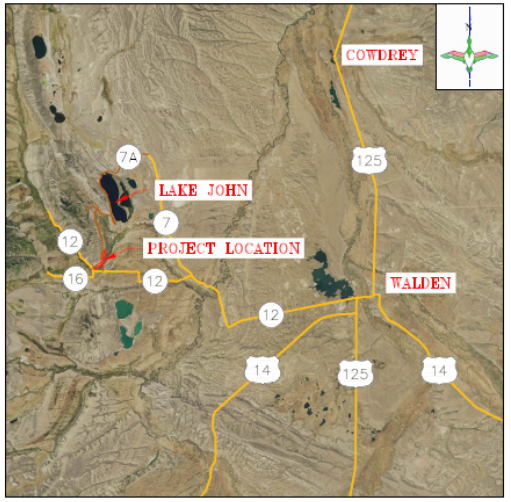
SPECIFICATIONS

101	GENERAL CONDITIONS
102	SUPPLEMENTAL CONDITIONS
201	MOBILIZATION
202	SITE PREPARATION
203	EXCAVATION
204	EMBANKMENT CONSTRUCTION
302	STRUCTURE AND CULVERT APPURTENANCES
303	CULVERT AND PIPE INSTALLATION
304	CAST-IN-PLACE REINFORCED CONCRETE
305	RIPRAP, REVETMENT & AGGREGATE PLACEMENT
311	REMOVAL OF EXISTING CULVERTS AND STRUCTURES
402	SEEDING AND MULCHING



PAVED ROAD
DIRT ROAD

LOCATION MAP
SCALE 1" = 2,000'



PAVED ROAD
DIRT ROAD

VICINITY MAP
SCALE 1" = 10,000'

"BEFORE YOU DIG"
BEFORE THE START OF CONSTRUCTION, THE OWNER OF ANY UTILITIES INVOLVED MUST BE NOTIFIED. THE EXCAVATOR/CONTRACTOR IS RESPONSIBLE FOR GIVING THIS NOTICE BY CALLING "ONE CALL OF COLORADO" AT 811, A 72 HOUR NOTIFICATION AND FULL DESCRIPTION OF LOCATION IS REQUIRED.

DU REGIONAL ENGINEER:
KEVIN WARNER, P.E.
(970) 590-1545

DU DESIGN ENGINEER:
WILL ETTEMA, P.E.
(970) 218-9624

DUCKS UNLIMITED INC.
GREAT PLAINS REGIONAL OFFICE

P.E. SEAL

DESIGNED BY: WDE
DRAWN BY: WDE
SURVEYED BY: WDE/MAK
DATE:
APPROVED BY:
APPROVED BY:

REVISIONS

PROJECT: LAKE JOHN SWA LEGAL TENDER DITCH REPAIR
SHEET TITLE: COVER SHEET & LOCATION MAP

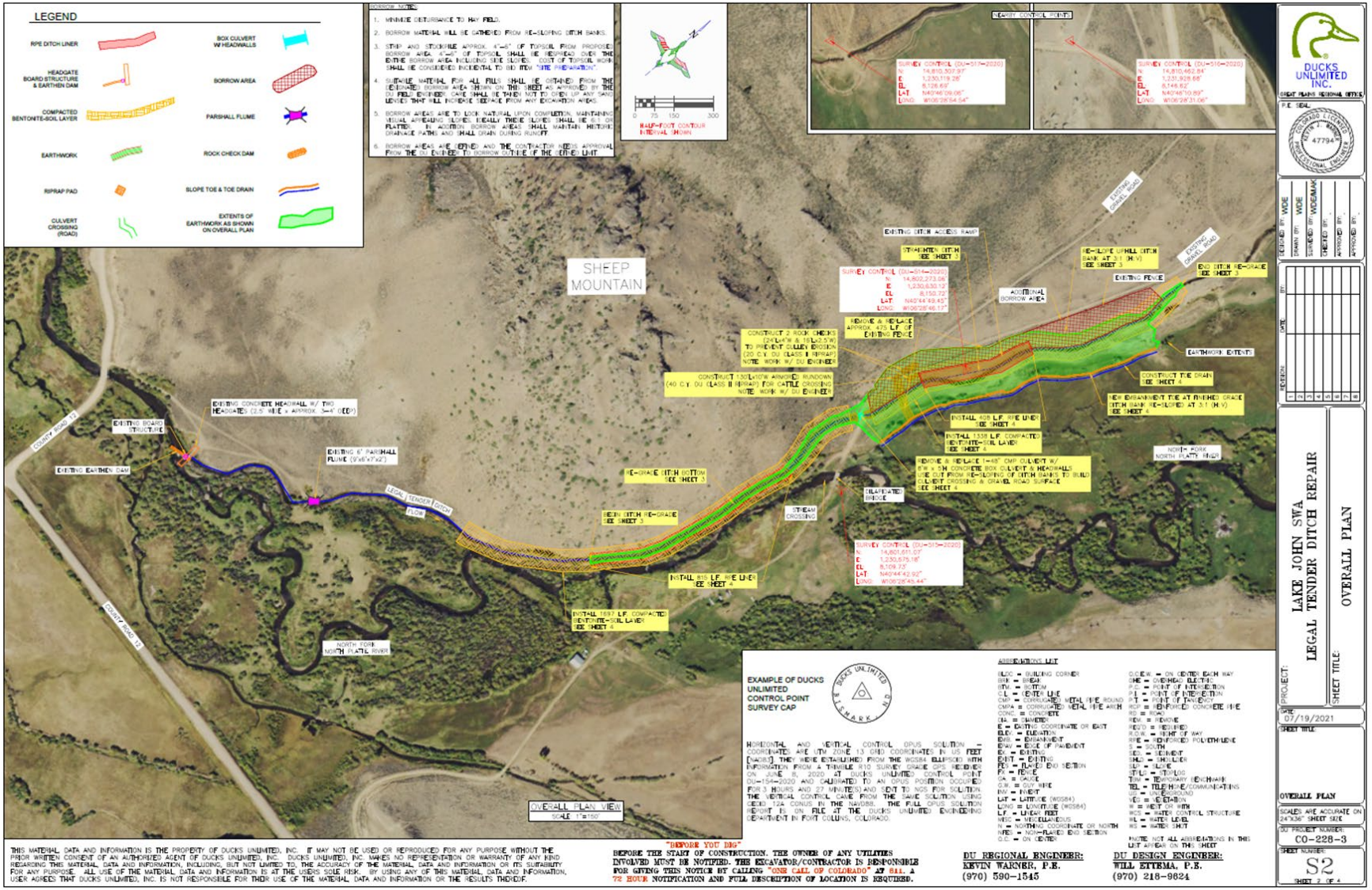
DATE: 07/19/2021

SHEET TITLE: COVER SHEET AND LOCATION MAP

SCALES ARE ACCURATE ON 24"X36" SHEET SIZE

DU PROJECT NUMBER: CO-228-3

SHEET NUMBER: S1
SHEET 1 OF 4


LEGEND
RPE DITCH LINER
HEADGATE BOARD STRUCTURE & EARTHEN DAM
COMPACTED BENTONITE-SOIL LAYER
EARTHWORK
RIPRAP PAD
CULVERT CROSSING (ROAD)
BOX CULVERT W/ HEADWALLS
BORROW AREA
PARSHALL FLUME
ROCK CHECK DAM
SLOPE TOE & TOE DRAIN
EXTENTS OF EARTHWORK AS SHOWN ON OVERALL PLAN
BORROW NOTES:
1. MINIMIZE DISTURBANCE TO HAY FIELD.
2. BORROW MATERIAL WILL BE GATHERED FROM RE-SLOPING DITCH BANKS.
3. STRIP AND STOCKPILE APPROX. 4"-6" OF TOPSOIL FROM PROPOSED BORROW AREAS. 4"-6" OF TOPSOIL SHALL BE SPREAD OVER THE ENTIRE BORROW AREA INCLUDING SIDE SLOPES. COST OF TOPSOIL WORK SHALL BE CONSIDERED INCIDENTAL TO BID ITEM "SITE PREPARATION".
4. SUITABLE MATERIAL FOR ALL FILLS SHALL BE OBTAINED FROM THE DESIGNATED BORROW AREA SHOWN ON THIS SHEET AS APPROVED BY THE DU FIELD ENGINEER. CARE SHALL BE TAKEN NOT TO OPEN UP ANY SAND LENSES THAT WILL INCREASE SEEPAGE FROM ANY EXCAVATION AREAS.
5. BORROW AREAS ARE TO LOOK NATURAL UPON COMPLETION, MAINTAINING NEGATIVE SLOPES. IDEALLY THESE SLOPES SHALL BE 3:1 OR FLATTER. IN ADDITION, BORROW AREAS SHALL MAINTAIN HISTORIC DRAINAGE PATHS AND SHALL DRAIN DURING RUNOFF.
6. BORROW AREAS ARE TO BE SEEDED AND THE CONTRACTOR NEEDS APPROVAL FROM THE DU ENGINEER TO BORROW OUTSIDE OF THE SEEDED LIMIT.
HALF-FOOT CONTOUR INTERVAL SHOWN
NEARBY CONTROL POINTS
SURVEY CONTROL (DU-517-2020)
SURVEY CONTROL (DU-516-2020)
SHEEP MOUNTAIN
EXISTING DITCH ACCESS RAMP
STRAIGHTEN DITCH SEE SHEET 3
RE-SLOPE UPHILL DITCH BANK AT 3:1 (H:V) SEE SHEET 3
END DITCH RE-GRADE SEE SHEET 3
EXISTING FENCE
ADDITIONAL BORROW AREA
SURVEY CONTROL (DU-514-2020)
REMOVE & REPLACE APPROX. 425 L.F. OF EXISTING FENCE
CONSTRUCT 2 ROCK CHECKS (24"LxW & TIE)(2.5 CY) TO PREVENT GULLEY EROSION (20 C.Y. DU CLASS II RIPRAP) NOTE: WORK W/ DU ENGINEER
CONSTRUCT 1 LOW ARMORED RUNDOWN (40 C.Y. DU CLASS II RIPRAP) FOR CATTLE CROSSING NOTE: WORK W/ DU ENGINEER
EARTHWORK EXTENTS
CONSTRUCT TOE DRAIN SEE SHEET 4
NEW EMBANKMENT TOE AT FINISHED GRADE DITCH BANK RE-SLOPED AT 3:1 (H:V) SEE SHEET 4
INSTALL 408 L.F. RPE LINER SEE SHEET 4
INSTALL 1338 L.F. COMPACTED BENTONITE-SOIL LAYER SEE SHEET 4
REMOVE & REPLACE 1-48" CMP CULVERT W/ 6'W x 5'H CONCRETE BOX CULVERT & HEADWALLS. USE CUT FROM RE-SLOPING OF DITCH BANKS TO BUILD CULVERT CROSSING & GRAVEL ROAD SURFACE SEE SHEET 4
ELEVATED BRIDGE
NORTH FORK NORTH PLATTE RIVER
EXISTING CONCRETE HEADWALL W/ TWO HEADGATES (2.5' WIDE x APPROX. 3-4' DEEP)
EXISTING BOARD STRUCTURE
EXISTING EARTHEN DAM
COUNTY ROAD 43
EXISTING 6" PARSHALL FLUME (9'x6'x7'x2')
LEGAL TENDER DITCH
FLOW
RE-GRADE DITCH BOTTOM SEE SHEET 3
BEGIN DITCH RE-GRADE SEE SHEET 3
STREAM CROSSING
SURVEY CONTROL (DU-515-2020)
INSTALL 855 L.F. RPE LINER SEE SHEET 4
INSTALL 1697 L.F. COMPACTED BENTONITE-SOIL LAYER SEE SHEET 4
COUNTY ROAD 43
NORTH FORK NORTH PLATTE RIVER
OVERALL PLAN VIEW
SCALE 1"=150'
EXAMPLE OF DUCKS UNLIMITED CONTROL POINT SURVEY CAP
HORIZONTAL AND VERTICAL CONTROL OPUS SOLUTION – COORDINATES ARE UTM ZONE 13 (NAD 83) COORDINATES IN US FEET (NAD83), THEY WERE ESTABLISHED FROM THE WGS84 ELLIPSOID WITH INFORMATION FROM A TRIMBLE R10 SURVEY GRADE GPS RECEIVER ON JUNE 8, 2020 AT DUCKS UNLIMITED CONTROL POINT DU-154-2020 AND CALIBRATED TO AN OPUS POSITION OCCUPIED FOR 3 HOURS AND 27 MINUTE(S) AND SENT TO NGS FOR SOLUTION. THE VERTICAL CONTROL CAME FROM THE SAME SOLUTION USING GEOID 12A CONUS IN THE NAVD88. THE FULL OPUS SOLUTION REPORT IS ON FILE AT THE DUCKS UNLIMITED ENGINEERING DEPARTMENT IN FORT COLLINS, COLORADO.
ABBREVIATIONS LIST
BLDG = BUILDING CORNER
BRK = BREAK
BTM = BOTTOM
C.L. = CENTER LINE
CMP = CORRUGATED METAL PIPE ROUND
CMPA = CORRUGATED METAL PIPE ARCH
CONC = CONCRETE
DIA. = DIAMETER
E = EASTING COORDINATE OR EAST
ELEV = ELEVATION
ENM = ENHANCEMENT
EOAV = EDGE OF PAVEMENT
EX = EXISTING
EXIST = EXISTING
FES = FLARED END SECTION
FF = FENCE
GA = GAUGE
G.W. = GUY WIRE
INV = INVERT
LAT = LATITUDE (WGS84)
LONG = LONGITUDE (WGS84)
L.F. = LINEAR FEET
MISC = MISCELLANEOUS
N = NORTHING COORDINATE OR NORTH
NFES = NON-FLARED END SECTION
O.C. = ON CENTER
O.C.E.W. = ON CENTER EACH WAY
OHE = OVERHEAD ELECTRIC
P.I. = POINT OF INTERSECTION
P.T. = POINT OF TANGENCY
RCP = REINFORCED CONCRETE PIPE
RD = ROAD
REM = REMOVE
REQ'D = REQUIRED
R.O.W. = RIGHT OF WAY
RPE = REINFORCED POLYETHYLENE
S = SOUTH
SED = SEDIMENT
SNL = UNKNOWN
U/D = UNDER
TP/LG = TOP/LOG
TBM = TEMPORARY BENCHMARK
TEL = TELEPHONE/COMMUNICATIONS
UG = UNDERGROUND
VEG = VEGETATION
W = WEST OR WITH
WCS = WATER CONTROL STRUCTURE
WL = WATER LEVEL
WO = WATER SHUT
NOTE: NOT ALL ABBREVIATIONS IN THIS LIST APPEAR ON THIS SHEET
THIS MATERIAL, DATA AND INFORMATION IS THE PROPERTY OF DUCKS UNLIMITED, INC. IT MAY NOT BE USED OR REPRODUCED FOR ANY PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF AN AUTHORIZED AGENT OF DUCKS UNLIMITED, INC. DUCKS UNLIMITED, INC. MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND REGARDING THIS MATERIAL, DATA AND INFORMATION, INCLUDING, BUT NOT LIMITED TO, THE ACCURACY OF THE MATERIAL, DATA AND INFORMATION OR ITS SUITABILITY FOR ANY PURPOSE. ALL USE OF THE MATERIAL DATA AND INFORMATION IS AT THE USERS SOLE RISK. BY USING ANY OF THIS MATERIAL DATA AND INFORMATION, USER AGREES THAT DUCKS UNLIMITED, INC. IS NOT RESPONSIBLE FOR THEIR USE OF THE MATERIAL DATA AND INFORMATION OR THE RESULTS THEREOF.
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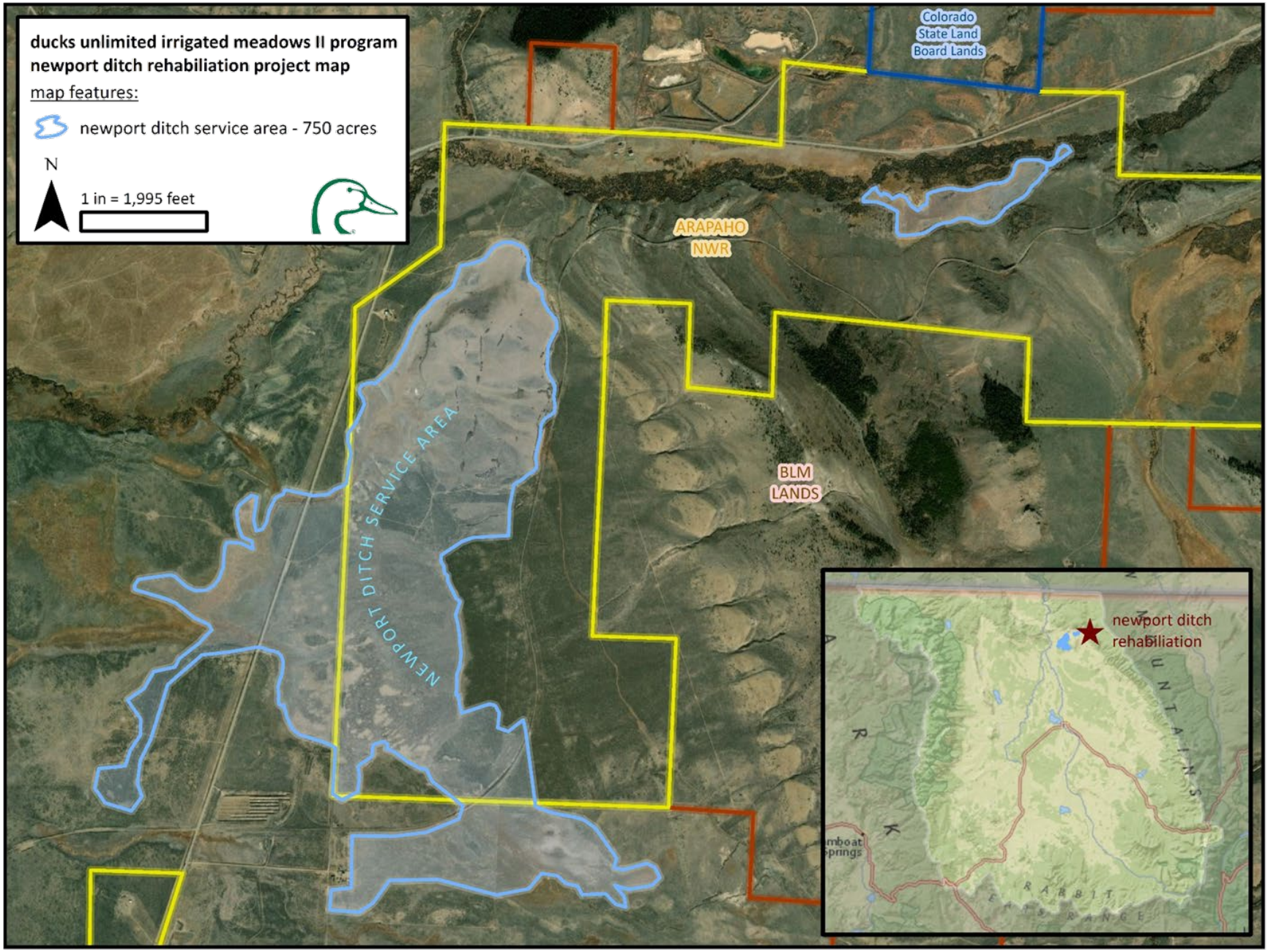
DUCKS UNLIMITED INC.
GREAT PLAINS REGIONAL OFFICE
P.E. SEAL
DESIGNED BY: WDE
DRAWN BY: WDE
SURVEYED BY: WDE/MAM
CHECKED BY:
APPROVED BY:
APPROVED BY:
DATE
BY
REVISIONS
PROJECT: LAKE JOHN SWA LEGAL TENDER DITCH REPAIR
SHEET TITLE: OVERALL PLAN
DATE 07/19/2021
SHEET TITLE
OVERALL PLAN
SCALES ARE ACCURATE ON 24"X36" SHEET SIZE
DU PROJECT NUMBER: CO-228-3
SHEET NUMBER: S2
SHEET 2 OF 4

Exhibit C: Newport Ditch Rehabilitation Project Completion Map



6TH SEMI-ANNUAL REPORT FOR CONTRACT:

CTGG1 2019-3416
WSRF – North Park Irrigated Meadows Conservation Program Phase 2

for the project period through June 13th, 2022

IN COOPERATION WITH: THE COLORADO WATER CONSERVATION BOARD, COLORADO PARKS & WILDLIFE AND COLORADO STATE UNIVERSITY

Summary

Ducks Unlimited, Inc. provides this sixth semi-annual report to the Colorado Water Conservation Board to demonstrate progress on the second phase of the North Park Irrigated Meadows Conservation Program. The contract was fully executed on June 14th, 2019 and identifies eight tasks to be completed by Ducks Unlimited, Inc. and our partners by June 30th, 2024.This report covers the period from December 14th, 2021 through June 13th, 2022.

We are pleased to report significant progress in achieving the aims of the program. We have completed the design phase on three of four irrigated meadow projects in North Park; and the fourth is nearly complete pending input from the U.S. Forest Service. We have completed construction on the Sherman Creek Ranch project, the Newport Ditch Rehabilitation project, and the Legal Tender Ditch project.

Our partners, Colorado Parks & Wildlife and Colorado State University, continue their assessment of waterfowl use of irrigated meadows in North Park. They have completed their Third full field season since the project began and have adjusted their approach to compensate for the poor field conditions, i.e. drought, and continuing impact of COVID-19 restrictions on their ability to perform field work. DU and CSU will provide an update of assessment activities to the North Platte Basin Roundtable at one of their regular meetings in the Winter of 2022.

To date, DU has expended nearly $262.1k of the $450.6k allocated to the program by the WSRF. This represent fifty-eight percent (58%) of the award. We and our partners have, in the same period of time, expended $679.2k in match performing both construction and assessment work. We have conserved 2,343 acres of North Platte Basin irrigated lands and produced a number of designs, plansets and reports related to project activities.

We look forward to continuing our progress under this contract meeting the water needs of the North Platte Basin and the State of Colorado. Please let us know if you have any questions, comments or concerns.

Kind Regards,

mreddy@ducks.org

Cover Photo: Photograph of a bull moose enjoying wetlands irrigated by the Jennie Ditch in Jackson County, Colorado.

Table 1. WSRF Grant Expenditures by Report Period and Matching Contributions by Partner.

CTGG1 2019-3416 Semi-Annual Report		WSRF BUDGET ONLY	TASK 1 Feasibility & Design BUDGET $	TASK 2 Pre-project Assessment BUDGET $	TASK 3 Construct (2020) BUDGET $	TASK 4 Assessment (Year 1) BUDGET $	TASK 5 Construct (2021) BUDGET $	TASK 6 Assessment (Year 2) BUDGET $	TASK 7 Assessment (Year 3) BUDGET $	TASK 8 Grant Admin BUDGET $
No.	***Date***	**450,600**	**36,885**	**36,673**	**73,457**	**92,000**	**41,658**	**116,000**	**46,327**	**7,600**
1	December, 2019	16,994	13,968	3,026	-	-	-	-	-	-
2	June, 2020	64,989	6,778	33,647	-	1,352	23,212	-	-	-
3	December, 2020	37,526	5,364	-	-	31,305	-	-	-	857
4	June, 2021	53,453	10,861	-	853	40,695	-	-	-	1,043
5	December, 2021	30,583	7,336	-	22,442	-	-	805	-	-
6	June, 2022	58,517	-	-	43,950	-	-	4,427	10,140	-
7	December, 2022	-	-	-	-	-	-	-	-	-
8	June, 2023	-	-	-	-	-	-	-	-	-
9	December, 2023	-	-	-	-	-	-	-	-	-
10	June, 2024	-	-	-	-	-	-	-	-	-
11	December, 2024	-	-	-	-	-	-	-	-	-
Total WSRF Expended		262,062	44,308	36,673	67,245	73,352	23,212	5,232	10,140	1,900
Total WSRF Remain		188,538	(7,423)	-	6,212	18,649	18,446	110,768	36,187	5,700
% Expended		58	120	100	92	80	56	5	22	25

Matching Funds by Partner	TOTAL MATCH $	TASK 1 MATCH $	TASK 2 MATCH $	TASK 3 MATCH $	TASK 4 MATCH $	TASK 5 MATCH $	TASK 6 MATCH $	TASK 7 MATCH $	TASK 8 MATCH $
	474,000	**50,000**	**81,000**	**50,000**	**81,000**	**50,000**	**81,000**	**81,000**	**-**
Ducks Unlimited, Inc.	296,143	47,410	2,765	105,930	16,339	123,699	-	-	-
CO Parks & Wildlife	332,259	48,042	66,000	26,956	57,900	133,361	-	-	-
CO State University	59,750	-	15,000	-	35,750	-	7,000	2,000	-
Total Match Expended	688,153	95,453	83,765	132,886	109,989	257,060	7,000	2,000	-
Total Match Remain	(214,153)	(45,453)	(2,765)	(82,886)	(28,989)	(207,060)	74,000	79,000	-
% Expended	145	191	103	266	136	514	9	2	-

Table 2. Progress in achieving project deliverables required by Task under ***CTGG1 2019-3416***.

CTGG1 2019-3416 Semi-Annual Report		TASK 1 Feasibility & Design			TASK 2 Pre-project Assessment	TASK 3 Construct (2020)	TASK 4 Assessment (Year 1)			TASK 5 Construct (2021)	TASK 6 Assessment (Year 2)			TASK 7 Assessment (Year 3)		
		Conceptual Plans	Stamped Plansets	30-year Agreements	Report	Acres Restored	General Report	Landowner Report	Roundtable Report	Acres Restored	General Report	Landowner Report	Roundtable Report	General Report	Landowner Report	Roundtable Report
No.	*Date*	**4**	**4**	**4**	**1**	**500**	**1**	**1**	**1**	**500**	**1**	**1**	**1**	**1**	**1**	**1**
1	December, 2019	2	1	1	1	-	-	-	-	-	-	-	-	-	-	-
2	June, 2020	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-
3	December, 2020	1	-	-	-	-	1	1	-	375	-	-	-	-	-	-
4	June, 2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	December, 2021		2	2	-	868	-	-	-	-	1	-	-	-	-	-
6	June, 2022					1,100	-	-	-	-	-	-	-	-	-	-
7	December, 2022															
8	June, 2023															
9	December, 2023															
10	June, 2024															
11	December, 2024															
Deliverables Achieved		4	3	4	1	1,968	1	1	-	375	1	-	-	-	-	-
Deliverables Remain		-	1	-	-	(1,468)	-	-	1	125	-	1	1	1	1	1
% Achieved		100	75	100	100	394	100	100	-	75	100	-	-	-	-	-

Task 1 – Project Feasibility, Design and Permitting

***Description of Task*:** At least four irrigation and/or storage projects that flood irrigated pasture or hayland located within the North Platte Basin of Jackson County, Colorado will be identified for rehabilitation and/or expansion. Projects will be designed by Ducks Unlimited bioengineering teams such that the extent and quality of irrigated lands will be maintained an/or expanded (as allowed under decreed water rights). This task will complete conceptual planning on these four projects, complete the development of professional plansets stamped by DU's certified engineer, and the fulfillment of all required permits.

Progress Report on Task: At the time of application to the North Platte Basin Roundtable and CWCB, DU had identified four project tracts upon which to complete irrigation and storage improvements. We summarize below the progress had on each of these tracts and include a summary of our feasibility work on a substitute project:

1.) Newport Ditch Rehabilitation – All project design work and construction has been completed for this project. Please see Task 3 for construction details.

2.) Lost Creek Ditch/Dryer Reservoir Rehabilitation – Project cancelled. Please refer to Semi-annual Report #1.

3.) Jennie Ditch Rehabilitation – Design work has been completed on the Jennie Ditch Rehabilitation project on Little Grizzly Creek Ranch except for any modifications required by USFS authorization of project activities. We continue to work with the USFS to permit the ditch rehabilitation as a good portion of the work will be completed on USFS land. USFS has granted provisional approval of the project pending completion of cultural resource surveys and some minor modifications to the project construction plan. Upon final determination of this course, DU will complete our construction planset and put the project out to bid for delivery in Winter of 2022 for delivery in 2023;

4.) Sherman Ditch/Hamilton Ditch Rehabilitation – All project feasibility and design work has been completed for this project. Please see Task 5 for more information on construction of the completed project.

5.) Legal Tender Ditch Rehabilitation – All project design work and construction has been completed for this project. Please see Task 3 for construction details.

Financial Summary: $36,885 WSRF budgeted, $36,885 expended to date which represents 100% of funds allocated to this task by CWCB.

***Deliverable Summary*:** All four conceptual plans completed, three of four stamped plansets completed, three of four projects' construction completed.

Task 2 – Pre-project Assessments (2019-20)

***Description of Task*:** DU, Colorado State University, and Colorado Parks & Wildlife will perform avian surveys and, on identified project tracts with landowner permission, vegetation surveys prior to project construction to document baseline habitat condition and bird use of those areas. These surveys allow us to estimate the impact of project development on irrigated meadows and explore how waterfowl use of these habitats change within and between season and with project improvements. Baseline data will greatly increase the power of any conclusion develop under our project assessments.

Progress Report on Task: No additional work on this Task was performed during the project report period. Assessment work in the report period was accomplished under Task 4. This Task is complete.

Financial Summary: $36,673 WSRF budgeted, $36,673 expended to date which represents 100% of funds allocated to this task by CWCB.

***Deliverable Summary*:** The one required report has been written.

Task 3 – Project Construction (2020)

***Description of Task*:** DU staff will put out to bid, contract, manage construction and complete work on at least two irrigated meadows projects within the North Platte Basin of Jackson County, CO. This will include the Newport Ditch Rehabilitation on Arapaho NWR and the Lost Creek Ditch/Dryer Reservoir Rehabilitation on the Parkview Ranch. The intent of this task is to secure irrigation on at least 500 acres of irrigated meadows and maintain storage of water in at least 30 acres of reservoir that also serves as breeding waterfowl habitat. Rehabilitation will proceed through the installation of fish-friendly, beaver-proof headgates, the placement of new diversion structures, and the re-building of ditch, culvert, and pipeline structures such that water losses in conveyance are minimized and irrigated lands receive as much water as allowed.

Progress Report on Task: The Lost Creek Ditch/Dryer Reservoir Rehabilitation project was cancelled; please refer to Semi-annual Report #1 for more information. That project was substituted with the Legal Tender Ditch Rehabilitation project.

The **Newport Ditch Rehabilitation** project is complete. Please see Report #5 for more information.

The **Legal Tender Ditch Rehabilitation** project was completed in June 2022.

Photo 1. DU and CPW personnel inspect the Legal Tender Ditch Rehabilitation project in June of 2022.	
Photo 2. The run of Legal Tender Ditch that was the principal focus of rehabilitation efforts. DU removed obstructions from the ditch course, lined the bottom and sides of the ditch, regraded steep sections of the ditch bank, and renovated the toe drain; all in an effort to ensure that agricultural and wildlife water sourced through the Ditch can be safely conveyed.	

Financial Summary: $73,457 WSRF budgeted, $67,245 expended to date which represents 92% of funds allocated to this task by CWCB.

***Deliverable Summary*:** 1,968 acres of irrigated upland, wet meadow, and wetlands were conserved under the Newport Ditch Rehabilitation project and the Legal Tender Ditch Rehabilitation project.

Task 4 – Post-project Assessments & Outreach (2020-21)

***Description of Task*:** DU, CSU, and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings.

Progress Report on Task: CSU and CPW completed field work.

Financial Summary: $92,000 WSRF budgeted, $73,352 expended to date which represents 80% of funds allocated to this task by CWCB.

***Deliverable Summary*:** One of one General Reports and one of one Landowner Reports have been published.

***Description of Task*:** DU staff will put out to bid, contract, manage construction and complete work on at least two irrigated meadows projects within the North Platte Basin of Jackson County, CO. This will include the Jennie Ditch Rehabilitation on Little Grizzly Creek Ranch and the Sherman Ditch/Hamilton Ditch Rehabilitation on the Sherman Ranch. The intent of this task is to secure irrigation on at least 500 acres of irrigated meadows. Rehabilitation will proceed through the installation of fish-friendly, beaver-proof headgates, the placement of new diversion structures, and the re-building of ditch, culvert, and pipeline structures such that water losses in conveyance are minimized and irrigated lands receive as much water as allowed.

Progress Report on Task: Construction on the Jennie Ditch Rehabilitation project has been postponed to summer/fall of 2023. DU is working with Colorado Open Lands and the U.S. Forest Service to permit construction of ditch improvements on the Routt National Forest (where the diversion for the Jennie Ditch is located). Permitting delays has postponed construction, but we foresee permits being released in Winter of 2022 to allow construction beginning when conditions allow in summer of 2023.

Construction on the Sherman Ditch and Hamilton Ditch projects was completed in summer of 2020

Financial Summary: $41,658 WSRF budgeted, $23,212 expended to date which represents 56% of funds allocated to this task by CWCB. We anticipate that all CWCB funds dedicated to this task will be expended by December of 2023.

***Deliverable Summary*:** 375 of the 500 acres of irrigated meadow restoration promised has been delivered during the report period. We expect the remaining acres to be delivered by December of 2023.

***Description of Task*:** DU, CSU and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post-construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings. CSU staff will also produce at least one outreach article or other item suitable for media summarizing project findings in light of the impact irrigated meadows in the North Platte Basin have on populations of waterfowl.

Progress Report on Task: CSU and CPW continued their assessment work in the 2021 field season and are performing data management and analysis. Please refer to the research report that follows.

Financial Summary: $92,000 WSRF budgeted, $5,232 expended to date which represents 5% of funds allocated to this task by CWCB.

***Deliverable Summary*:** The latest progress report submitted by CSU follows. An updated report will be submitted in the next semi-annual report.

PRODUCTIVITY OF BREEDING WATERFOWL ON WORKING LANDS IN A FLOOD IRRIGATED SYSTEM

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ABSTRACT

Flood-irrigated working lands are a component of many wetland communities throughout the Intermountain West and, when managed properly, have the potential to act as breeding habitat for a variety of waterfowl. Whether they attract and benefit breeding waterfowl or act as an ecological trap remains untested, however. We are studying the ways in which one flood-irrigated system, the North Platte Basin in Colorado, impacts breeding waterfowl and how birds that breed there go on to contribute to the population at a larger scale. Specifically, we are assessing whether projects that restore flood irrigation infrastructure, thus maintaining or expanding the number of irrigated acres, increase waterfowl use and improve reproductive success. In 2021, we searched 131 plots averaging 8.58 ha and located 40 nests of six species. We collected 571 invertebrate samples from various wetland types throughout the summer. We conducted three rounds of counts of breeding duck pairs across 68 basin wetlands, 18 hay meadows, 13 riparian transects, and 13 irrigation ditch and three rounds of brood counts across 74 wetlands in North Park. Basin wetlands and reservoirs held the highest numbers of breeding pairs and ducklings, and preliminary results are beginning to reveal that they also held the highest abundance and diversity of invertebrates.

PROJECT RATIONALE

Similar to agricultural production, the sustainable management of waterfowl populations across the western United States inherently depends on limited water availability. Both endeavors are increasingly challenged by municipal demands for water, drought, and changes in the seasonality of precipitation (Johnson et al. 2005). Healthy wetlands for wildlife can be sustained in conjunction with the needs of agricultural producers on working lands (Blevins 2015), but the multifaceted importance of water management is rarely quantified (Petrie et al. 2013). Information pertaining to the multiple benefits of water management practices might bring to light the larger societal importance of sound water management, and thereby allow natural resource managers to allocate resources more efficiently and effectively by directing them towards the practices with demonstrated advantages for both wildlife and agricultural producers.

The North Platte Basin in north-central Colorado (hereafter North Park) is a model system to evaluate benefits and trade-offs of hydrological manipulations that benefit both agricultural producers and wildlife. Not only are waterfowl and water management already being conducted by federal and state agencies and NGOs like Ducks Unlimited, but the North Platte Basin is also representative of many working lands throughout the Intermountain West. Approximately 84% of all wetland habitats in the North Platte Basin are privately owned, a majority of which are irrigated pastures and hayfields (Lemly and Gilligan 2012). Reminiscent of agricultural practices that were common 50-100 years ago, agricultural producers in the North Platte Basin do not use center-pivot irrigation, which has drastic effects on hydrological regimes, water tables, wetlands, and stream flows. Cereal grain agriculture has not replaced hay production, and the haylands are irrigated via flood irrigation. Although flood irrigation may lead to somewhat more evapotranspiration of water than center-pivot sprinklers (Brown

2008, Eldeiry et al. 2015, Lu et al. 2017), it more closely resembles natural stream and river flood regimes and is thought to be more beneficial for wildlife, water table recharge, and evaporative cooling of return flow water during cool nights at high elevation. Most important for agricultural producers, flood irrigation could significantly enhance the quality and quantity of forage production for livestock while maintaining sustainable levels of soil moisture through drought years (Wallace 2000, Brown 2008).

As water resources become diverted for urban municipal uses and the increasing frequency of drought reduces water availability in the semi-arid West, it is believed that the North Platte Basin may begin to play a significant role in the production of waterfowl on a statewide or even a flyway scale (Kirkman 1956, Szymczak 1986, Colorado Division of Wildlife 1989, Gilbert et al. 1996, Sanders 1997, Runge 2011). Private organizations such as Ducks Unlimited have established partnerships with many landowners in the North Platte Basin and are continuing conservation initiatives focused on refurbishing irrigation infrastructure to benefit both waterfowl and agricultural producers. We are taking advantage of these manipulations of flood irrigation infrastructure and delivery to examine the benefits and trade-offs for migrating waterfowl, locally breeding waterfowl, wetland productivity, and other ecosystem services within and across drainages. Specifically, we are conducting an observational study on waterfowl productivity and habitat use within flood-irrigated working lands. This project has the potential to elucidate the impacts of working lands on waterfowl throughout the entirety of their annual cycle and how their demography might be impacted by future climate change. Determining the effects of breeding habitat management on waterfowl across seasons and life stages will provide waterfowl conservationists with a better understanding regarding the cross-seasonal nature of habitat suitability and the nuances of birds' requirements within these habitats.

STUDY SITE & METHODS

Field work takes place in the North Platte Basin in Jackson County, Colorado along the North Platte River and its tributaries. This high elevation (8800 ft) basin is dominated by salt desert shrub and sagebrush steppe interspersed by lakes, ponds, irrigation ditches, irrigated hay fields, and the tributaries of the North Platte River. Land ownership is approximately 74% public, with the US Forest Service owning the largest parcels of public land (32%) that border the valley. Arapahoe National Wildlife Refuge, several State Wildlife Areas, and privately irrigated fields encompass many of the wetlands available to breeding and migrating waterfowl in the region and especially in the state of Colorado. Hay meadows primarily consist of Timothy grass (*Phleum pretense*) interspersed with sedges (*Cyperaceae*) and rushes (*Juncaceae*). They are often surrounded by willows (*Salix* spp.) and other riparian plants that grow along the tributaries from which meadows are flooded.

OBJECTIVES

Our research goal is to assess the impacts of flood irrigation on breeding waterfowl in North Park. We seek to address water management uncertainties in addition to evaluating how birds breeding in intermountain basins contribute to or differ from the continental population of waterfowl. The primary components of this project include:

Objective 1: Assess waterfowl use of flood-irrigated hay meadows during migration and the breeding season on public and private lands. Specifically, compare nest density, nest survival, and brood habitat use across wetland types (e.g., hay meadows, irrigation ditches, riparian areas, basin wetlands, and reservoirs).

Objective 2: Evaluate the impact of water infrastructure improvement projects on waterfowl and agricultural irrigated acres. Specifically, evaluate whether the construction of irrigation infrastructure (e.g., ditches, headgates, etc.) and the subsequent increase in irrigated acres impacts nest density, nest survival, and brood habitat use in those wetland areas.

Objective 3: Evaluate cross-seasonal effects of breeding in flood-irrigated agricultural areas.

In the 2021 season, we focused on intensively searching private and public lands for duck nests, evaluating invertebrate productivity throughout the breeding season, and conducting counts of breeding waterfowl pairs on select bodies of water. We focused less on deploying GPS transmitters than in previous years because it has proven relatively unsuccessful, and we wanted to spend as much time as possible locating nests across habitat types. The final field season (2022) will continue these efforts to increase our sample of nests as much as possible.

PRELIMINARY RESULTS

Search Effort and Nest Site Selection

We searched 131 plots across three privately-owned ranches, Arapahoe National Wildlife Refuge, Lake John State Wildlife Area, and Hebron Slough Waterfowl Area within areas that were managed via flood irrigation. Plots ranged from 0.45-123.55 ha ($\bar{x}$ = 8.58 ha) and we rope-dragged on foot, dragged chains using ATVs, or searched systematically to locate duck nests. Plots consisted of flooded and dry hay meadows (*n*=18), flooded and dry uncut/nongrazed meadows interspersed with shrubs (*n*=75), expanses of shrub/scrub (primarily greasewood and basin sagebrush; *n*=3)), irrigation ditches (*n*=6), reservoir perimeters (*n*=4), and the perimeter of riparian areas (*n*=23). Preliminary results indicate that the top three observed nesting species (mallards, gadwall, and cinnamon teal) all selected nest sites with high visual obstruction (i.e., high vegetation density surrounding the nest), indicating that tall, dense ground vegetation may be important for nesting ducks. We did not detect an effect of the other measured covariates (e.g., percent of each of the following at the nest site: litter, grass, forbs, shrubs, sedges, or rushes) on where each of these three species selected nest sites.

Nest Density and Nest Survival

We located 40 nests of six species throughout the 2021 breeding season. A large portion (82.5%, *n*=33) of these nests were located on Arapahoe NWR while 15% (*n*=6) were associated with working lands and 2.5% (*n*=1) were located at Lake John State Wildlife Area. Over the four years the study has been taking place, nest density has been highest in different habitat types each year. Typically riparian areas (mean = 1.09 nests/ha), irrigation ditches (mean = 0.58 nests/ha), and graminoid meadows (mean = 0.42 nests/ha) have exhibited the highest density of nests across all years. Nest density was highest in riparian areas (3.14 nests/ha) in 2021, followed by hay meadows (0.31 nests/ha), irrigation ditches (0.33 nests/ha), graminoid meadows interspersed by shrubs (0.15 nests/ha), purely graminoid meadows (0.13 nests/ha), and shrub-scrub habitat (0 nests/ha). Future analyses will explore how nest density is impacted by local weather conditions and whether that might explain the disparity between densities within the same habitat type across years. Only six nests successfully hatched at least one duckling in 2021, and most nests were depredated by nest predators (e.g., common raven, coyote, etc.). Nest survival did not vary by habitat type and averaged 0.28 (SE = 0.17) across species and habitats.

Invertebrate Samples

We collected nektonic invertebrate samples in flooded hay plots, basin wetlands (i.e. ponds), reservoirs, irrigation ditches, and riparian areas using two-liter activity traps placed at the water's surface for 48 hours every two weeks. We planned to collect 135 samples during each sampling occasion, but water availability (i.e., whether a wetland had water in it during a given sampling occasion) limited the number of samples we could collect. We collected 571 total samples throughout the summer of a possible 810. Samples are currently being processed to identify invertebrates down to taxonomic family and count individuals in each sample. Preliminary results from 2020 samples reveal temporal shifts in invertebrate abundance and taxonomic richness across habitat types and indicate reservoirs and basin wetlands hold the highest diversity and abundance of invertebrates (Figures 1 & 2).

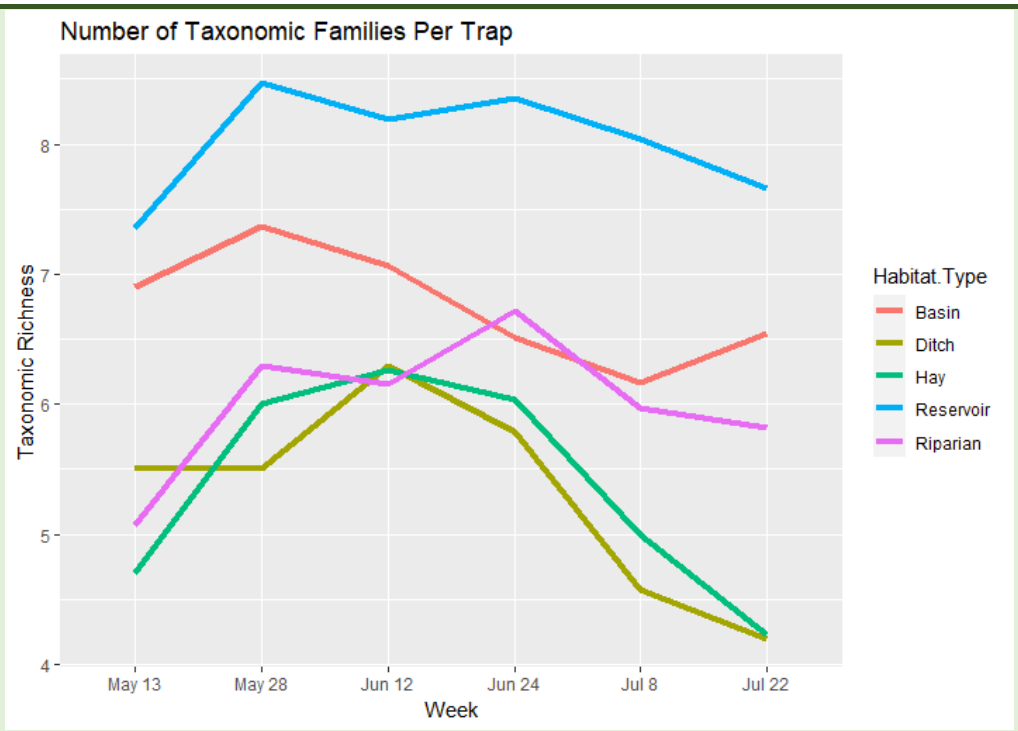

Figure 1: The taxonomic richness observed in invertebrate traps placed in five different habitat types throughout North Park. Taxonomic richness refers to the number of unique taxonomic families observed in each trap.

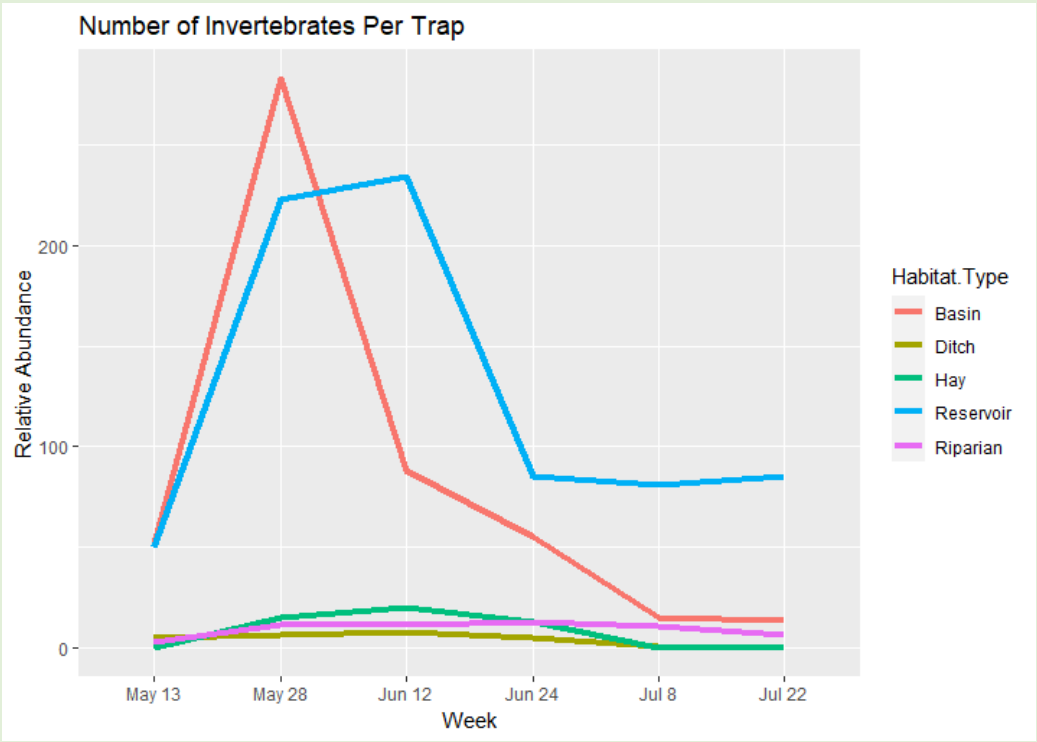

Figure 2: Relative abundance of invertebrates observed in invertebrate traps placed in five different habitat types throughout North Park.

Mallard Movement

We placed one GPS transmitter on one nesting mallard (Figure 3, northernmost points) and two GPS transmitters on mallard hens during August banding efforts. As of the writing of this report, the nesting mallard had migrated to the southeast border of Colorado along the Arkansas river, and the other two had migrated to Aurora and Greeley, CO. One mallard female marked with a transmitter during 2020 returned to North Park to nest in 2021 (farthest east points in Figure 3), but we did not have access to the property to monitor the assumed nest. Very few of the transmitters deployed in 2020 continued transmitting into 2021, but it is unknown whether the birds died or the transmitters failed. GPS locations are still undergoing preliminary analysis, and will be used to assess habitat use of breeding females and movement patterns of females with broods.

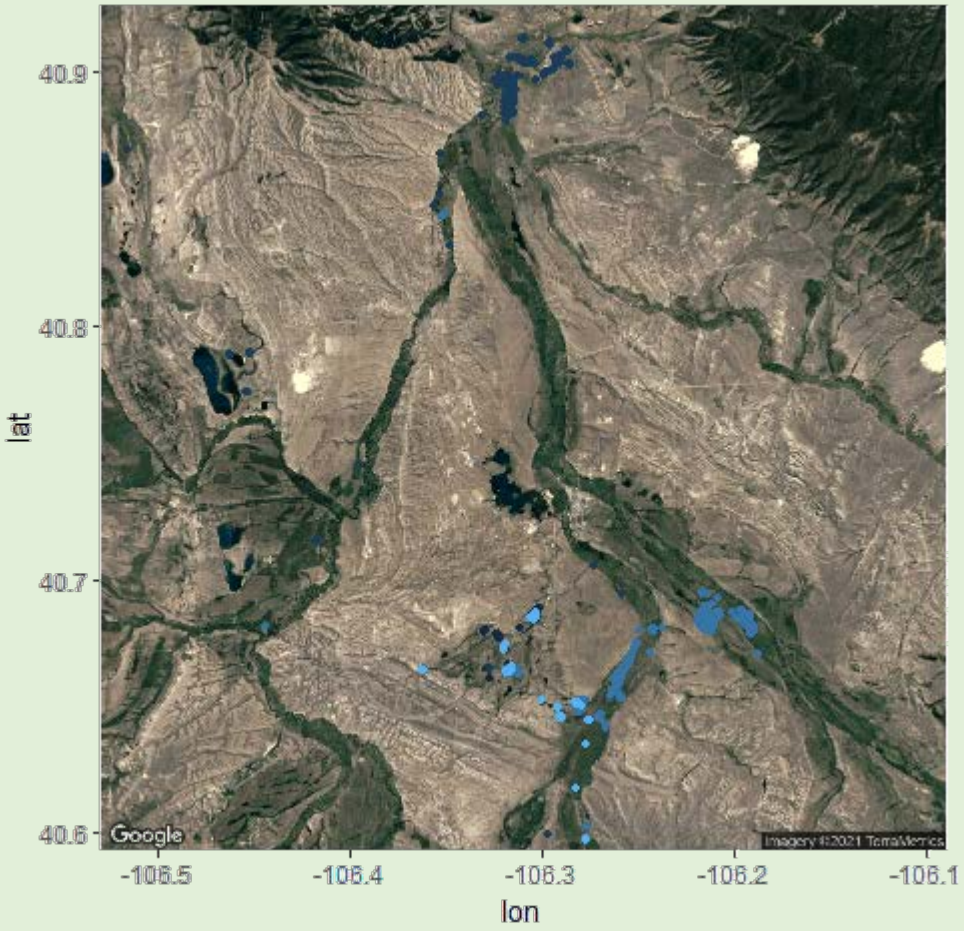

Figure 3: GPS data from four ducks breeding in North Park, CO during 2021. Each color represents a unique individual and GPS points were taken hourly during daylight hours.

Detection Probability

We conducted 147 dependent double observer surveys on basin wetlands in 2021. Out of 2,086 duck detections during these surveys, 36 were missed by the primary observer. The most parsimonious model of detection probability allowed detectability to vary among observers (two groups: obs A, B, C vs. obs D) and linearly with group size. Detection probability was 0.993 and 0.974 for the two levels of observer held constant at mean group

size. Detectability increased with group size (β_{group} = 0.28 ± 0.15). We conducted 113 independent double observer surveys on riparian areas, irrigation ditches, and hay fields. Out of 258 duck detections, 20 were missed by an observer. The best model of detection probability allowed detectability to vary among habitat types, species (3 groups: small dabbling duck, larger dabbling duck, diving duck), and linearly with group size. Estimated detection probabilities were generally high, ranging from 0.91 to 1.00. Detectability decreased with group size (β_{group} = -0.59 ± 0.18).

We conducted 199 independent double observer surveys for broods. Out of 1,394 duckling detections 518 were missed by an observer. The only model of brood detection probability to outperform the null model included wetland type. Detection ± SE was greatest in hay meadows (1.0 ± 0.00), followed by riparian (0.98 ± 0.02), basin (0.77 ± 0.01), and reservoirs (0.70 ± 0.04).

Breeding Duck and Pair Abundance

At 5 large reservoirs, we conducted 3 rounds of duck counts between 23-Apr and 15-Jun. Duck abundance decreased throughout the survey period. We conducted duck pair counts on 68 basin wetlands, 18 hay meadows, 13 riparian transects, and 13 irrigation ditch transects from 22-Apr until 18-Jun. Summed across all sites, we observed 3,765 total indicated breeding pairs, including 1,049 gadwall, 648 mallards, 501 northern shovelers, 322 American wigeon, and 319 lesser scaup. We modeled pair abundance separately for these five species in addition to all ducks combined. For all ducks combined, gadwall, and mallards, a cubic effect of day was the most parsimonious time trend model. For northern shovelers, a linear time trend was best and for lesser scaup, a quadratic time trend was best, whereas the null model outperformed any time trend for American wigeon. Total pair abundance across species was relatively stable throughout the breeding season but decreased in June, while individual species temporal trends were more variable. We then added vegetation variables to the best time trend model. For all ducks, gadwall, mallard, and northern shoveler, percent open water was the best habitat variable and was positively related to pair abundance. For American wigeon and lesser scaup, scrub/shrub vegetation was best and negatively related to pair abundance.

Brood Abundance/Productivity

We conducted 201 brood counts at 74 sites from 12-Jul until 16-Aug. We observed broods of 12 duck species with gadwall being the most common followed by mallard, and cinnamon teal. Summed across sites we observed 1459 ducklings (267 broods). On average, we conducted three brood surveys per site. Similar to the analysis for pair counts, we modeled duckling abundance for all duck species combined. For the species-specific analyses, an excess of zero counts necessitated modeling presence/absence of broods rather than duckling abundance for mallards, gadwall, and northern shovelers. For all ducks combined, date in quadratic form was the best temporal trend of duckling abundance, which peaked in early August. Percent of the site that was flooded positively influenced duckling abundance, whereas percent herbaceous vegetation negatively impacted abundance. Gadwall duckling abundance peaked in late July, decreased, and then increased again in mid-August, whereas,mallard duckling abundance had a more gradual peak in late July. Percent herbaceous vegetation was the best habitat variable predicting mallard duckling presence. Percent submergent vegetation was best in predicting gadwall and northern shoveler duckling

presence. The probability of mallard ducklings being present on a site decreased with percent herbaceous vegetation, indicating open water may be important for ducklings. Gadwall and northern shoveler duckling presence increased with percent submergent vegetation on a site.

Mean brood-pair ratio was greatest for cinnamon teal and least for lesser scaup. Overall mean ± SD brood-pair ratio was 0.15 ± 0.37 and duckling pair ratio was 0.86 ± 2.24.

TIMELINE AND FUTURE PLANS

All data are undergoing preliminary analyses and data collection for this project will continue through 2022. We will continue to locate nests, monitor broods, and sample invertebrates across habitat types in order to determine the most effective ways to manage water for agricultural producers and breeding waterfowl. This information will be summarized to create a set of best management practices for landowners and land managers throughout the region.

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***Description of Task*:** DU, CSU and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post-construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings. CSU staff will produce at least two outreach articles or other item suitable for media summarizing project findings in light of the impact irrigated meadows in the North Platte Basin have on populations of waterfowl. At least one of these items will be targeted for media outlets within Jackson County. At least one other item will be targeted for general media outlets covering water and wildlife issues in the State of Colorado. DU and CSU staff will produce at least two sets of Best Management Practices to be distributed to landowners and conservation practitioners in the Basin and elsewhere in the state. These Best Management Practices will translate project assessment findings about waterfowl use and land productivity into prescriptions for management of irrigated lands similar to those included in the study.

Progress Report on Task: None to report.

Financial Summary: $22,000 WSRF budgeted, $10,140 expended to date which represents 22% of funds allocated to this task by CWCB.

***Deliverable Summary*:** None to report.

Task 8 – Indirect Costs (Project Administration)

***Description of Task*:** Oversight of the activities for the proper allocation of grant funds, activities and reporting assuring timely delivery of grant deliverables. DU staff will manage financial planning for each of the tasks presented in the workplan, will manage project timelines, produce reports and correspondence to partners and CWCB staff.

Progress Report on Task: DU staff have developed project financial plan software and developed new project report templates to standardize and make more efficient the reporting process.

Financial Summary: $7,600 WSRF budgeted, $1,900 expended to date which represents 25% of funds allocated to this task by CWCB.

***Deliverable Summary*:** None to report.

Proposed changes to project period: None to request.

Proposed changes to project deliverables: None to report.

Proposed changes to project budget: None to request.

7TH SEMI-ANNUAL REPORT FOR CONTRACT:

CTGG1 2019-3416
WSRF – North Park Irrigated Meadows Conservation Program Phase 2

for the project period through December 13th, 2022

IN COOPERATION WITH: THE COLORADO WATER CONSERVATION BOARD, COLORADO PARKS & WILDLIFE AND COLORADO STATE UNIVERSITY

Summary

Ducks Unlimited, Inc. provides this 7th semi-annual report to the Colorado Water Conservation Board to demonstrate progress on the second phase of the North Park Irrigated Meadows Conservation Program. The contract was fully executed on June 14th, 2019 and identifies eight tasks to be completed by Ducks Unlimited, Inc. and our partners by June 30th, 2024. This report covers the period from June 13th, 2022 through December 13th, 2022.

We are pleased to report significant progress in achieving the aims of the program. We have completed the design phase on 4 of 4 irrigated meadow projects in North Park. We have completed construction on the Sherman Creek Ranch project, the Newport Ditch Rehabilitation project, and the Legal Tender Ditch project, and we anticipate completion of the Jennie Ditch project in 2023 as necessary permits have been received and a site showing with contractors has occurred.

Regarding the assessment portion of this project, our partners, Colorado Parks & Wildlife and Colorado State University, continue their assessment of waterfowl use of irrigated meadows in North Park. They have completed 3 field seasons since the project inception. Data analysis from field collections continues and will continue through the duration of this project with the necessary products being completed over the next 2 years.

To date, DU has expended $293,377.03 of the $450,600 allocated to the program by the WSRF. This represents sixty-five percent (65%) of the award. We and our partners have, in the same period of time, expended at least $679.2k, well over the proposed amount of $474,000 in match performing both construction and assessment work. This total will likely increase even further. We have conserved 2,343 acres of North Platte Basin irrigated lands, which is well over the 1,000 acres proposed, and produced a number of designs, plan sets and reports related to project activities.

We look forward to continuing our progress under this contract meeting the water needs of the North Platte Basin and the State of Colorado. please let us know if you have any questions, comments or concerns.

Sincerely,

John Denton

Colorado Manager of Conservation Programs
Ducks Unlimited, Inc.

Task 1 – Project Feasibility, Design and Permitting

***Description of Task*:** At least four irrigation and/or storage projects that flood irrigated pasture or hayland located within the North Platte Basin of Jackson County, Colorado will be identified for rehabilitation and/or expansion. Projects will be designed by Ducks Unlimited bioengineering teams such that the extent and quality of irrigated lands will be maintained an/or expanded (as allowed under decreed water rights). This task will complete conceptual planning on these four projects, complete the development of professional plansets stamped by DU's certified engineer, and the fulfillment of all required permits.

Progress Report on Task: At the time of application to the North Platte Basin Roundtable and CWCB, DU had identified four project tracts upon which to complete irrigation and storage improvements. We summarize below the progress had on each of these tracts and include a summary of our feasibility work on a substitute project:

1.) Newport Ditch Rehabilitation – All project design work and construction has been completed for this project. Construction completed as part of Task 3.

2.) Lost Creek Ditch/Dryer Reservoir Rehabilitation – Approved project cancellation reported in semi-annual report 1.

3.) Jennie Ditch Rehabilitation – Design work has been completed on the Jennie Ditch Rehabilitation project on Little Grizzly Creek Ranch. We recently received our special use permit from the U.S. Forest Service. The construction plan set is complete, and a site showing was held in November with potential contractors. We anticipate an awarded bid with delivery of this project in 2023;

4.) Sherman Ditch/Hamilton Ditch Rehabilitation – All project feasibility and design work has been completed for this project. Construction completed as part of Task 5.

5.) Legal Tender Ditch Rehabilitation – All project design work and construction has been completed for this project. Project completed as part of Task 3.

Financial Summary: $52,000.00 WSRF budgeted, $52,000.00 expended to date.

***Deliverable Summary*:** All four conceptual plans completed, four of four stamped plansets completed, three of four projects' construction completed.

***Description of Task*:** DU, Colorado State University, and Colorado Parks & Wildlife will perform avian surveys and, on identified project tracts with landowner permission, vegetation surveys prior to project construction to document baseline habitat condition and bird use of those areas. These surveys allow us to estimate the impact of project development on irrigated meadows and explore how waterfowl use of these habitats change within and between season and with project improvements. Baseline data will greatly increase the power of any conclusion develop under our project assessments.

Progress Report on Task: No additional work on this Task was performed during the project report period. Assessment work in the report period was accomplished under Task 4. This Task is complete.

Financial Summary: $85,000.00 WSRF budgeted, $36,673.00 expended to date. Remaining funds will be used toward assessment Tasks 4 and 6 if necessary.

***Deliverable Summary*:** The one required report has been written.

***Description of Task*:** DU staff will put out to bid, contract, manage construction and complete work on at least two irrigated meadows projects within the North Platte Basin of Jackson County, CO. This will include the Newport Ditch Rehabilitation on Arapaho NWR and the Lost Creek Ditch/Dryer Reservoir Rehabilitation on the Parkview Ranch. The intent of this task is to secure irrigation on at least 500 acres of irrigated meadows and maintain storage of water in at least 30 acres of reservoir that also serves as breeding waterfowl habitat. Rehabilitation will proceed through the installation of fish-friendly, beaver-proof headgates, the placement of new diversion structures, and the re-building of ditch, culvert, and pipeline structures such that water losses in conveyance are minimized and irrigated lands receive as much water as allowed.

Progress Report on Task: The Lost Creek Ditch/Dryer Reservoir Rehabilitation project was cancelled; please refer to Semi-annual Report 1 for more information. That project was substituted with the Legal Tender Ditch Rehabilitation project, which is now complete.

The **Newport Ditch Rehabilitation** project is complete.

The **Legal Tender Ditch Rehabilitation** project was completed in June 2022.

Financial Summary: $50,000 WSRF budgeted, $50,000.00 expended.

***Deliverable Summary*:** 1,968 acres of irrigated upland, wet meadow, and wetlands were conserved under the Newport Ditch Rehabilitation project and the Legal Tender Ditch Rehabilitation project.

***Description of Task*:** DU, CSU, and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings.

Progress Report on Task: CSU and CPW completed field work.

Financial Summary: $92,000.00 WSRF budgeted, $75,408.18 expended to date.

***Deliverable Summary*:** One of one General Reports and one of one Landowner Reports have been published.

***Description of Task*:** DU staff will put out to bid, contract, manage construction and complete work on at least two irrigated meadows projects within the North Platte Basin of Jackson County, CO. This will include the Jennie Ditch Rehabilitation on Little Grizzly Creek Ranch and the Sherman Ditch/Hamilton Ditch Rehabilitation on the Sherman Ranch. The intent of this task is to secure irrigation on at least 500 acres of irrigated meadows. Rehabilitation will proceed through the installation of fish-friendly, beaver-proof headgates, the placement of new diversion structures, and the re-building of ditch, culvert, and pipeline structures such that water losses in conveyance are minimized and irrigated lands receive as much water as allowed.

Progress Report on Task: Construction on the Jennie Ditch Rehabilitation project has been postponed to 2023. DU is worked with Colorado Open Lands and the U.S. Forest Service to receive a special use permit for construction of ditch improvements on the Routt National Forest (where the diversion for the Jennie Ditch is located). A sit showing with contractors was completed in November. Now that the special use permit has been received, we anticipate construction in early to mid-2023

Construction on the Sherman Ditch and Hamilton Ditch projects was completed in summer of 2020

Financial Summary: $50,000.00 WSRF budgeted. $50,000 expended.

***Deliverable Summary*:** 375 of the 500 acres of irrigated meadow restoration promised has been delivered during the report period. We expect the remaining acres to be delivered in 2023. Additional work to complete the final construction project within this proposal will be completed with secured match funding.

***Description of Task*:** DU, CSU and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post-construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings. CSU staff will also produce at least one outreach article or other item suitable for media summarizing project findings in light of the impact irrigated meadows in the North Platte Basin have on populations of waterfowl.

Progress Report on Task: CSU and CPW continued their assessment work in the 2022 field season and are performing data management and analysis. An extensive progress report was reported with the last semi-annual report provided, and another will be provided with the next report.

Financial Summary: $92,000 WSRF budgeted, $21,695.85 expended to date.

***Deliverable Summary*:** Continued data analysis. An updated progress report will be submitted in the next semi-annual report.

***Description of Task*:** DU, CSU and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post-construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings. CSU staff will produce at least two outreach articles or other item suitable for media summarizing project findings in light of the impact irrigated meadows in the North Platte Basin have on populations of waterfowl. At least one of these items will be targeted for media outlets within Jackson County. At least one other item will be targeted for general media outlets covering water and wildlife issues in the State of Colorado. DU and CSU staff will produce at least two sets of Best Management Practices to be distributed to landowners and conservation practitioners in the Basin and elsewhere in the state. These Best Management Practices will translate project assessment findings about waterfowl use and land productivity into prescriptions for management of irrigated lands similar to those included in the study.

Progress Report on Task: None to report, but this work will likely be completed in 2023 and 2024 as results of the assessment are completed via Tasks 4 and 6.

Financial Summary: $22,000 WSRF budgeted, $0 expended to date (corrected from last report).

***Deliverable Summary*:** None to report.

***Description of Task*:** Oversight of the activities for the proper allocation of grant funds, activities and reporting assuring timely delivery of grant deliverables. DU staff will manage financial planning for each of the tasks presented in the workplan, will manage project timelines, produce reports and correspondence to partners and CWCB staff.

Progress Report on Task: DU staff have developed project financial plan software and developed new project report templates to standardize and make more efficient the reporting process.

Financial Summary: $7,600 WSRF budgeted, $7,600 expended.

***Deliverable Summary*:** Continued administration of all projects within this proposal and reporting for this project. Administration will continue with secured matching funds now that these have been expended.

8TH SEMI-ANNUAL REPORT FOR CONTRACT:

CTGG1 2019-3416
WSRF – North Park Irrigated Meadows Conservation Program Phase 2

for the project period through June 13th, 2023

IN COOPERATION WITH: THE COLORADO WATER CONSERVATION BOARD, COLORADO PARKS & WILDLIFE AND COLORADO STATE UNIVERSITY

Summary

Ducks Unlimited, Inc. provides this 8th semi-annual report to the Colorado Water Conservation Board to demonstrate progress on the second phase of the North Park Irrigated Meadows Conservation Program. The contract was fully executed on June 14th, 2019 and identifies eight tasks to be completed by Ducks Unlimited, Inc. and our partners by June 30th, 2024. This report covers the period from December 14th, 2022 through June 13, 2023.

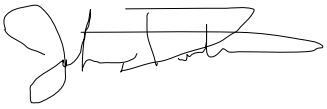
We are pleased to report significant progress in achieving the aims of the program. We have completed the design phase on 4 of 4 irrigated meadow projects in North Park. We have completed construction on the Sherman Creek Ranch project, the Newport Ditch Rehabilitation project, and the Legal Tender Ditch project, and we anticipate completion of the Jennie Ditch project in 2023 as necessary permits have been received and a site showing with contractors has occurred. We are just waiting on the contractor to move onto the site to commence the work pending their schedule.

Regarding the assessment portion of this project, our partners, Colorado Parks & Wildlife and Colorado State University and our staff, continue their assessment of waterfowl use of irrigated meadows in North Park. They have completed 3 field seasons since the project inception. Data analysis from field collections continues and will continue through the duration of this project with the necessary products being completed over the next 2 years. One PhD dissertation defense has occurred utilizing the results of this project. The presentation can be found at: https://echo360.org/media/69468ff6-29e2-40bd-a81d-be69140d8bda/public

To date, DU has expended $318,183.04 of the $450,600 allocated to the program by the WSRF. This represents seventy-one percent (71%) of the award. We and our partners have, in the same period of time, expended at least $700k, well over the proposed amount of $474,000 in match performing both construction and assessment work. This total will likely increase even further. We have conserved 2,343 acres of North Platte Basin irrigated lands, which is well over the 1,000 acres proposed with one construction project, the Jennie Ditch project, is set to add to that number. We have produced a number of designs, plan sets, and reports related to project activities.

We look forward to wrapping up this project by the deadline next year under this contract while assessing and meeting the water needs of the North Platte Basin and the State of Colorado. Please let us know if you have any questions, comments or concerns.

Sincerely,



John Denton

Colorado Manager of Conservation Programs
Ducks Unlimited, Inc.

Task 1 – Project Feasibility, Design and Permitting

***Description of Task*:** At least four irrigation and/or storage projects that flood irrigated pasture or hayland located within the North Platte Basin of Jackson County, Colorado will be identified for rehabilitation and/or expansion. Projects will be designed by Ducks Unlimited bioengineering teams such that the extent and quality of irrigated lands will be maintained an/or expanded (as allowed under decreed water rights). This task will complete conceptual planning on these four projects, complete the development of professional plansets stamped by DU's certified engineer, and the fulfillment of all required permits.

Progress Report on Task: At the time of application to the North Platte Basin Roundtable and CWCB, DU had identified four project tracts upon which to complete irrigation and storage improvements. We summarize below the progress had on each of these tracts and include a summary of our feasibility work on a substitute project:

1.) Newport Ditch Rehabilitation – All project design work and construction has been completed for this project. Construction completed as part of Task 3.

2.) Lost Creek Ditch/Dryer Reservoir Rehabilitation – Approved project cancellation reported in semi-annual report 1.

3.) Jennie Ditch Rehabilitation – Design work has been completed on the Jennie Ditch Rehabilitation project on Little Grizzly Creek Ranch. We recently received our special use permit from the U.S. Forest Service. The construction plan set is complete, and a site showing was held in November with potential contractors. We anticipate an awarded bid with delivery of this project in 2023 with the contractor set to begin this summer.

4.) Sherman Ditch/Hamilton Ditch Rehabilitation – All project feasibility and design work has been completed for this project. Construction completed as part of Task 5.

5.) Legal Tender Ditch Rehabilitation – All project design work and construction has been completed for this project. Project completed as part of Task 3.

Financial Summary: $52,000.00 WSRF budgeted, $52,000.00 expended to date.

***Deliverable Summary*:** All four conceptual plans completed, four of four stamped plansets completed, three of four projects' construction completed.

***Description of Task*:** DU, Colorado State University, and Colorado Parks & Wildlife will perform avian surveys and, on identified project tracts with landowner permission, vegetation surveys prior to project construction to document baseline habitat condition and bird use of those areas. These surveys allow us to estimate the impact of project development on irrigated meadows and explore how waterfowl use of these habitats change within and between season and with project improvements. Baseline data will greatly increase the power of any conclusion develop under our project assessments.

Progress Report on Task: Pre-project data was collected for the Jennie Ditch project that will be constructed this summer.

Financial Summary: $85,000.00 WSRF budgeted, $82,243.86 expended to date. Remaining funds will likely be used toward assessment Tasks 4, 5, and 7 as necessary. Note that this differs from the last report as we needed to reconcile our records regarding what had been spent from each task thus far.

***Deliverable Summary*:** The one required report has been written.

***Description of Task*:** DU staff will put out to bid, contract, manage construction and complete work on at least two irrigated meadows projects within the North Platte Basin of Jackson County, CO. This will include the Newport Ditch Rehabilitation on Arapaho NWR and the Lost Creek Ditch/Dryer Reservoir Rehabilitation on the Parkview Ranch. The intent of this task is to secure irrigation on at least 500 acres of irrigated meadows and maintain storage of water in at least 30 acres of reservoir that also serves as breeding waterfowl habitat. Rehabilitation will proceed through the installation of fish-friendly, beaver-proof headgates, the placement of new diversion structures, and the re-building of ditch, culvert, and pipeline structures such that water losses in conveyance are minimized and irrigated lands receive as much water as allowed.

Progress Report on Task: The Lost Creek Ditch/Dryer Reservoir Rehabilitation project was cancelled; please refer to Semi-annual Report 1 for more information. That project was substituted with the Legal Tender Ditch Rehabilitation project, which is now complete.

The **Newport Ditch Rehabilitation** project is complete.

The **Legal Tender Ditch Rehabilitation** project was completed in June 2022.

Financial Summary: $50,000 WSRF budgeted, $50,416.38 expended. Note that this differs from the last report as we needed to reconcile our records regarding what had been spent from each task thus far. There is still one project to complete, and match funds and potentially funding from other tasks in this award will be moved to cover it.

***Deliverable Summary*:** 1,968 acres of irrigated upland, wet meadow, and wetlands were conserved under the Newport Ditch Rehabilitation project and the Legal Tender Ditch Rehabilitation project.

***Description of Task*:** DU, CSU, and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings.

Progress Report on Task: CSU and CPW completed field work.

Financial Summary: $92,000.00 WSRF budgeted, $35,643.00 expended to date. Remaining funds will likely be used toward assessment Tasks 4, 5, and 7 if necessary. Note that this differs from the last report as we needed to reconcile our records regarding what had been spent from each task thus far.

***Deliverable Summary*:** One of one General Reports and one of one Landowner Reports have been published.

***Description of Task*:** DU staff will put out to bid, contract, manage construction and complete work on at least two irrigated meadows projects within the North Platte Basin of Jackson County, CO. This will include the Jennie Ditch Rehabilitation on Little Grizzly Creek Ranch and the Sherman Ditch/Hamilton Ditch Rehabilitation on the Sherman Ranch. The intent of this task is to secure irrigation on at least 500 acres of irrigated meadows. Rehabilitation will proceed through the installation of fish-friendly, beaver-proof headgates, the placement of new diversion structures, and the re-building of ditch, culvert, and pipeline structures such that water losses in conveyance are minimized and irrigated lands receive as much water as allowed.

***Progress Report on Task*:** Construction on the Jennie Ditch Rehabilitation project has been postponed to 2023. DU is worked with Colorado Open Lands and the U.S. Forest Service to receive a special use permit for construction of ditch improvements on the Routt National Forest (where the diversion for the Jennie Ditch is located). A site showing with contractors was completed in November and bid was awarded. Now that the special use permit has been received, we anticipate construction this summer when the contractor is able to get to it.

Construction on the Sherman Ditch and Hamilton Ditch projects was completed in summer of 2020

***Financial Summary*:** $50,000.00 WSRF budgeted. $48,099.32 expended. Note that this differs from the last report as we needed to reconcile our records regarding what had been spent from each task thus far.

***Deliverable Summary*:** 375 of the 500 acres of irrigated meadow restoration promised has been delivered. The remaining acres will be delivered prior to the deadline via the Jennie Ditch project. Additional work to complete the final construction project within this proposal will be completed with secured match funding and potentially by moving funding from other tasks in this award to this task.

***Description of Task*:** DU, CSU and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post-construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings. CSU staff will also produce at least one outreach article or other item suitable for media summarizing project findings in light of the impact irrigated meadows in the North Platte Basin have on populations of waterfowl.

Progress Report on Task: CSU and CPW continued their assessment work in the 2022 field season and are performing data management and analysis.

Financial Summary: $92,000 WSRF budgeted, $22,946.33 expended to date. Funding from this task may be moved to task 5 if necessary to assist with the completion of the final construction project. Note that this differs from the last report as we needed to reconcile our records regarding what had been spent from each task thus far.

***Deliverable Summary*:** Continued data analysis and writing. A dissertation seminar was completed in February and can be found at the following link:

https://echo360.org/media/69468ff6-29e2-40bd-a81d-be69140d8bda/public

***Description of Task*:** DU, CSU and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post-construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings. CSU staff will produce at least two outreach articles or other item suitable for media summarizing project findings in light of the impact irrigated meadows in the North Platte Basin have on populations of waterfowl. At least one of these items will be targeted for media outlets within Jackson County. At least one other item will be targeted for general media outlets covering water and wildlife issues in the State of Colorado. DU and CSU staff will produce at least two sets of Best Management Practices to be distributed to landowners and conservation practitioners in the Basin and elsewhere in the state. These Best Management Practices will translate project assessment findings about waterfowl use and land productivity into prescriptions for management of irrigated lands similar to those included in the study.

***Progress Report on Task*:** This work is being completed in 2023 and 2024 as results of the assessment are completed.

***Financial Summary*:** $22,000 WSRF budgeted, $20,220.15 expended to date. Note that this differs from the last report as we needed to reconcile our records regarding what had been spent from each task thus far.

***Deliverable Summary*:** Continued data analysis and writing. A dissertation seminar was completed in February and can be found at the following link:

https://echo360.org/media/69468ff6-29e2-40bd-a81d-be69140d8bda/public

***Description of Task*:** Oversight of the activities for the proper allocation of grant funds, activities and reporting assuring timely delivery of grant deliverables. DU staff will manage financial planning for each of the tasks presented in the workplan, will manage project timelines, produce reports and correspondence to partners and CWCB staff.

Progress Report on Task: DU staff have developed project financial plan software and developed new project report templates to standardize and make more efficient the reporting process.

Financial Summary: $7,600 WSRF budgeted, $6,614.00 expended. Note that this differs from the last report as we needed to reconcile our records regarding what had been spent from each task thus far.

***Deliverable Summary*:** Continued administration of all projects within this proposal and reporting for this project.

9TH SEMI-ANNUAL REPORT FOR CONTRACT:

CTGG1 2019-3416
WSRF – North Park Irrigated Meadows Conservation Program Phase 2

for the project period through December 13, 2023

IN COOPERATION WITH: THE COLORADO WATER CONSERVATION BOARD, COLORADO PARKS & WILDLIFE AND COLORADO STATE UNIVERSITY

Summary

Ducks Unlimited, Inc. provides this 9th semi-annual report to the Colorado Water Conservation Board to demonstrate progress on the second phase of the North Park Irrigated Meadows Conservation Program. The contract was fully executed on June 14th, 2019 and identifies eight tasks to be completed by Ducks Unlimited, Inc. and our partners by June 30th, 2024. This report covers the period from June 14th, 2023 through December 13, 2023.

The design phase on 4 of 4 irrigated meadow projects in North Park. We have completed construction on the Sherman Creek Ranch project, the Newport Ditch Rehabilitation project, and the Legal Tender Ditch project, and the Jennie Ditch project was completed just after this report period, and the results have been added to this report. Prior to this report, we requested a budget amendment that was approved to task 5 to complete the construction of the Jennie Ditch project as in addition to the small remaining balance of the grant, we have used and will use match to complete all other remaining items in this project and to cover any overages.

Regarding the assessment portion of this project, our partners, while all deliverables have been accomplished, Colorado Parks & Wildlife and Colorado State University and our staff, continue analyzing data of waterfowl use of irrigated meadows in North Park. Three field seasons were completed. One PhD dissertation defense was completed utilizing the results of this project.

To date, with the attached invoice, DU has expended $447,834.15 of the $450,600 allocated to the program by the WSRF. This represents ninety-nine percent (99%) of the award. We and our partners have, in the same period of time, expended at least $840k, which is well over the proposed amount of $474,000 in match performing both construction and assessment work, and as mentioned earlier, plan to continue to wrap up all other tasks outlined in this proposal with a combination of award and match funds. We have conserved 3,084 acres of North Platte Basin irrigated lands, which is well over the 1,000 acres proposed.

We look forward to finishing this project by the deadline next year under this contract while assessing and meeting the water needs of the North Platte Basin and the State of Colorado. Please let us know if you have any questions, comments or concerns.

Sincerely,

John Denton

Colorado Manager of Conservation Programs
Ducks Unlimited, Inc.

Task 1 – Project Feasibility, Design and Permitting

***Description of Task*:** At least four irrigation and/or storage projects that flood irrigated pasture or hayland located within the North Platte Basin of Jackson County, Colorado will be identified for rehabilitation and/or expansion. Projects will be designed by Ducks Unlimited bioengineering teams such that the extent and quality of irrigated lands will be maintained an/or expanded (as allowed under decreed water rights). This task will complete conceptual planning on these four projects, complete the development of professional plansets stamped by DU's certified engineer, and the fulfillment of all required permits.

Progress Report on Task: At the time of application to the North Platte Basin Roundtable and CWCB, DU had identified four project tracts upon which to complete irrigation and storage improvements. We summarize below the progress had on each of these tracts and include a summary of our feasibility work on a substitute project:

1.) Newport Ditch Rehabilitation – All project design work and construction has been completed for this project. Construction completed as part of Task 3.

2.) Lost Creek Ditch/Dryer Reservoir Rehabilitation – Approved project cancellation reported in semi-annual report 1.

3.) Jennie Ditch Rehabilitation – Design work has been completed on the Jennie Ditch Rehabilitation project on Little Grizzly Creek Ranch. We recently received our special use permit from the U.S. Forest Service. The construction plan set is complete, and the project is currently under construction. We anticipate delivery well ahead of the deadline of this award.

4.) Sherman Ditch/Hamilton Ditch Rehabilitation – All project feasibility and design work has been completed for this project. Construction completed as part of Task 5.

5.) Legal Tender Ditch Rehabilitation – All project design work and construction has been completed for this project. Project completed as part of Task 3.

Financial Summary: $52,000.00 WSRF budgeted, $52,000.00 expended to date.

***Deliverable Summary*:** All four conceptual plans completed, four of four stamped plansets completed, three of four projects' construction completed.

***Description of Task*:** DU, Colorado State University, and Colorado Parks & Wildlife will perform avian surveys and, on identified project tracts with landowner permission, vegetation surveys prior to project construction to document baseline habitat condition and bird use of those areas. These surveys allow us to estimate the impact of project development on irrigated meadows and explore how waterfowl use of these habitats change within and between season and with project improvements. Baseline data will greatly increase the power of any conclusion develop under our project assessments.

Progress Report on Task: Pre-project data was collected for the Jennie Ditch project that was constructed just after the report date.

Financial Summary: $85,000.00 WSRF budgeted, $85,000 expended to date.

***Deliverable Summary*:** The one required report has been written.

***Description of Task*:** DU staff will put out to bid, contract, manage construction and complete work on at least two irrigated meadows projects within the North Platte Basin of Jackson County, CO. This will include the Newport Ditch Rehabilitation on Arapaho NWR and the Lost Creek Ditch/Dryer Reservoir Rehabilitation on the Parkview Ranch. The intent of this task is to secure irrigation on at least 500 acres of irrigated meadows and maintain storage of water in at least 30 acres of reservoir that also serves as breeding waterfowl habitat. Rehabilitation will proceed through the installation of fish-friendly, beaver-proof headgates, the placement of new diversion structures, and the re-building of ditch, culvert, and pipeline structures such that water losses in conveyance are minimized and irrigated lands receive as much water as allowed.

Progress Report on Task: The Lost Creek Ditch/Dryer Reservoir Rehabilitation project was cancelled; please refer to Semi-annual Report 1 for more information. That project was substituted with the Legal Tender Ditch Rehabilitation project, which is now complete.

The **Newport Ditch Rehabilitation** project is complete.

The **Legal Tender Ditch Rehabilitation** project was completed in June 2022.

Financial Summary: $50,416.39 WSRF now budgeted, $50,416.38 expended.

***Deliverable Summary*:** 1,968 acres of irrigated upland, wet meadow, and wetlands were conserved under the Newport Ditch Rehabilitation project and the Legal Tender Ditch Rehabilitation project.

***Description of Task*:** DU, CSU, and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings.

Progress Report on Task: CSU and CPW completed field work.

Financial Summary: $35,643.00 WSRF now budgeted, $35,643.00 expended to date.

***Deliverable Summary*:** One of one General Reports and one of one Landowner Reports have been published.

***Description of Task*:** DU staff will put out to bid, contract, manage construction and complete work on at least two irrigated meadows projects within the North Platte Basin of Jackson County, CO. This will include the Jennie Ditch Rehabilitation on Little Grizzly Creek Ranch and the Sherman Ditch/Hamilton Ditch Rehabilitation on the Sherman Ranch. The intent of this task is to secure irrigation on at least 500 acres of irrigated meadows. Rehabilitation will proceed through the installation of fish-friendly, beaver-proof headgates, the placement of new diversion structures, and the re-building of ditch, culvert, and pipeline structures such that water losses in conveyance are minimized and irrigated lands receive as much water as allowed.

Progress Report on Task: DU worked with Colorado Open Lands and the U.S. Forest Service to receive a special use permit for construction of ditch improvements on the Routt National Forest (where the diversion for the Jennie Ditch is located). A site showing with contractors was completed in November and bid was awarded. The construction on the Jennie Ditch Rehabilitation project was completed just after the reporting period in December.

Construction on the Sherman Ditch and Hamilton Ditch projects was completed in summer of 2020

Financial Summary: $174,994.29 WSRF now budgeted. $174,994.29 expended.

***Deliverable Summary*:** 1,116 acres, well over the proposed 500 acres of irrigated meadow restoration promise, has been delivered.

***Description of Task*:** DU, CSU and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post-construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings. CSU staff will also produce at least one outreach article or other item suitable for media summarizing project findings in light of the impact irrigated meadows in the North Platte Basin have on populations of waterfowl.

Progress Report on Task: CSU and CPW continued their assessment work in the 2022 field season and are performing data management and analysis.

Financial Summary: $22,946.33 WSRF now budgeted, $22,946.33 expended to date.

***Deliverable Summary*:** Continued data analysis and writing. A dissertation seminar was completed in February 2023.

***Description of Task*:** DU, CSU and CPW staff will continue avian and vegetation surveys described in Task 2 on project sites, post-construction. After this survey work is complete, CSU staff will provide landowners and the North Platte Basin Roundtable with a summary of their findings. CSU staff will produce at least two outreach articles or other item suitable for media summarizing project findings in light of the impact irrigated meadows in the North Platte Basin have on populations of waterfowl. At least one of these items will be targeted for media outlets within Jackson County. At least one other item will be targeted for general media outlets covering water and wildlife issues in the State of Colorado. DU and CSU staff will produce at least two sets of Best Management Practices to be distributed to landowners and conservation practitioners in the Basin and elsewhere in the state. These Best Management Practices will translate project assessment findings about waterfowl use and land productivity into prescriptions for management of irrigated lands similar to those included in the study.

***Progress Report on Task*:** This work is being completed in 2023 and 2024 as results of the assessment are completed.

***Financial Summary*:** $22,000 WSRF budgeted, $20,220.15 expended to date.

***Deliverable Summary*:** Continued data analysis and writing are occurring even though deliverables have been met.

***Description of Task*:** Oversight of the activities for the proper allocation of grant funds, activities and reporting assuring timely delivery of grant deliverables. DU staff will manage financial planning for each of the tasks presented in the workplan, will manage project timelines, produce reports and correspondence to partners and CWCB staff.

Progress Report on Task: DU staff have developed project financial plan software and developed new project report templates to standardize and make more efficient the reporting process.

Financial Summary: $7,600 WSRF budgeted, $6,614.00 expended. Note that this differs from the last report as we needed to reconcile our records regarding what had been spent from each task thus far.

***Deliverable Summary*:** Continued administration of all projects within this proposal and reporting for this project until the grant is closed.