

Appendix B

Coordination

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Coordination Appendix B

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Value Engineering Study

Function Analysis Workshop

29-31 March 2011

Clarence Cannon

National Wildlife Refuge

Habitat Rehabilitation and Enhancement Project

Upper Mississippi River, River Miles 263.5-260.6



**US Army Corps
of Engineers**

St. Louis District

Clarence Cannon NWR Visitor Center
Annada, Missouri

Final Report – 27 May 2011

Executive Summary

Value Engineering Function Analysis-Derived Project Objectives

The US Army Corps of Engineers, St. Louis District, sponsored this Value Engineering (VE) Function Analysis workshop in conjunction with the U.S. Fish and Wildlife Service. The workshop was held at the Clarence Cannon National Wildlife Refuge (NWR) Visitor Center in Annada, Missouri from 29-31 March 2011.

The VE study team was randomly divided into three workgroups so as to obtain a maximum breadth and diversity of ideas within a relatively short period of time. Each work group focused on the delineation of project objectives and, most importantly, specific measures to optimize the attainment of those objectives. Initially, four focus areas were offered to the entire VE study team by the workshop facilitator as a suggested starting point for their deliberations:

1. Vegetative/Woody Terrestrial
2. Aquatic Habitats
3. Open River Connectivity (Levee Setback)
4. Water Level Management

These focus areas then were modified to some extent by each of the work groups during their subsequent brainstorming activities.

Each work group developed desired future conditions/goals, measures to optimize and accomplish the objectives, additional data needs, and how success would be measured, etc. A listing of the objectives that were developed by the work groups is shown on page 8 of this report. For a detailed description of the proposed measures to optimize the objectives as developed by each work group, please refer to the work group write-ups beginning on page 9 of this report.

Within each objective listing for a particular work group it is imperative that the reader carefully examine the “Description of Objective” and “Measures to Accomplish and Optimize the Objective” categories for the detailed information that was developed during this brief workshop period.

It is further recommended that the reader (specifically, the Corps of Engineers Project Delivery Team and applicable stakeholders) then compare this information with that of the other two work groups for similarities and differences in idea generation so as to arrive at a set of unified optimized objectives and measures/actions for further development.

Cover Photograph: Aerial view of Clarence Cannon National Wildlife Refuge looking northwest (note Moist Soil Unit 7 in the upper left and the spillway in the lower right of photograph).

Clarence Cannon Site Visit

April 19, 2011

Attendees: Jason Wilson (USFWS), Candy Chambers (USFWS), Donovan Henry (USACE), Amanda Oliver (USACE), and Kat McCain (USACE)

Purpose: To discuss findings from VE Workshop and to discuss possible alternatives/features to meet objectives of the project (improve habitat).

Meeting Notes:

- **VE Study** - Donovan provided an update of the VE study status.
- **Proposed New Habitat** - Refuge staff provided a map showing proposed acreages of semi permanent water, seasonally flooded areas, wet prairie and forest. The map also displayed old meanders which staff desired to restore. Interestingly, these meanders seemed to flow in unexpected directions. This is what they would like to see at CCNWR.
- **Existing Spillway/Flood Frequency** - Based on spillway height (+31.5 LD 24 gage) and future flood projections, there is a good possibility that the spillway will be overtopped this year. If the spillway is overtopped, this will be the fourth year in a row that the spillway has overtopped and CCNWR has flooded.
- **Proposed Setback** - One of the major problems at the refuge is lack of connectivity. Jason would like to see a setback which would re-connect the water bodies in the unmanaged unit to the river. Original setback discussions included degrading the whole southeastern corner of the levee. To avoid impacts to the landowners on the south bank of Bryants Creek, only parts of the levee may be degraded. There was a brief discussion about the cultural sites which are located along the proposed setback location. COE will discuss with their cultural section to determine if the setback could affect these sites.
- **Existing Water Management Plan** – staff provided a first draft of water management plan. Jason indicated that in a perfect year the refuge would flood as a whole with water moving into the low elevation areas. As water levels slowly rise, water would feather out (begin to cover new ground following the contours of the site).
- **Existing Pump Station** - Water is pumped on and off CCNWR at different times throughout the year based on management/maintenance needs. In 2010, pumped all year. Jason provided info on gallons of ag diesel used per year: FY 08 - 2,455, FY 09 - 2,015, and FY 10 - 5,207. The high diesel usage in FY 10 was caused by pumping out throughout the summer of 2010. Pumping was used to remove seep water from the interior of the site caused by high river levels.
- **Existing Mississippi Water Control Structure** - This structure was installed to drain the area after an overtopping flood. It cannot drain the entire area (Crane Pond, Raybourn Slough) because there are too many deep pockets of water. However, at one time Crane Pond was dried out and farmed.
- **Future Desired Water Management** - The future desired time for flooding and dewatering would be 4 - 6 week to drain or flood the entire refuge. Dewatering after flood is more important. Would love to be able to flood entire refuge at once... lower areas would naturally flood first and then “feather” out.

Main Theme for Project = **CONNECTIVITY of flow and of habitats**

Potential Features

- 1) Setback Options
 - a. No Setback

- b. Setback to high ridge on western side of the Riverside Unit This setback would utilize the existing road when feasible. The setback could be used for the Goose Pasture Hunting Club road easement. Moving the road easement would allow more units to be connected in the interior. The high ground in 6A and F4 near the north end of the site is a good location for the setback to go through.
 - c. Partial setback (just the northern section)
 - 2) Reconnect old scours/backwaters in SE corner
 - 3) Degrade SE corner of Mississippi River berm to allow back flooding and flow into that area
 - a. Cannot impact cabins to the south
 - b. Cannot cause additional sediment in Bryant's Creek
 - 4) Connecting Units
 - 5) Dredge Meanders
 - 6) Pump Station Location possibilities –
 - a. Ramsey Creek at north end of GTR7: A pump station at the top of Ramsey Creek would reconnect flow. However, the creek goes dry. Placing a well at this location would not provide enough water and well water has a different chemical composition from river water.
 - b. *Along road between Buttonbush and Heron Pond* - Depending on setback location this pump station would be located at the river or on the setback. If on the setback, water could flow through the old sloughs and Crane Pond to the pump station. It would then move through an interior channel to a two way diversion structure that can direct flow into one of the two meanders proposed for restoration. The upper meander would connect to GTR. At the south end of the GTR, a new water control structure would allow pump station water to move into the units to the west of the GTR. There is concern that this would cause sediment to drop out in Crane Pond and the sloughs. Alternatively large pipes could connect the pump station to the river or the site interior. At this location along the river, there is an old concrete culvert and homesteads.
 - c. *At northeast corner* Ken Dalrymple suggested that this area of the Mississippi may be shallow with a lot of sediment deposition. More research needs to be done to determine if this is feasible
 - d. *Along Bryants Creek*: This location would be able to tie into existing conveyance channels.

MEMORANDUM FOR RECORD

SUBJECT: Potential measures deemed infeasible for Upper Mississippi River System Environmental Management Program, Clarence Cannon National Wildlife Refuge Habitat Rehabilitation and Enhancement Project Definite Project Report, Pool 25, Mississippi River

1. Reference. This Memorandum For Record (MFR) is prepared per Project Delivery Team (PDT) request made in person on May 9, 2011. The project manager, environmental planners, and appropriate supervisor requested this MFR to summarize the Clarence Cannon National Wildlife Refuge Habitat Rehabilitation and Enhancement Project potential project measures that were not included in the Definite Project Report or carried forward following the Value Engineering (VE) Workshop held March 29-31, 2011.

2. Numerous measures were proposed during the VE Workshop. However after further examination, some measures were deemed infeasible and were not moved forward into the feasibility study. However, if at a later time these measures want to be re-evaluated the project delivery team may do so. The measures and reasons for exclusion are documented below.

a. *Management units divided following natural topography /Realign road to follow contours:* This measure was infeasible because currently available elevation data is not precise enough to determine topographic variation. High resolution elevation data acquired by the Scientific Assessment and Strategy Team in 1995 produces 2 foot contours which are too low of resolution to adequately determine location of new berms/road based on higher elevations. SAST 1995 elevation data indicates that the elevation at CCNWR (excluding water bodies and berms) ranges from 438.4 - 444.5. Historic aerial photography indicates channels crossing the site but this is not reflected in the topography. VE attendees felt that six inch contours would be needed to accurately assess the elevation of the area. If detailed topography becomes available during the planning phase this measure may be revisited.

b. *Wells:* The current well is used to supplement pump water and is run 20 - 25 days per year. A well could be added at the north end of GTR 7 which feeds water to the entire area. This measure was considered infeasible based on length of time it would take the well to fill the management units, lack of sponsor support, and unknown quality of well water.

c. *Artificial connectivity between management units via additional screw gates:* This measure was infeasible because the primary purpose of this measure was to ease operation and maintenance, and not to improve habitat. The units themselves would remain mostly disconnected (i.e., no berm removals). Therefore, habitat connectivity would minimally improve. Approximately twice the number of structures currently at the refuge would be needed to connect all units to each other, which would greatly increase maintenance in the future. This measure does not mean screw gates cannot be used in the recommended plan, it

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SUBJECT: Potential measures deemed infeasible for Upper Mississippi River System Environmental Management Program, Clarence Cannon National Wildlife Refuge Habitat Rehabilitation and Enhancement Project Definite Project Report, Pool 25, Mississippi River

simply excludes an alternative that connects all interior management units together solely by screw gates.

d. *Shelf/Bench berm along exterior berm*: This measure was infeasible because the primary purpose of this measure was to ease maintenance/repair to the berm due to wave wash and erosion. The measure did not enhance habitat. It decreased the likelihood of slides and erosion; therefore, it was omitted from further study.

e. *New access roads*: Access roads could be constructed to allow site staff to easily reach each ditch and moist soil management unit. Additionally new access roads could be constructed along the proposed interior channels. The main purpose of this measure was to improve access for operation and maintenance. This feature is not compatible with the project objective of improving habitat connectivity. Building new access roads would divide the habitat even further; therefore this measure was omitted from further study. This measure does not include constructing/moving the mandatory access road to the Goose Pasture Hunting Club.

f. *Fill in low areas*: This measure was proposed to reduce reed canary grass invasion, reduce wave wash on adjacent berms, reduce permanent water, and increase acreage of moist soil plants for migratory birds. However, low areas provide habitat diversity. Low areas were historically present within the floodplain and provide scarce habitat. With the establishment of hunting clubs, conservation areas and refuges, moist soil habitat is becoming more prevalent along the Mississippi River floodplain. Since this measure reduces the prevalence of a rare historic habitat, it was eliminated.

g. *Perforated pipe*: This measure was proposed as a means to provide permanent flow into areas protected by the exterior berm. However, this pipe has never been built or tested on the Mississippi River. The proposed pipe would be buried by rock in the Mississippi River main channel. Due to the uncertainty and risk of: high maintenance cost, impacts to navigation, installation feasibility, and operation feasibility, in addition to lack of sponsor support, this measure was not considered for further analysis.

h. *Removal of all berms*: Removing all berms in the project area would connect the area to the Mississippi River. However, this would lead to loss of native habitat. The river has been modified for navigation and flood control altering the hydrograph while native flora and fauna are adapted to the historic hydrograph. Maintaining some of the existing berms allows refuge staff to mimic the historic hydrograph in the site's interior. In addition, berm removal would increase flood frequency and thus increase the likelihood of additional exotic species invasion. Due to these reasons, removal of all berms was not considered further.

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SUBJECT: Potential measures deemed infeasible for Upper Mississippi River System Environmental Management Program, Clarence Cannon National Wildlife Refuge Habitat Rehabilitation and Enhancement Project Definite Project Report, Pool 25, Mississippi River

i. *Large-scale removal of willow and cottonwoods:* Willow and cottonwood are prevalent throughout the Mississippi River floodplain while wet herbaceous meadow is less prevalent. This measure included large-scale removal using herbicides to remove willow and cottonwoods to allow for wet herbaceous meadow plantings; however, the impacts of large-scale herbicide application may be detrimental and the unknown continuing encroachment of willows and cottonwoods may cause additional maintenance problems in the future. Willow and cottonwoods are wetland species that do provide habitat. Based on this and professional judgment large-scale removal of trees will not be implemented as a project measure. This does not exclude small-scale removal of willow and cottonwood in the recommended plan if needed to create large continuous patches of wet herbaceous meadow.

j. *West channel meander restoration:* This measure consisted of restoring a historic channel within management unit 5 present in aerial photography from the 1940s and connecting it to GTR7. However, after further examination of historic photography this channel did not connect to GTR7. The channel appeared to originate in the middle of MSU 5 and flow towards the exterior berm. Creating this channel would not reconnect aquatic habitats nor improve drainage or water delivery to this unit. Therefore this measure was omitted.

k. *Northern pump station:* This measure consisted of constructing a new pump station along the existing exterior berm in the northeast corner of the refuge coupled with excavating a new pump station channel. Bathymetric data was available for 2007 for Slim Chute adjacent to the pump station. The PDT hydraulic engineer indicated that the river surface minimum elevation in this area was approximately 434. The bathymetric data indicated that the river bed adjacent to the pump station was 431.5 sloping to 426.5. Additionally, there were no historic meanders to use as the pump station channel. A channel could be created to GTR7 or to the channel running along Crane Pond. Either channel would require more excavation than the proposed Heron Pond Pump Station location. The north location was no better than the Heron Pond location which has adequate depth and a historic channel; therefore, this measure was not considered further.

l. *Connect units through water control structures only:* This measure consists of connecting management units through water control structures only while berms remain intact. This would provide hydraulic connectivity, but habitat fragmentation would still exist. This measure was eliminated from further analysis due to the high cost of OMRR&R.

m. *Half Setback:* The desired function would be to provide permanent floodplain connection to the northern section of the refuge along the river, while a flow through the southern end could be created by using the existing infrastructure and placement of new water control structures. The uncertainty with this measure was the risk of sedimentation in the setback area which would negatively impact aquatic habitat. A lower end exterior berm degrade is usually ideal, but based on the location of the thalweg the lower end degrade and the setback berm would be susceptible to erosion; therefore the

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exterior berm degrade would have to occur on the upper end of the area which would lead to headwaters filling in the area rather than back flooding. Another issue is trying to create flow through the southern unmanaged area. A new ditch or restoration of a historic meander would need to be dug to connect the existing large screw gate to new water control structures along the southern boundary; however there is high risk and uncertainty that digging these channels could cross a sand lens leading to increased seepage problems and could negatively impact the existing wetland habitat.

3. The St. Louis District point of contact is Mr. Donovan Henry, (314) 331-8497 or e-mail, donovan.henry@usace.army.mil.

Clarence Cannon Site Visit
May 31, 2011

Attendees: Jason Wilson (USFWS), Amanda Oliver (USACE), Kat McCain (USACE), Kip Runyon (USACE), and Mick Hanan (USFWS)

Purpose:

- Discuss berm locations throughout CCNWR
- Take pictures of berms proposed for removal to better characterize existing conditions,
- Determine current flooding conditions and when the site may be dry for LiDAR acquisition and cultural survey,
- Determine depth in Ramsey Creek to determine pump station feasibility, and
- Determine fisheries composition within permanent water bodies (Crane Pond and Raybourn Slough).

Due Outs:

1. Scan CCNWR annual reports and provide original and electronic copies back to CCNWR staff.
2. Continue to coordinate with CCNWR staff to determine when water levels are low enough for cultural and elevation surveys.

Meeting Notes:

We met at the CCNWR office. All attendees toured the site to observe and photograph conditions to provide information for the elevation survey, verify that the USACE berm map was correct, and photograph berms proposed for removal.

Observations

- MSU 7 was flooded 18 - 24" higher than normal for this time of year.
- The road leading to the observation platform was flooded.
- The southern berm which flanks the ditch between MSU 8 and Goose Pasture continues along Crane Pond all the way down to Raybourn Slough. Its exact location is unknown.
- There is no berm between F3 and MSU8
- There is no berm between WM1 and F2
- There is a double berm between GTR9 and Supply Pond.
- There is a double berm between 25 and 14.
- There is no berm on the east side of Rabbit Ears.
- There is a double berm on either side of Crane Pond.
- There are forested spoil piles on either side of the ditch which runs through the middle of Big Pond.
- There is high ground around the display pond possibly from the excavation to create the pond.
- Mick and Jason felt that seep water comes in through Crane Pond.
- At the Heron Pond Pump Station location there is a culvert going through the levee. On the riverside, there is an old homestead and a borrow pit with a culvert leading out of it.
- The plan, prior to the current river rise, was to have all of CCNWR dry by the end of June. With the current river rise, may be dry by mid-July if water goes down. Otherwise will likely use Crisafulli Pump to dry the area unit by unit.

In the afternoon, we attempt to obtain depth information for Ramsey Creek. The road leading to the Hamburg boat ramp was flooded. No other boat ramp was near enough. We returned to CCNWR and launched the boat into the ditch between F4 and MSU 10 at the road. Growing in each berm flanking the ditch were pin oak, abundant persimmon (including saplings), silver maple, and pecan. The ditch, pond and slough were lined with button bush, and had abundant duck weed. We drove the boat all the way to the water control structure in the Mississippi River berm, the lower end of Raybourn Slough. We collected water quality data and sampled the fish community using daytime electrofishing in the pool around the water control structure. We also collected water quality and sampled the fish community in Crane Pond. This information will be used for the habitat benefits analysis and project monitoring.

Clarence Cannon
Feasibility Scoping Meeting

June 30, 2011

Attendees

Dieckmann, Ronald J MVS
Duncan, Donald L MVS
Henry, Donovan MVS
Johnson, Brian L MVS
Kniep, Michelle R MVS
Markert, Brian J MVS
McCain, Kathryn MVS
Oliver, Amanda J MVS
Wood, Cynthia L MVS

Introduction – Kat McCain

- Kathryn McCain reviewed the attached presentation.



CCNWR_FSM_Presentation.pptx

- Kat has incorporated comments into the document that have been received. Additional comments from this FSM will also be incorporated.
- Constraints will be refined further such as cultural resources. Cultural resources person cannot go there because of current flooding.
- Kat distributed map. Added water control structures on the southeast end. Zone 5 area berm in red is the one that you have to do if you do southern restoration channel in purple.

Reviewed comments on attached reconciliation document.



Reconciliation Document.xlsx

- Michelle Kniep brought up a comment on the very first Objective. She thought we could divide into two separate objectives that is increase acreage of native wetland plant communities and a second objective to increase connectivity.
- Michelle Kniep – if they are measurable it might make sense to split them. If they are not separable or measurable then they don't need to be split. Kat would like them to stay together but also sees benefits from just increasing acreage or connectivity.
- Brian Markert – you are trying to increase the ability to drain water but don't put an elevation.
- Kat – the sponsor said ideally they would want to be able to achieve their target level within 30 days. Need that number for engineers and size of structure.
- X's throughout document will be filled in when we get the data.
- Suggestions to maps will be incorporated and word clarifications made to document.
- Circles for Eagles Nests maps are for plans and specs and will be removed.

- Don Duncan – his comment 1 for page 29. The way this was reworded still implies that the dam increased flood frequency which it doesn't. They have no flooding impact. Kat went to document and changed on page 29 of the text.3.1 – Problem Identification.
- Brian Market had comment on statement "refuge is flooded annually to provide the habitat and resting areas." A more accurate statement would be "water levels are manipulated to provide" because it is not always flooded. Use "water level management" instead of "flooded." "Water levels at the refuge are managed." Kat changed wording in text in Section 3.1 paragraph 2.
- Brian Market – in the next paragraph where you say "fragmented into numerous management units capable of manual alteration." It is really kind of limited. They struggle to manage those water levels. Need to add adjective to help this argument.
- Kat – Brian did bring up "wet herbaceous meadows." Page 30 also in 3.1. We were trying to argue for WHM restoration. MVD usually doesn't like this. What verbiage should we use? Should we use "increase acreage of native plant species." Brian Markert said this term doesn't work anymore. Brian Johnson unsure where Rock Island is with this. He is not uncomfortable with the fact that they call out this one in the flood plain and was this habitat. As part of your benefits you have to do based on whatever type of habitat you plan to restore than what they might have the ability to restore.
- Kat changed text in document.
- Page 32 – the table on "Problems, Opportunities, Goals and Objectives." These are more vague categories. Michelle said in her mind you haven't talked about potential measures yet. She would rather see here are your goals and objectives; here are the measures that might address those, and then a nice table to summarize. This is preference. Kat can move it down closer to Measures.
- Kat – under the Channel Restoration Functional Group on Page 36 we added the Rabourn Slough which is an actual existing slough on the map in "y" shape along the river. This had been discussed as deepening, so I added in as one of the possible areas we could restore.
- Brian asked – so the existing water bodies are "Big Pond". They don't want anything done there. Then they have Crane Pond which is on the map to the right of Zone 2. If we do the pump station here the Crane Pond ditch can be used as a delivery channel. Currently it is fairly shallow. We didn't call out deepening it so far. Even in shallow conditions it can move water through it. Its function is moving water. It is the furthest isolated from the river. It doesn't get as flooded currently.
- Don Duncan – the point he was making about the pump station not being compatible with the set back. I was confused. You have the pump station here, but if you do the set back the levee would be moved. Would this levee be removed? So pump station would still be able to function and get water through this levee. Kat – yes.
- Ron Dieckmann – you would have to have gates on there and be able to have that delivery ditch confine the water. In a situation when the river was low, you would get the water into the system. Obviously, when the river is high, you don't need to pump anyway so you can open those gates and let the river back in.
- Kat – with pump station up here, the unknown is there is currently a ditch outside the refuge boundary. We haven't been able to get up there to see if it has adequate depth to use as a delivery channel for the refuge. Also maintenance and dealing with real estate since it is outside the refuge boundary. Brian – this may be a good one to sacrifice.
- Kat – Don had a suggestion of the current pump station was on the south end. Could we make this have greater capacity so it could function as needed? Currently it can pump water in but the drainage ditches get maxed out. Don – so I don't think you need to increase the capacity of the pump station, but you need more ditches. Kat – we don't have any of the data. I don't see why we couldn't add that one in as a possible solution.
- Kat asked if zones should be lumped together.
- Michelle Kniep – she talked about comments she had about things she didn't see such as where the analysis is going, how you were going to do the benefits analysis, and did not get that it was going to be done incrementally. What is the best answer for Zone 1, Zone 2, etc. Ordinarily after you show measures, there is a suite of alternatives we are looking at, and here is how the rest of the analysis

will go. We are going to use these models, analyze the benefits in these ways, etc. That is information she didn't see.

- Don – if you do restore all the purple channels on the map does that make the zones interconnected?
- Kat – the zones only refer to the berm replacement. Amanda – so you will need more water control structures.
- Donovan – this is just a little too incremental. Do we need that many measures? Can we just say berms in the inside the exterior, berms outside the exterior.
- Don – probably where the matrix is coming from, when you are running the ICA and you do all these combinations, it is good to know what can and can't work together.
- Kat – you can do all the berm removals and not do any of the channel restorations and you would still get benefits. A lot of these are independent things. We could have a lot of alternatives that could be developed from this list of measures. Almost any combination is compatible.
- Don Duncan – if you have broken down into zones, you could identify the benefits from each piece. Won't the ICA look at all those combinations? Michelle – you do have to tell it which ones are combinable and which ones are not.
- Amanda – the attempt at doing that was the letters. Everything with the same letter is not combinable such as the Fs, but then the Fs are combinable with everything else. If you try to do separable benefits for each one of those measures, it is too hard. That was fine with MVD.
- Michelle – I understand the challenge of combinability. Still unclear as to how you are going to do an analysis by zone. Some of these measures aren't in each zone. Kat - The zones are arbitrary things I used just to describe which berms are removed. The only thing it pertains to is the berm removals. So instead of having into 5 categories for Zone 1 should be together because it is on one side of the drainage ditch. But should we lump together the others?
- Brian – looks like you have determined which berms to potentially remove. How did you determine that. Kat – that was based on a rough elevation that we have and the desire from the sponsor. All this area was designed for farming, and now they are trying to restore it. A lot of the berms are already partially degraded because they haven't maintained them.
- Don Duncan – are we getting at to try and keep the berms along the water distribution system. Brian – right, they did some pre-screening already that went into the selection of the berms. It sounds like it was logical. We couldn't look at all the berms, so we started by looking at hydrology, then habitats separated only by a berm and had very similar features otherwise as logical ones to explore further. To keep this from mushroom to an unusable level of information, we did some early assumptions and screened some out as potential berms that needed to be evaluated for removal.
- Don – instead of calling them zones, would it be better to call them berm group A, berm group B. Zones implies you are splitting the whole project. Michelle does not agree with the word zones. Kat will change this.
- Michelle – does zone 4 only have one berm in it. Yes. Brian – you are not going to get a lot of benefit from taking away dirt from zone 4. But if you lump it with zone 3, you may get a lot more efficiencies that provide for better habitat than just the one.
- Kat – I would be happy with having Zone 1, Zone 2, and combine Zone 3, 4, and 5. Brian – that doesn't eliminate your ability to do anything else.
- Don - but then if it does not make sense to remove all of berm 3 – it is a lot of cost with a little benefit. But then you would have had enough to remove 4, how do you keep 4? We need to figure out the right combination to evaluate.
- Michelle – don't like calling them zones because you are segmenting in a weird way. I agree that lumping into lesser zones seems good.
- Wouldn't FWOP project have a lot of O&M that would be reduced with project as an additional benefit by reducing structures?

- Michelle – you have to have a really good FWOP projection and quantify the costs. Then for each measure, you are going to have to lay out the savings to those costs. That could be really difficult. You may choose not to do it unless you need it for some reason. Amanda – that is a good point. Basically you are adding O&M costs by putting in the levee setback but you are saving some other costs by doing it. Michelle – the problem is going to be figuring their overall O&M costs and parcing them out. Donovan – we have already asks them some of those questions. They only thing they had was the cost was for diesel fuel. Michelle – I would only use it if you have to. Don – couldn't we use the O&M cost for an existing stop log structure? Michelle – we could figure it out roughly, but it would be painful to segregate into each berm.
- Brian – benefits are going to come from two areas, aquatic and terrestrial. A lot of terrestrial is already there but fragmented. You are not going to get a ton of benefits by removing a berm in terms of habitat going from .2 to .8. Amanda – but you will gain acreage which is where you see your habitat units coming from anyway. Your wetland habitat is 50 acres without the project and with the project when you remove that berm, it becomes 70 acres. Brian – just because of the acreage of the berm? Wrestling with how you get your values from the terrestrial side. Then I am not clear if you are even going to try and get value on the aquatic side.
- Kat – deepening Rabourn Slough and restoring those old channel meanders is where we get our aquatic benefits.
- Brian Markert – on Ted Shanks on the berm setbacks we got spring spawn habitat from setting those. Brian Johnson – that is in essence claiming benefits from the terrestrial to wet. It was terrestrial and now it is wet. Levee setback is great. You will get a lot of things aquatically that will help justify your levee setback.
- Don asked what the levee setback would entail. Kat – the exterior levee would still be there. If we do the full setback and then you would degrade part of area so it could backup. It would be a whole setback area.
- Brian – so it is not really a setback. Setback implies that you set the levee back. Really we are going to raise the interior berm to the outside berm standard and punch a bottom whole in the existing berm which will allow it to backfull as the river comes up. Ron – it is not setback in the idea that you are going to have conveyance through that area. There is not going to be water conveyance through that area unless the original one overtops. Brian – maybe you should get away from the word setback because it implies that you set the levee back. Brian Markert – but there is more flood storage. We are providing storage. We are not providing conveyance. Brian Johnson – but it isn't a setback.
- Kat explained the half setback. Don asked how the fish would get through. The half setback won't make it much further along the process.
- Don – one reason we did the full one is the area on the upper end is the one that had the good trees now. By opening it up the water would get out of there quicker. The trees wouldn't be as likely to die.
- Brian asked what is being done in another part of Crane Pond. Nothing yet. It hasn't been discussed. Kat said it isn't horrible but not very deep. Even in flood stage water bodies are only 4 to 5 feet deep.
- Brian – if we do the full setback or opening up at the bottom and we give these some good depth, is it likely to retain that depth. Don said more so than if you open the top one. Brian is trying to figure out if it is better to have these features in the project because it makes it better environmentally.
- Kat – if we add in restore Crane Pond to that functional group of channel restoration by just deepening it, I think we could get aquatic benefits for sure. Brian and it comes at no cost. We need to put best project on the ground. There is nothing there for them to maintain. Is it cost effective for us to create that habitat.
- Kat – if we did deepen Crane Pond, would having a deep water body right next to the setback be good? Brian Markert – we will put it on the list and discuss it with them.
- Don Duncan – how deep before you get to sand. Amanda – would it matter? It almost wouldn't be a bad thing if you made a sand lense there. Then you would have flow. You already have it opened at

the bottom. Kat – because their concern is seepage. Don – you might need to tie that to the setback. If it is not there you don't want the current levee failing.

- Kat – another concern is the sponsor said, even though there is not data to support it, seepage has been occurring into the refuge since 1970. They believe it is coming from Crane Pond. So if we put Crane Pond on the side of the setback that seepage into the rest of the refuge could be resolved.
- Don – do they currently have to pump that out? Kat – they can get the water that floods out but if it is already a wet year they have to continually run the pump to get it to dry conditions. In 2008, the spillway overtopped early, and they were able to get that water out but then the rest of the season it had to continuously flood for habitat management.
- Kat will take notes from today and incorporate any changes into the draft. She asked if reviewers want to see the document one more time. If not, she has FSM Certification sheet that needs to be signed.
- Brian Markert – we need to decide if we can move forward with the existing data that we have. We don't have the LIDR data.
- Brian asked about HGM. Kat said it is supposed to be getting done sometime within the next year. Charlie Hanneken is responsible for it. See if they have something that we don't.
- Reviewers only need to see the document if there is a substantial change.
- Comments need to get cleaned up and any discussion on how we tweaked the project. Michelle can reword any comments. She thinks we are missing preliminary alternatives identification, description of where the analysis is going and how it is going to be done. A normal FSM would be MVD and/or HQ checking off that we agree with your plan for proceeding.
- Kat could say in the notes that we discussed at the meeting and Michelle was satisfied with the direction we are heading and as the document moved forward it will contain that information.

/clw

**CLARENCE CANNON NATIONAL WILDLIFE REFUGE
ENVIRONMENTAL MANAGEMENT PROGRAM
HABITAT REHABILITATION AND ENHANCEMENT PROJECT
DEFINITIVE PROJECT REPORT WITH INTEGRATED ENVIRONMENTAL ASSESSMENT**

**COMPLETION STATEMENT
FOR FEASIBILITY SCOPING MEETING**

St. Louis District has completed steps 1 and 2 of the planning process (i.e., Step 1 – Identification of Problems and Opportunities; Step 2 – Inventory and Forecast Resource Conditions) and preliminary plan formulation and evaluation for the Clarence Cannon National Wildlife Refuge, Environmental Management Program, Habitat Rehabilitation and Enhancement Project. Notice is hereby given that a Feasibility Scoping Meeting review, that is appropriate to the level of risk and complexity inherent in the project, has been conducted as defined in the Review Plan. During FSM review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of a detailed description of identified problems and opportunities, statements of specific planning objectives and constraints, a detailed description of future without project conditions, a description of applicable management measures, the results of preliminary plan formulation and evaluation (i.e., screening), and the results of any preliminary coordination or public involvement. The FSM review was accomplished by a multi-disciplinary expert-level team composed of staff from the home district. All comments resulting from the FSM have been resolved.



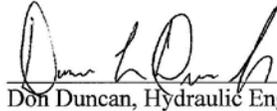
Brian Johnson, Environmental Planning

30 Jun 2011
Date



Michelle Kniep, Plan Formulation

30 Jun 11
Date



Don Duncan, Hydraulic Engineering

30 Jun 2011
Date

Clarence Cannon PDT Meeting

Clarence Cannon PDT Meeting

December 12, 2011

Attendees: Ray Kopsky (Hydrologist), John Osterhage (Civil Engineer), Tim Eagen (GIS), Donovan Henry (PM), Kat McCain (Environmental Planner)

Purpose: To discuss how to move forward in the absence of collecting new elevation data and to discuss the use of existing elevation data

Tim shared that we have SAS elevation (1998-2001) collected for Clarence Cannon NWR. And the purpose of this data originally was for use in planning. Its accuracy is 15 feet horizontal and 4 feet vertical (Class 1). Tim thinks it would be good enough for planning. John and Ray need to see the data to see if it is “good enough” since they’ll be the ones designing project features to meet the need of better water management. Using this data will have high risk and uncertainty until newer more accurate data is collected. However, we do not have the funds to acquire LiDAR (plus timing of data collection is problematic since for LiDAR you need no leaves and no snow, but during that time CCNWR floods the area for waterfowl). Tim will send SAS data to Ray and John for them to look over and see if it is “good enough” for planning. Another option will be possibly “redneck LiDAR” to get the data we need in certain areas.

We also need to survey existing structures so the engineers can determine the existing capacity. John would also like to survey existing ditches.

After meeting, Kat discussed LiDAR with Frank Nelson (Missouri Department of Conservation) and there is a potential to get LiDAR flown within the next year with the MO Grand Project.

Due Outs:

- 1) Tim will send SAS data to Ray (in ARC) and John (in microstation) by COB 16 December 2011
- 2) Kat will send project feature descriptions and most recent maps to Ray and John
- 3) Ray and John will look over the data and determine what else they’ll need by COB 30 December 2011
- 4) Once John and Ray have reviewed the data they will determine if they need a site visit (shoot for mid-to-late January)
- 5) Kat will send Redneck LiDAR info to Tim
- 6) Kat will send email to Jim Barnes to get cultural write-up from his pedestrian survey
- 7) Kat will talk with Nate Richards about habitat models



REPLY TO
ATTENTION OF:

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT CORPS OF ENGINEERS
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

ROUTING COPY

January 30, 2012

Engineering and Construction Division
Curation and Archives Analysis Branch

SUBJECT: Proposed Environmental Enhancement Project at Clarence Cannon National
Wildlife Refuge, Pike County, Missouri.

Mr. Mark Miles
Deputy State Historic Preservation Officer
Director, State Historic Preservation Office
Missouri Department of Natural Resources
P. O. Box 176
Jefferson City, Missouri 65102

Dear Mr. Miles:

The St. Louis District is partnering with the US Fish and Wildlife Service to investigate the feasibility of an environmental enhancement project at the Clarence Cannon National Wildlife Refuge in Pike County, Missouri. The primary aspect of the proposed project is a setback levee (see enclosure). We are initiating the consultation process in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended.

The refuge was previously surveyed and five prehistoric sites were found to be eligible for nomination to the National Register of Historic Places: 23PI58, 23PI59, 23PI60, 23PI61, and 23PI62. As indicated in the enclosure, the proposed setback levee and associated construction will avoid all of the sites. However, we were concerned that the mapped location of 23PI59 might be inaccurate and the proposed levee would impact the site. Therefore, we conducted a survey in September 2011, which indicated that the site boundaries were to the north of the construction area. As a result, we have determined that the proposed project will have no adverse effect on historic properties.

If you have any questions, please contact Mr. James E. Barnes at (314) 331-8830 or e-mail james.e.barnes@usace.army.mil.

Sincerely,

SIGNED MKT 30JAN2012

Michael K. Trimble, Ph.D.
Chief, Curation and Archives
Analysis Branch

Enclosure


BARNES
CEMVS-EC-Z


MALIN-BOYCE
CEMVS-EC-Z


PULLIAM
CEMVS-EC-Z


TRIMBLE
CEMVS-EC-Z



Jeremiah W. (Jay) Nixon, Governor • Sara Parker Pauley, Director

DEPARTMENT OF NATURAL RESOURCES

www.dnr.mo.gov

March 5, 2012

Michael K. Trimble, Ph.D.
Chief, Curation & Archives Analysis Branch
Corps of Engineers, St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Re: Setback Levee, Clarence Cannon National Wildlife Refuge (COE) Pike County, Missouri

Dear Mr. Trimble:

Thank you for submitting information on the above referenced project for our review pursuant to Section 106 of the National Historic Preservation Act (P.L. 89-665, as amended) and the Advisory Council on Historic Preservation's regulation 36 CFR Part 800, which requires identification and evaluation of cultural resources.

We have reviewed the preliminary report of field investigations for the setback levee, Clarence Cannon National Wildlife Refuge. We concur with your recommendation that there will be **no historic properties affected** and, therefore, we have no objection to the initiation of project activities. Please submit a final report with a pdf copy as soon as possible.

Please be advised that, should project plans change, information documenting the revisions should be submitted to this office for further review. In the event that cultural materials are encountered during project activities, all construction should be halted, and this office notified as soon as possible in order to determine the appropriate course of action.

If you have any questions, please write Judith Deel at State Historic Preservation Office, P.O. Box 176, Jefferson City, Missouri 65102 or call 573/751-7862. Please be sure to include the SHPO Log Number (008-PI-12) on all future correspondence or inquiries relating to this project.

Sincerely,

STATE HISTORIC PRESERVATION OFFICE



Mark A. Miles
Director and Deputy
State Historic Preservation Officer

MAM:jd

c James Barnes, COE/STL



March 13, 2012

James E. Barnes
Corps of Engineers, St. Louis District
CEMVS-EC-Z (Barnes)
1222 Spruce Street
St. Louis, Missouri 63103

Re: Clarence Cannon National Wildlife Refuge Setback Levee (COE) Pike County, Missouri

Dear Mr. Barnes:

Thank you for submitting information on the above referenced project for our review pursuant to Section 106 of the National Historic Preservation Act (P.L. 89-665, as amended) and the Advisory Council on Historic Preservation's regulation 36 CFR Part 800, which requires identification and evaluation of cultural resources.

We have reviewed the Section 106 Survey Memo entitled *Clarence Cannon NWR Environmental Enhancement, Pike County, Missouri*. Based on this review it is evident that a thorough and adequate cultural resources survey has been conducted of the project area. We concur with the investigator's recommendation that there will be **no historic properties affected** and, therefore, we have no objection to the initiation of project activities.

Please be advised that, should project plans change, information documenting the revisions should be submitted to this office for further review. In the event that cultural materials are encountered during project activities, all construction should be halted, and this office notified as soon as possible in order to determine the appropriate course of action.

If you have any questions, please write Judith Deel at State Historic Preservation Office, P.O. Box 176, Jefferson City, Missouri 65102 or call 573/751-7862. Please be sure to include the SHPO Log Number (**012-PI-12**) on all future correspondence or inquiries relating to this project.

Sincerely,

STATE HISTORIC PRESERVATION OFFICE



Mark A. Miles
Director and Deputy
State Historic Preservation Officer

MAM:jd



**Clarence Cannon HREP site visit
April 23, 2012**

Attendees: Kat McCain (Corps), Donovan Henry (Corps), Jason Wilson (USFWS), Candy Chambers (USFWS), Mick Hanan (USFWS)

Purpose: To discuss and obtain values to use for the existing conditions in WHAG and AHAG models

WHAG – Existing Conditions for Moist Soil Units:

- Q4. Fall winter water conditions: nearly annually predictable barring unusual flood events
- Q5. Fall-winter flood condition: assuming uncontrolled flood; existing conditions unaffected
- Q6. Water depth: most of the year for moist soil units
- Q7. Water depth: May-June is drawdown, end of June 50-75%; answered for by the end of June; Early May starts drawdowns
- Q8. Water depth: in August <25%
- Q9. Permanent water entire year: MSU has no permanent water; all semi-permanent wetlands; Supply pond will keep water some years; Big Pond sometimes has water year-round
- Q10. % emergent vegetation: MSUs are dry; category 4 (<25%)
- Q11. Woody vegetation: <10% for MSUs
- Q12. Emergent vegetation coverage: For MSUs, with management of disking will have more open areas; dependent on time of year; overall right now (May 2012) ~90%; assumed when the area refuge is flooded (75-90%)
- Q13. Cattail and bulrush: 10-25%; assuming river bulrush (nuisance) is included. MSU1 and 2, Goose Pasture, Big Pond has it; other units not so much; if we can get water off we'd get less; which is what we want
- Q15. Wetland edge: <10% because of existing levees...MSU adjacent to BLH is limited; A little bit in multiple units, but overall still low
- Q16. Water regime: By August 1st <25%; want to maintain with project; with project during flood we want to be able to get water off
- Q17. Important food plant coverage: 25-50%; with the project want higher due to RCG and other nuisance species (swamp smartweed, river bulrush, spikerush)
- Q18. Plant diversity: within each unit >7; may be dominated by 1-2 species; wet prairie plantings would increase diversity, reduce dominance
- Q19. Persistent emergent and woody veg: >50% except in areas where disking occurs; assuming during winter when snow is packing down vegetation (river bulrush stays erect); depends on usage and water depth... flooding deeper would mean less veg
- Q20. Substrate-surface water interspersion: most units have 1 large connected body of water; will not change with project
- Q21. Percent open water: right around 25% depending on disking; with the project may have more open water since larger areas to drain
- Q22. Winter water depth: average 8 inches
- Q23. Sedge canopy coverage: 1-25%; with the project would like higher
- Q24. Wetland substrate: muddy
- Q25. Percent soil waterlogged substrate May-June: 75-90%
- Q26. Percent exposed substrate: In May, starting to drawdown; 1-4" is areas we disked the year before; 50%; will not change with project

AHAG: Existing conditions for Crane Pond, Buttonbush Pond, Heron Pond, Rabourn Slough

- Looked over spreadsheet, did not change any values entered by the Corps (Based on field data collected)

Other Discussion Items:

- Setback road location; USFWS okay with it being at the toe or on top of setback; either location would still provide access to the northern neighbor
- Discussed the Heron Pond pump station and southern pump station locations. USFWS liked the idea of the southern pump station more and more. The Heron Pond Pump station would dissect the setback area via the delivery channel, and could only be used as a pump-in during high water (Since the area would be flooded during high water)
- In terms of setback with degrade, USFWS expressed concern with cabins/houses located along Bryants Creek... want to make sure these will not be impacted with the back-flooding into the refuge

Clarence Cannon NWR HREP Habitat Model Workshop
June 5, 2012

Attendees: Kat McCain (USACE), Donovan Henry (USACE), Jason Wilson (USFWS), Candy Chambers (USFWS), Mick Hanan (USFWS), Matt Mangan (USFWS), Mike Flaspohler (MDC), Ken Dalrymple (USFWS)

Purpose: To complete the habitat evaluation models for AHAG and WHAG

GENERAL DISCUSSION:

- Proposed South Pump Station has to have a large capacity to drain MSUs
- Setback = all forest plantings, convert fallow fields/ag areas to forest. Plantings requires setback
- Reed Canary Grass in MSU 7... getting better. The natural sheet flow is helping. Wildlife responding well to large unit. Last year most birds on site, but 50% of the birds were located in MSU7, which is 1/3 of the refuge. Get data from Mick
- In MSU7 management is moving towards control of woody encroachment rather than invasive species.
- In MSU7, diverse flow = diverse plants = diverse food source = more birds
- Overall, 1993 flood killed most of the oaks out. The remaining large hardmast trees are pecans, which are more hardy species. In the NE unmanaged forest area some pin oaks, but limited regeneration. For future tree plantings, might want to consider Overcup Oak since the along the Illinois River this species is being successful in recent plantings effort. Other species to plant to consider: Nuttle Oak and Cypress
- For exterior berm degrade, degrade lowest as possible.

AHAG DISCUSSION/ASSUMPTIONS to QUESTIONS

1A. With dredging temp should decrease; with setback temp should decrease; without temp should get warmer;

For base temps selected based on professional judgment; june/july =hot

1B. Assuming 10% reduction in acreage every 10 years. DUE OUT CALCULATE ACREAGE REDUCTION

DUE OUT = revisit acres of permanent waters

1C. Fish kills occur in July-September; stay the same with setback; dredging would provide overwintering habitat

2A-2C. NTUs >40 = can't grow vegetation. No change with or without project

7. Aquatic vegetation = emergent and some SAV

8. If no flood = slow rise

9. With project = microtopography

11. With project = spring and fall connected = 50%

12. Increase movement due to flood pulses. LOTIC, omit

16. Not sure if this referred to on-site or off-site. Answered for on-site

17. LOTIC ONLY, omit

18. Conductivity. If stagnant would increase conductivity = bad, FWOP would get higher. Talked with Donovan this doesn't happen. No change with project

19. DUE OUT – get data from RAY

WHAG – FORESTED

- Mallard doesn't get much benefit
- No setback = no tree plantings; re-write in DPR
- Overtopping neighbors is not a concern

3. Without project % decrease; will lose through time, <10% in year 50. With project setback, maintain and slight increase. With setback + plantings... count all trees (not just hardmast) >75%

4. Assumption: most years = >75% of time predictable in spring and fall. FWOP= no fall flood. No difference between alternatives

Number of days overtopped in the fall... get from RAY. 1 of 3 vs. most years.

5. Food plant = food unaffected across all alternatives

6. With setback, will increase. DUE OUT look at number of years inundated

12. FWP = will increase. Setback only and setback+plantings = same

14. >200 acres across all

15. >75% across all

17. FWOP stay the same. FWP same

18. FWOP, may drop to lowest category. FWP >7
27. 0 across all
28. omit
35. Setback + plantings Year 1 = 3; Years 5-50 = 4
36. 61 acres of 398. Year 50 water gone 75%. With setback + dredging = maintain 61 acres. With setback only may need to change. DUE CALCULATE!
37. DUE OUT CALCULATE WIDTH. 1 FWOP, FWP year 25 category 2
38. FWP+plantings Baseline = 3, Year 1 = 4, Year 5 = 4, Year 25, 3, Year 50=2
LOOK AT CROPLAN WHAG
39. Cottonwoods and maples.... Composition may change but overall height would stay the same
41. No comments
43. FWOP same as #36. FWP 14% (61 of 398)
47. No change <25%. Water bodies +_ river within 660 feet. DUE OUT CALCULATE!
- WHAG NON-FORESTED WETLAND
- Southern setback area need to run as CROPLAND WHAG
- Rabbit ears = BLH
- Little Rabbit Ears = add to cropland
1. No change
 2. No change
 3. 'With setback/planting increase, look at BLH WHAG
 4. Pump station will change
 5. No change on alternatives without pump station. Seepage can impact (Setback would alleviate). Inability to move water (pump station could improve). Uncontrolled flood, too deep = fall. Answered question as if the impacts of the spring/summer flood impacts food availability during fall flood. 1 unaffected for all.... Tie to #17.
 6. Gain with berm removals, pump station >90%. 4" bad indicator. Refuge staff okay with <4" of water
 7. Main benefit from pump station. Berm removal would improve. Setback would decrease seepage
 8. At this time, barely putting water on. REVISIT HISTORIC SLOUGHS IF NEEDED
 9. <25% for all
 10. Permanent water assumed as perennials (cattail, *Coccineum*) around permanent water. No change.
 11. MSUs only
 12. Not 100% due to management activities. Disking = no veg. Better control with all 3 features
 13. Better is less
 14. Berm removal benefit, 100 acres average size
 15. With setback/plantings increase
 16. <25% same across
 17. No comments
 18. >7 across the board FWP. FWOP may become dominant
 19. Bulrush and cattail stay erect... you want grasses that fall over. Pump station main driver. Setback would decrease seepage. Berm removals increase water movement
 20. Existing 1-3 few pools. Berm removals = interspersed microtopography
 21. No change
 22. No change
 23. Benefit with larger units... berm removals, pump station, and seepage are all drivers
 24. 1 for all
 25. May-june still wet. Pump station and berm removals main drivers
 26. 10-25%
 49. DUE OUT CALCULATE PREDICTABILITY. Existing 1-3, FWP more predictable
 50. Outside refuge = no change
 51. >1
 52. no comments.



REPLY TO
ATTENTION OF:

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT CORPS OF ENGINEERS
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

October 12, 2012

Ken
McCain

Engineering and Construction Division
Curation and Archives Analysis Branch

Mr. John Barrett, Chairman
Citizen Potawatomi Nation, Oklahoma
1601 South Gordon Cooper Drive
Shawnee, Oklahoma 74801

Dear Chairman Barrett:

This letter addresses the Clarence Cannon National Wildlife Refuge Habitat Rehabilitation and Enhancement Project. This project is located on the right descending bank of the Mississippi River, adjacent to the town of Annada in Pike County Missouri, approximately 70 miles northwest of St. Louis (see Figure 1). The study area includes the entire 3,750-acre refuge, which is comprised of bottomland hardwood timber, open marsh, mud flats, backwater lakes, and agricultural fields in rotational crop production.

The current project is focused on improving ecosystem resources (aquatic, wetland, and terrestrial complexes) within the Clarence Cannon National Wildlife Refuge. Other identified resources may be impacted within a broader geographical scale such as other areas within Pike County and Pool 25 Watershed.

This project is 100% federal funded as The Clarence Cannon Wildlife Refuge area is fee-titled to the U.S. Fish and Wildlife Service (FWS) and they are the federal sponsor. The U.S. Army Corps of Engineers, St. Louis District has partnered with FWS to identify potential measures to improve ecosystem resources throughout the Refuge.

The impact of human activities over time has resulted in degraded habitats. In the early 1900s, the area was drained, ditched, leveled, and cleared for agricultural production. This large-scale conversion to agriculture of native plant communities (bottomland hardwoods and wet prairie) resulted in disturbed and degraded ecosystem resources (e.g., decreased habitat quality and quantity). In 1958 the project area became part of the Mark Twain National Wildlife Refuge system, which led to the creation of wetland management units managed with seasonally adjusted water depths to mimic natural drying and flooding cycles and to provide appropriate habitat and food for nesting and migratory birds, as well as other wetland species.

Currently, on the 3,750-acre refuge, approximately 3,200 acres are fragmented into 27 management units capable of limited manual water level alterations; however, this fragmentation has eliminated the natural drainage, topography, and habitat connectivity of the project area. In addition, forest resources on the refuge, primarily pin oak and pecan, were impacted by the flood

of 1993. Up to eighty percent of the bottomland hardwoods in the approximate four hundred acres of forest died due to the flood. Furthermore, backwater sloughs, lakes, and old meander scars have been cut-off from the river by the exterior berm. Almost all of the aquatic areas are greatly deteriorated due to shallow water and poor aquatic habitat conditions (i.e., low dissolved oxygen). This has greatly reduced aquatic habitat diversity and important deep water fish habitat in summer and winter. Furthermore, due to the altered hydrology and loss of native vegetation, non-native reed canary grass is spreading across the site resulting in further ecosystem degradation.

The Habitat Rehabilitation and Enhancement Project is an opportunity to restore native wetland plant communities in areas of suitable elevation by reducing the fragmentation of the management units. It will improve aquatic ecosystem resources in backwater sloughs and other water bodies by creating additional depth and habitat diversity to support aquatic species and by restoring the seasonal connectivity between the project area and the Mississippi River. The project also will improve water drainage and delivery, promote wetland plant diversity, and improve overall ecosystem resource functions.

Impacts to potentially significant historic properties are not anticipated during this project. If sites will be impacted the tribes who have indicated an interest in this area will be contacted and consultation will take place. Should an inadvertent discovery of Native American human remains occur, then Section 3 of the Native American Graves Protection and Repatriation Act will be followed.

The project lands are encompassed within the area judicially established by a finding of the Indian Claims Commission as being the aboriginal territory of the Sac & Fox Nations. All of the following tribes are being notified regarding this project as potentially interested parties.

Sac & Fox Nation, Oklahoma	Miami Tribe of Oklahoma
Sac & Fox Tribe of the Mississippi in Iowa	The Osage Nation
Sac & Fox Nation of Missouri in Kansas and Nebraska	Citizen Potawatomi Nation
Ho-Chunk Nation of Wisconsin	Forest County Potawatomi Community
Winnebago Tribe of Nebraska	Pokagon Band of Potawatomi
Iowa Tribe of Kansas and Nebraska	Nottawaseppi Huron Band of Potawatomi Indians
Iowa Tribe of Oklahoma	Prairie Band of Potawatomi Nation
Kickapoo Tribe of Oklahoma	Match-e-be-nash-she-wish Band of Potawatomi Indians
Kickapoo Traditional Tribe of Texas	Hannahville Indian Community
Kickapoo Tribe of Indians of the Kickapoo Reservation in Kansas	Peoria Tribe

The U.S. Army Corps of Engineers, St Louis District is requesting you notify our office no later than November 26, 2012, if you would like to consult on this project. If you have any questions regarding this matter, please contact Ms. Roberta L. Hayworth, Native American Coordinator at (314) 331-8833, at roberta.l.hayworth@usace.army.mil, or at the following address.

U.S. Army Engineer District, St. Louis
ATTN: CEMVS-EC-Z (Hayworth)
1222 Spruce Street
St. Louis, Missouri 63103-2833

Thank you in advance, for your timely review of this request.

Sincerely,



for
Michael K. Trimble, Ph.D.
Chief, Curation and Archives
Analysis Branch

Enclosure

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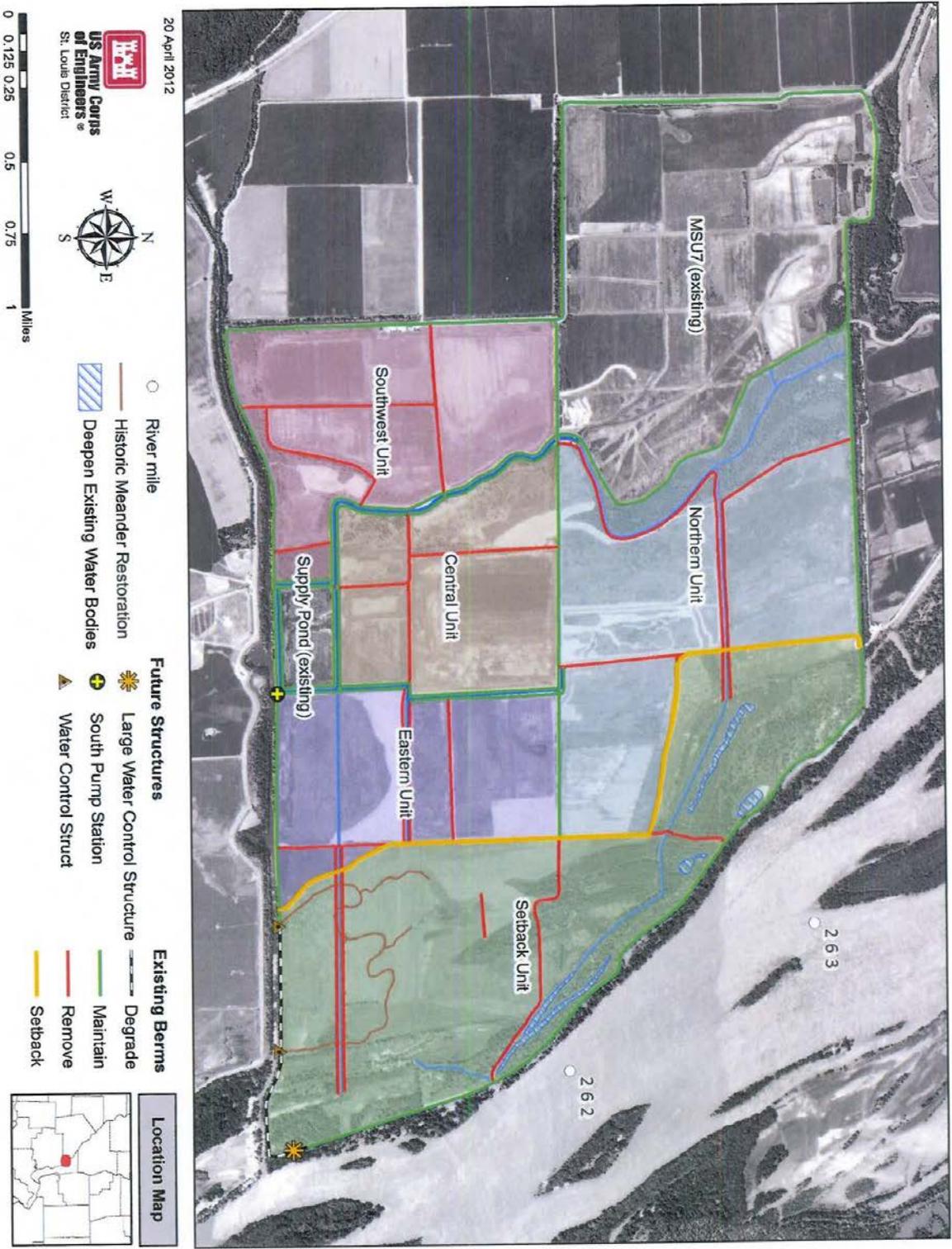
Ms. Kelli Mostertler

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SAME LETTER SENT:

TRIBAL CHAIRPERSONS

Mr. John Barrett, Chairman
Citizen Potawatomi Nation, Oklahoma
1601 S. Gordon Cooper Drive
Shawnee, Oklahoma 74801

Mr. Harold Frank, Chairman
Forest County Potawatomi
Community, Wisconsin
P.O. Box 340
Crandon, Wisconsin 54520

Mr. D.K. Sprague, Chairman
Match-e-be-nash-she-wish Band of
Potawatomi Indians of Michigan
P.O. Box 218
Dorr, Michigan 49323

Mr. Kenneth Meshigand, Chairman
Hannahville Indian Community, Michigan
N14911 Hannahville Blvd. Rd.
Wilson, Michigan 49896-9728

Mr. Homer Mandoka, Chairman
Nottawaseppi Huron Band of
Potawatomi, Michigan
2221—1 ½ Mile Road
Fulton, Michigan 49052

Mr. Matthew Wesaw, Chairman
Pokagon Band of Potawatomi Indians,
Michigan and Indiana
P.O. Box 180
Dowagiac, Michigan 49047

Mr. Steve Ortiz, Chairman
Prairie Band Potawatomi Nation
Government Center
16281 Q Road
Mayetta, Kansas 66509

Mr. Jon Greendeer, President
Ho-Chunk Nation of Wisconsin
W 9814 Airport Road
Black River Falls, Wisconsin 54675

Mr. John Blackhawk, Chairman
Winnebago Tribe of Nebraska
P.O. Box 687
Winnebago, Nebraska 68071

Mr. Tim Rhodd, Chairman
Iowa Tribe of Kansas and Nebraska
3345 Thrasher Road # 8
White Cloud, Kansas 66094

Ms. Janice Rowe-Kurak, Chairwoman
Iowa Tribe of Oklahoma
Route 1, Box 721
Perkins, Oklahoma 74059

Mr. Juan Garza, Chairman
Kickapoo Traditional Tribe of Texas
HC 1, Box 9700
Eagle Pass, Texas 78853

Mr. Tony Salazar, Chairman
Kickapoo Tribe of Oklahoma
P.O. Box 70
McCloud, Oklahoma 74851

Mr. Russell Bradley, Chairman
Kickapoo Tribe of Indians of the
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Horton, Kansas 66439

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Mr. Michael Dougherty, Chairman
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Mr. Frank Blackcloud, Chairman
Sac & Fox Tribe of the
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Mr. Thomas E. Gamble, Chief
Miami Tribe of Oklahoma
P.O. Box 1326
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Miami, Oklahoma 74355

Mr. John D. Red Eagle, Principal Chief
The Osage Nation
P.O. Box 779
Pawhuska, Oklahoma 74056

Mr. John Froman, Chief
Peoria Tribe of Indians of Oklahoma
P.O. Box 1527
118 S. Eight Tribes Trail
Miami, Oklahoma 74355

SAME LETTER SENT:

TRIBAL REPRESENTATIVE:

Ms. Kelli Mosteller
Tribal Historic Preservation Officer
Citizen Potawatomi Nation, Oklahoma
1601 S. Gordon Cooper Dr.
Shawnee, Oklahoma 74801

Mr. Mike Alloway
Forest County Potawatomi
Community, Wisconsin
P.O. Box 340
5460 Everybody's Road
Crandon, Wisconsin 54520

Ms. Melissa Cook
Tribal Historic Preservation Officer
Forest County Potawatomi,
Community, Wisconsin
Cultural Center, Library & Museum
8130 Mishkoswen Drive, P.O. Box 340
Crandon, Wisconsin 54520

Mr. Ed Pigeon
Match-e-be-nash-she-wish Band
of Pottawatomi Indians of Michigan
P.O. Box 218
Dorr, Michigan 49323

Mr. Earl Meshigaud
Hannahville Indian Community,
Michigan
N 14911 Hannahville Road
Wilson, Michigan 49896

Mr. John Rodwan
Nottawaseppi Huron Band of
Potawatomi, Michigan
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Fulton, Michigan 49052

Mr. Mark Parrish
Pokagon Band of Potawatomi Indians,
Michigan and Indiana
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Dowagiac, Michigan 49047

Mr. Mike Zimmerman
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Pokagon Band of Potawatomi Indians,
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Ms. Jancita Warrington
Prairie Band Potawatomi Nation
Government Center
16281 Q Road
Mayetta, Kansas 66509

Mr. George Garvin
Ho-Chunk Nation of Wisconsin
P.O. Box 667
Black River Falls, Wisconsin 54615

Mr. William Quackenbush
Tribal Historic Preservation Officer
Ho-Chunk Nation of Wisconsin
P.O. Box 667
Black River Falls, Wisconsin 54615

Ms. Emily DeLeon
Winnebago Tribe of Nebraska
Little Priest Tribal College
P.O. Box 270
Winnebago, Nebraska 68071

Mr. Patt Murphy
Iowa Tribe of Kansas and Nebraska
206 South Buckeye
Salina, Kansas 67410

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Miami, Oklahoma 74355



Iowa Tribe of Kansas and Nebraska
3345 B Thrasher Road
White Cloud, KS 66094
(785) 595-3258 or (785) 595-3259
Fax: (785) 595-6610

October 23, 2012

U.S. Army Corp of Engineers
ATTN: CEMVS-EC-Z (Hayworth)
1222 Spruce Street
St. Louis, MO 63103-2833

Subject: Clarence Cannon National Refuge Habitat Rehabilitation

To Whom It May Concern:

Thank you for your correspondence dated October 12, 2012 concerning the subject project.

- Copy of SHPO and/or Archeologist's Report(s) Requested.
- No interest in the area geographically.
- No comments or objections to the proposed project at this time.
- No objections to the project as proposed, if cleared through the SHPO. We wish to be notified if any Sec. 106 consultations are requested, any new historical/cultural properties are discovered, and if any Adverse Effects are reported. If human skeletal remains and/or any objects falling under NAGPRA are uncovered during construction, please stop immediately and notify this office.
- An objection requires additional project information. Please submit the following:

Sincerely,


F. Martin Fee
Tribal Historic Preservation Officer

Clarence Cannon National Wildlife Refuge HREP Site Visit

November 13, 2012

Attendees: Jason Wilson (USFWS), Brian Markert, Greg Dyn, Greg Bertoglio, Caroline Williams, Steve Johnson, Kory Hannah, Kat McCain

Purpose: Orient PDT to the site

The meeting started with introductions and Jason provided a brief overview of the project area.

The PDT discussed project status and planning assumptions:

- Assuming borrow will be from on-site.
- Hydraulic modeling will provide the information needed to size the new structures.
- Need to clarify terminology in report when talking about berm removals. – Kat will take care of changing terminology to degrade throughout document.
- O&M Costs. USFWS is currently being tasked to keep detailed O&M costs, but this data will not be available until FY14. In terms of this project, the PDT will assume that with the project O&M costs will go down because less infrastructure/berms to maintain. Jason did share that the majority of staff time is spent on maintenance currently, and not on wildlife management.
- Once the PDT determines the amount of borrow needed to construct the setback, Jason will have a better idea on where to locate borrow areas.
- For planning, the PDT is assuming that the existing berm material is suitable material for setback construction.
- Excavated berm material not used for setback construction will be disposed of onsite per agreed upon methods with the sponsor.
- Western border levee... cooperative agreement with Annada Levee District (non-federal levee). Proposed features will have no net change to existing western levee protection.
- USFWS will share bird count numbers with Kat. Kat will incorporate abundance #s into DPR as needed.
- Habitat Management Plan has been finalized. Jason will share with Kat.

After the discussion in the office, the PDT went out to the field and observed the pump station, the exterior berm, the spillway, the location of the proposed Heron Pond Pump Station, and the proposed setback locations.



TRIBAL HISTORIC PRESERVATION OFFICE

Date: November 30, 2012

File: 1213-873MO-11

RE: USACE: St. Louis District Clarence Cannon National Wildlife Refuge Habitat Rehabilitation and Enhancement Project in Pike County, Missouri.

USACE: St. Louis District
Roberta Hayworth
1222 Spruce Street
St. Louis, MO 63103-2833

Dear Ms. Haywaorth,

The Osage Nation Historic Preservation Office has received notification and accompanying information for the proposed project listed as USACE: St. Louis District Clarence Cannon National Wildlife Refuge Habitat Rehabilitation and Enhancement Project in Pike County, Missouri.. **The Osage Nation requests a copy of any cultural resources survey reports and/or correspondences with the State Historic Preservation Officer regarding this project.**

In accordance with the National Historic Preservation Act, (NHPA) [16 U.S.C. 470 §§ 470-470w-6] 1966, undertakings subject to the review process are referred to in S101 (d)(6)(A), which clarifies that historic properties may have religious and cultural significance to Indian tribes. Additionally, Section 106 of NHPA requires Federal agencies to consider the effects of their actions on historic properties (36 CFR Part 800) as does the National Environmental Policy Act (43 U.S.C. 4321 and 4331-35 and 40 CFR 1501.7(a) of 1969).

The Osage Nation has a vital interest in protecting its historic and ancestral cultural resources. **The Osage Nation anticipates reviewing and commenting on any materials for the proposed USACE: St. Louis District Clarence Cannon National Wildlife Refuge Habitat Rehabilitation and Enhancement Project in Pike County, Missouri..**

Should you have any questions or need any additional information please feel free to contact me at the number listed below. Thank you for consulting with the Osage Nation on this matter.



Barker Fariss, Ph.D.
Archaeologist I

627 Grandview, Pawhuska, OK 74056, (918) 287-5328, Fax (918) 287-5376

Clarence Cannon NWR Sponsor Meeting 1/23/2013 – CCNWR Site Visit

- Current Pump Station and Performance
 - Current pump setup could use some more capacity under flood conditions.
 - Management target would be drain floodwaters <40 days
 - Flood events problematic
- New Pump Station and Performance
 - 60,000gpm is required to pump out according to hydraulic model.
 - Sponsor is mostly worried about pumping water out
 - PDT decided to look at diesel vs. electric pump station at the Bryants Creek location.
- Interior Water Control Structures
 - Sponsor currently has, and likes simplicity of, stop logs from bottom to top of all pipes.
 - They prefer aluminum c-channel stop logs for simplicity, weight and durability.
 - The new hydraulics design is calling for bigger pipes that may make stop logs too heavy to manually manipulate.
 - We suggest operable sluice weir gate combinations to avoid the labor of handling larger stop logs
 - Possible mix of gates and stop logs could be used.
 - Sponsor likes the pre-cast concrete structures that they have.
 - Eight inch water depth for interior unit water management
 - Assume soil pounded for structure placement
- Ditch Deposition
 - Sponsor does periodically clean out the channels as a maintenance item.
- Exterior Berm Degrade
 - Degrade to existing ground level, approx. 441 elevation.
 - Take the top 3' off from full degrade up to existing spillway for more fill.
- Spillway or Gravity Drain or Both
 - In 2008 flooding, the spillway worked very well to slowly let the water into the refuge.
 - Gravity drain was initially installed to get flood water out after coming in over the spillway.
 - A new gravity drain structure on the exterior would also be useful for open water
 - Gravity drain provides enough function for refuge to get "Free" water to fill management units
 - Existing spillway (built after 1993) may be a little too low at 3' below the crown. In some situations, the spillway has let flooding in that wouldn't have overtopped the levee. Sponsor would prefer it to be only 1.5'-2' below crown height.
 - Spillway provides function needed, simplest design to reduce headcutting; however a gated structure would allow floodwaters out of the "bath tub"
 - The gravity drain is part of the pump station design so will automatically be part of the pump station feature; therefore not portrayed on the feature map as a separate feature.
- Borrow for Setback
 - Approx. 115,000cuyds needed after other features.
 - We can possibly cut additional historic meanders for additional needed borrow. Sponsor will send a map with areas located.
 - Make historic meander features wider to a 35' bottom and 1v:6h side slopes for more borrow.
 - There is a spoil levee near project dredging feature that may be used for borrow.
 - Take the top 3' off from full degrade up to existing spillway for more borrow.
- Crane Pond, Buttonbush and Heron Pond
 - Dredging vs. deep hole excavation; hydraulic dredging may be problematic due to dense vegetation.
 - Sponsor okay with deep holes vs. complete excavation of these waterbodies
- Historic Meander Restoration
 - PDT went into field to look at the proposed area for the historic meander restoration
 - The old sloughs are visible on the surface due to different vegetation and lower elevation
 - PDT approximated width of these meander scars and decided to increase the width of the proposed excavation based on the field observations

From: [Mangan, Matthew](#)
To: [Mccain, Kathryn MVS](#)
Subject: Re: CCNWR - pike county species (UNCLASSIFIED)
Date: Monday, April 29, 2013 10:15:46 AM

If Pike county Missouri than,

<http://www.fws.gov/midwest/endangered/lists/missouri-cty.html>

Pike	Gray bat (<i>Myotis grisescens</i>)	Endangered	Caves
	Indiana bat (<i>Myotis sodalis</i>)	Endangered	Hibernacula = Caves and mines; Maternity and foraging habitat = small stream corridors with well developed riparian woods; upland forests
	Decurrent false aster (<i>Boltonia decurrens</i>)	Threatened	Disturbed alluvial soils
	Fat pocketbook (<i>Potamilus capax</i>)	Endangered	Rivers
	Sheepnose (<i>Plethobasus cyphus</i>)	Endangered	Bourbeuse River

Matt Mangan
 Fish and Wildlife Biologist
 Ecological Services
 Marion Illinois Sub-Office
 8588 Route 148
 Marion, IL 62959
 618-998-5945
 618-364-5389 Cell
 618-997-8961 Fax
matthew.mangan@fws.gov

On Mon, Apr 29, 2013 at 8:49 AM, Mccain, Kathryn MVS
 <Kathryn.Mccain@usace.army.mil> wrote:

Classification: UNCLASSIFIED
 Caveats: NONE

Matt,

I'm just updating some info for the BA in the DPR for CCNWR. I looked up the endangered species list for Pike County, and I noticed that spectacelcase is no longer listed (it was a species listed the last time I checked)... so based on the website, these are the species listed for pike county:

Gray Bat

Indiana Bat
Decurrent False Aster
Fat Pocketbook
Sheepnose

Do you concur with these species, or should I also include Spectacelcase?

Thanks!

cheers,

Kat McCain

Dr. Kathryn N.S. McCain
Ecologist
Regional Planning and Environment Division North - Environmental Planning
Branch (CEMVP PD-P)
St. Louis District, U.S. Army Corps of Engineers
1222 Spruce St.
St. Louis MO 63103-2833
314-331-8047
Kathryn.McCain@usace.army.mil

"In the end, we will conserve only what we love. We will love only what we understand. We will understand only what we are taught." - Baba Dioum

Classification: UNCLASSIFIED
Caveats: NONE

**Tentatively Selected Plan meeting with USFWS
5/16/2013**

Attendees:

Janice Hitchcock	USACE	Candy Chambers	USFWS	Mario Guerrero	USACE
Toni Serena	USACE	Mick Hanan	USFWS	Greg Bertoglio	USACE
Kat McCain	USACE	Jason Wilson	USFWS	Ray Kopsky, Jr.	USACE
Kory Hannah	USACE	Brian Markert	USACE		

TSP:

Kat presented the tentatively selected plan to the USFW service.

- ICA found 408 combinations, 38 viable plans, 9 best buys.
- TSP includes: Setback with degrade, Riverside, North and South units, Diesel pump station, historic meanders, and reforestation.
- Dredging feature isn't really justifiable from the cost/benefit ratio.
- Electric pump station also fell out in the ICA. USFWS would like the option for an electric pump station instead of just diesel. They are currently evaluating electric supply to the site.
- Jason from USFWS said they are very pleased with the features in the TSP.

O&M Cost:

Estimated O&M costs were presented to the USFWS for verification.

- Costs are covered by sponsor, but there needs to be a representative estimate in the report.
- Jason from USFWS agrees that the O&M costs look pretty realistic.

Structural Drawings:

Toni and Janice presented the structural and mechanical drawings.

Hydraulic Modeling:

Ray provided an overview of the hydraulics modeling.

- Modeled the refuge as a big bathtub and drained it using a combo of the pump station and gravity drain. Drained the refuge down to the channels in 37 days with current design based on flood of 2008. For the flood of 1993, it ranged from 77-82 days.
- Touched upon some additional modeling that would be conducted as we progress on to Plans and Specs once the report is approved.
- Discussed the idea of possibly adding small spillway type features to the interior berms.
- USFWS mentioned that in the flooding of this year, they saw very clearly that their current plumbing was too small. They were seeing overtopping of interior berms with the drainage structures completely open. Also that the river came up so fast that it was overtopping the north exterior berm and flowing out the spillway.

Monitoring Plan:

Details for the development of a monitoring plan were discussed with USFWS. Goal is to incorporate data currently being collected without changing the methods that are being used at this time.

Target Schedule forward:

- All appendixes must be to Kat by the end of May to finish the report.
- DQC (District Quality Control) review will begin in June and work in combination with the Fish and Wildlife Service review.
- ATR (Agency Technical Review) is to begin in July. Upon completion of this review, the report will be submitted to Division for review.
- Upon completion of Division review, a joint report and clean water act permitting public review will be done with a kick-off open house at the refuge. Timeframe: sometime this fall.

Mccain, Kathryn MVS

From: Wilson, Jason [jason_wilson@fws.gov]
Sent: Thursday, May 30, 2013 3:23 PM
To: Mccain, Kathryn MVS
Subject: Re: HREP feasibility main report (UNCLASSIFIED)

Hi Kat - I just finished looking over the main report. I really do not have any comments, I think it is very well put together. I know there has been a lot of work put into this.

As you know, the water is on it's way back up here. Should be coming in the spillway sometime tonight....here we go again.

Take care.

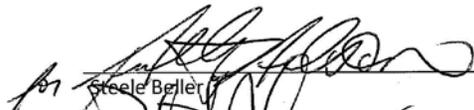
Jason

Jason L. Wilson
Refuge Manager
Clarence Cannon/Great River NWR's
573/847-2333
Fax - 573/847-2269
Cell - 573/754-2576

**CLARENCE CANNON NATIONAL WILDLIFE REFUGE
 UPPER MISSISSIPPI RIVER RESTORATION –
 ENVIRONMENTAL MANAGEMENT PROGRAM
 HABITAT REHABILITATION AND ENHANCEMENT PROJECT
 DEFINITIVE PROJECT REPORT WITH INTEGRATED ENVIRONMENTAL ASSESSMENT AND APPENDICES**

**COMPLETION STATEMENT
 FOR DISTRICT QUALITY CONTROL**

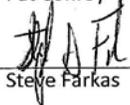
St. Louis District has completed the definite project report (feasibility report) of the Clarence Cannon National Wildlife Refuge, Upper Mississippi River Restoration-Environmental Management Program, Habitat Rehabilitation and Enhancement Project. Notice is hereby given that a District Quality Control, that is appropriate to the level of risk and complexity inherent in the project, has been conducted as defined in the Review Plan. During the district quality control, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level obtained; and reasonableness of the result, including whether the product meets the customer's needs consistent with law and existing Corps policy. The district quality control was accomplished by a multi-disciplinary expert-level team composed of staff from the home district. All comments resulting from the District Quality Control have been resolved.


 Steele Beller

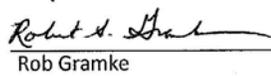
6/23/13
 Date


 Pat Conroy

28 June 2013
 Date


 Steve Parkas

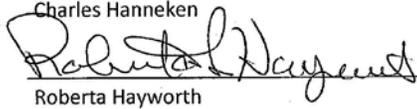
7/1/13
 Date


 Rob Gramke

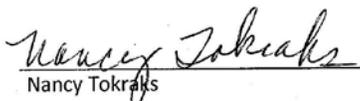
7-1-13
 Date


 Charles Hanneken

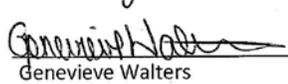
7/1/13
 Date


 Roberta Hayworth

7/1/13
 Date


 Nancy Tokraks

6/28/13
 Date


 Genevieve Walters

6/28/13
 Date

From: [Atwood, Butch](#)
To: [Matthew Mangan](#); [Stenburg, Janet MVS External Stakeholder](#)
Cc: [McCain, Kathryn MVS](#)
Subject: RE: Clarence Cannon EMP Draft Coordination Act Report
Date: Tuesday, July 09, 2013 4:28:40 PM

Matt,

Have reviewed the subject document and concur with your conclusions and recommendations. I have no edits or other comments regarding the document.

Thanks for the opportunity to review and comment on the DCAR.

Butch

From: Mangan, Matthew [matthew_mangan@fws.gov]
Sent: Tuesday, July 09, 2013 11:56 AM
To: Janet Sternberg; Atwood, Butch
Cc: Kat McCain
Subject: Clarence Cannon EMP Draft Coordination Act Report

Janet/Butch,

Can you both please review the attached DCAR for Clarence Cannon and provide any comments/edits and concurrence. If you could get back to me within two weeks it would be much appreciated since the Corps would like to have it by the end of the month.

Thanks,

Matt Mangan
Fish and Wildlife Biologist
Ecological Services
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618-998-5945
618-364-5389 Cell
618-997-8961 Fax
matthew_mangan@fws.gov



United States Department of the Interior



U.S. FISH AND WILDLIFE SERVICE

Marion Illinois Sub-Office (ES)

8588 Route 148

Marion, Illinois 62959

(618) 997-3344

August 2, 2013

Colonel Christopher G. Hall
U.S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Attn: Dr. Kathryn McCain, CEMVP-PD-P

Dear Colonel Hall:

This letter constitutes our Draft Fish and Wildlife Coordination Act Report (Report) for the Clarence Cannon National Wildlife Refuge (NWR) Habitat Rehabilitation and Enhancement Project (HREP) located in Pike County, Missouri. This report is intended to provide partial compliance with Subsection 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*); the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*); and, the National Environmental Policy Act (83 Stat. 852, as amended P.L. 91-190, 42 U.S.C. 4321 *et seq.*). This Report has been reviewed by the Missouri Department of Conservation and the Illinois Department of Natural Resources and their concurrence is noted.

INTRODUCTION

The Clarence Cannon HREP is a component of the Upper Mississippi River System-Environmental Management Program (UMRR-EMP) authorized by Section 1103 of the Water Resources Development Act (WRDA) of 1986. The goal of EMP is to implement “numerous enhancement efforts...to preserve, protect, and restore habitat that is deteriorating due to natural and man-induced activities.” The Clarence Cannon project addresses habitat rehabilitation and enhancement at Clarence Cannon NWR. Clarence Cannon NWR is owned by the U.S. Fish and Wildlife Service (Service) and is located in Pool 25 between Upper Mississippi River Miles 261.1 through 263.8. Clarence Cannon NWR contains approximately 3,750 acres of seasonally flooded wetlands, open marsh, mixed shrub/scrub/emergent wetlands, bottomland hardwood forest, agricultural fields, backwater lakes and sloughs, and floodplain forest.

RESOURCE PROBLEMS AND OPPORTUNITIES

In the early 1900s, the Clarence Cannon project area was drained, ditched, leveed, and the floodplain forest and wet prairie were cleared for agricultural use. By 1929, interior berms and

drainage channels were constructed to further divide the project area into agricultural parcels. This conversion to agriculture and the lack of floodplain connectivity to the river degraded wetland and aquatic habitats in the project area and limited the use of the project area by migratory birds and aquatic resources. In 1958, the project area became part of the Mark Twain National Wildlife Refuge for the purpose of providing a feeding and resting area for resident and migratory wildlife. The Refuge installed water control structures in the interior berms and excavated the existing water conveyance channels to establish wetland management units. However, the existing fragmentation of the project area continues to restrict the natural drainage and habitat connectivity of the project area, reducing wetland habitat diversity and quality. In addition, flooding in 1993 further degraded the bottomland hardwood forests and aquatic habitats in the project area. Other factors contributing to wetland and forest loss include an increased water table from the construction of Lock and Dam 24 and the inability to properly drain the area inside the levees following flooding. The degraded state of the project area, however, provides a significant opportunity to rehabilitate and enhance forested, wetland, and aquatic habitats for the benefit of migratory birds, fish and other wildlife resources.

The primary problems to be addressed by this project include: habitat loss and fragmentation, poor hydrologic conditions and limited drainage capacity, lack of floodplain connectivity to the river, lack of aquatic habitat diversity, and spread of invasive species.

GOALS AND OBJECTIVES

The goal of the Clarence Cannon project is to restore and improve the quality and diversity of wetland ecosystem resources in the project area to benefit migratory birds and other wetland species. To achieve this goal a planning team of biologists from the U.S. Army Corps of Engineers (Corps), Missouri Department of Conservation (MDC), and Service developed the objectives for the project. The objectives include the following:

- Objective 1: Restore native wetland plant communities (forest and non-forested wetlands) in areas of suitable elevation, hydrology, and soil
- Objective 2: Improve aquatic ecosystem resources
- Objective 3: Improve water drainage and delivery

PROPOSED PROJECT FEATURES

To achieve the project objectives, a number of project plans/features were evaluated. The recommended plan (alternative 8) consists of the following:

- Setting back the levee and degrading the exterior berm to increase floodplain connectivity and provide spawning and rearing opportunities for aquatic resources;
- Restoring historic meanders in the floodplain to improve floodplain topographic diversity and increase aquatic habitat;

- Creating three larger management units by degrading interior berms to reduce habitat fragmentation and improve water drainage and delivery;
- Installing a new diesel pump station to improve water level management capability and provide more a diverse and reliable wetland habitat for migratory birds and a better means to manage for invasive plant species;
- Reforesting floodplain areas to increase wetland habitat diversity and provide habitat for migratory birds.

METHODOLOGY TO EVALUATE ALTERNATIVES

The Clarence Cannon HREP was analyzed using the Wildlife Habitat Appraisal Guide (WHAG) and the Aquatic Habitat Appraisal Guide (AHAG). The target species for the WHAG included mallard, wood duck, least bittern, prothonotary warbler, lesser yellowlegs, king rail, and Canada goose. The target species for the AHAG included the flathead catfish, smallmouth buffalo, largemouth bass, and bluegill. Existing conditions, future without project conditions and future with project conditions were examined. This analysis was conducted with team members representing the Corps, MDC, and Service.

The utilized evaluation models produced a rating of habitat quality for each respective habitat type. This rating is referred to as a Habitat Suitability Index (HSI). The HSI, a value ranging from 0.1 to 1.0, measures the existing and future habitat conditions compared to optimum habitat which is 1.0. This value, when multiplied by the available habitat within the project area, will provide a measure of available habitat quality and quantity known as habitat units (HUs). Average annual habitat units (AAHUs) for each species are typically calculated to reflect expected habitat conditions over a 50-year project life.

The WHAG and AHAG models include limiting factors in each matrix. In the WHAG model, absence of critical life requisites for a particular species makes the habitat unsuitable and results in a HSI value of zero regardless of other habitat characteristic scores. In the AHAG model, absence of critical life requisites for a particular species during a specific season (spawning, rearing, and overwintering) makes the habitat unsuitable and results in an HSI value of zero for that season regardless of other habitat characteristic scores.

EXISTING, FUTURE WITHOUT, AND FUTURE WITH PROJECT CONDITIONS

A number of general and site specific assumptions were made as to what the project area and vicinity would be like 50 years in the future with and without the project and can be found in Appendix B of this report.

Terrestrial Species

The habitat suitability for the four target terrestrial species varies across the different habitat types of the preferred alternative (Table 1). In the nonforested wetland areas the HSI scores for all the species analyzed improved with the project over the existing condition and were greater

than the future without project scores (Table 1). Habitat quality for the mallard improved with the project due to increased abundance of wetlands, improved ability to manage water conditions in the fall/winter, and increased coverage of important food plants. Without the project, the loss of bottomland hardwoods and nonforested wetlands within the project area resulted in a HSI score of zero. Habitat quality for the least bittern improved with the project due to improved water conditions in the fall, increased coverage of emergent vegetation, and decreased coverage of woody vegetation. HSI scores for the lesser yellowlegs improved with the project due to improved water conditions in the May-June time period. Habitat quality for the king rail improved with the project due to improved water conditions in the fall, increased coverage of sedges, and decreased coverage of cattail and bulrush. Without the project, the increased coverage of cattail and bulrush within the nonforested wetland areas resulted in a HSI score of zero for the king rail.

In the bottomland hardwood area the HSI scores for all the species analyzed improved with the project over the existing condition and were greater than the future without project scores (Table 1). Habitat quality for the mallard improved with the project due to increased abundance and availability of wetland habitat, improved ability to manage water conditions in the fall/winter, increased coverage and diversity of important food plants, and improved forested habitat conditions. Without the project, the levee limits fall flooding of the bottomland hardwood area resulting in a limiting factor value for fall-winter water conditions and the HSI score of zero for the mallard. Habitat quality for the wood duck and prothonotary warbler improved with the project due to increased abundance of bottomland hardwoods and changes within the forest stand that benefited each of the species. Without the project, the loss of bottomland hardwood habitat and loss of permanent water within the project area resulted in decreased HSI scores.

In the cropland areas the HSI scores for the mallard remained the same as the existing condition while without the project the loss of bottomland hardwoods and nonforested wetlands within the project area resulted in a HSI score of zero (Table 1). The HSI score for the Canada goose remains the same with or without the project.

Aquatic Species

Habitat suitability for all the aquatic species improved with the project, while without the project the habitat remains inaccessible and unsuitable (Table 3). The inclusion of the levee setback in the proposed project increases connectivity between the backwaters and the river. This allows fisheries resources access to areas for spawning and rearing that were previously inaccessible under the current conditions. The inclusion of the historic meanders in the proposed project increases the variation in depth and provides additional overwintering habitat for fisheries resources. Both project features also improve water temperatures and dissolved oxygen during the spawning, rearing, and overwintering time periods.

Summary

The WHAG analysis indicates that the preferred alternative results in a net increase of 1308.13 AAHUs for the target terrestrial species. In the nonforested wetland areas the inclusion of the levee setback and pump station and removal of interior berms resulted in a net increase of

1040.48 AAHUs. For bottomland hardwoods, the inclusion of the levee setback and plantings resulted in a net increase of 351.04 AAHUs. In the cropland wetland areas, the inclusion of the levee setback and the conversion of cropland wetland resulted in a net decrease of 83.39 AAHUs; however, that loss is more than offset by AAHUs gained by planting and preserving the existing bottomland hardwoods in the levee setback area. The AHAG analysis indicates that the preferred alternative results in a net increase of 395.26 AAHUs for the target aquatic species over the future without project. The inclusion of the levee setback resulted in 378.15 AAHUs and the creation of historic meanders resulted in an additional 17.11 AAHUs. The combination of aquatic and terrestrial features in the preferred alternative will yield a net increase of 1703.39 AAHUs for all evaluation species over the future without project condition.

CONCLUSIONS AND RECOMMENDATIONS

According to the Incremental Cost Analysis, the preferred alternative ranks 8 out of 9 in cost per AAHU output compared to the other best buy plans (Appendix F, USACE 2013). A large portion of the cost for this alternative is attributable to the inclusion of a levee setback. Large scale flood control levees and other types of levee/berm systems have isolated much of the Mississippi River floodplain from the main channel and its associated aquatic habitats. This is particularly prevalent in the Lower Impounded Reach and the Unimpounded Reach. The loss of floodplain connectivity is a major stressor affecting the riverine hydrologic regime and the pattern of riverine habitats. This has thus affected the abundance and diversity of plant and animal populations in the UMR System. There are abundant published literature sources which identify the importance of floodplain connectivity to the riverine ecosystem (see Junk et al. 1989, Ward and Stanford 1995, Ward et al. 1999, Gallo et al. 2003, Barko et al. 2006, Opperman, et al. 2010).

There are currently limited opportunities to implement levee/berm setbacks along the UMR. Additionally, it is very difficult to capture the full benefits associated with floodplain reconnection projects. For purposes of the ICA, the AHAG model was only able to capture habitat unit benefits associated with the acreage (area) of floodplain reconnected as result of the setbacks. However, we believe that the ecosystem benefits of floodplain reconnection extend beyond the project area for both aquatic and terrestrial species. Currently, the WHAG and AHAG models are not able to capture these benefits. Although the preferred alternative has a higher cost, we fully support the alternative because it would restore a larger component of habitat diversity in this portion of the Upper Mississippi River.

Overall, the proposed project (Alternative 8) will be beneficial to the Mississippi River and biota dependent upon the river and its floodplain by improving habitat quality in this portion of river. The project will rehabilitate and enhance the quality and diversity of wetland habitat, enhance forest quality, reconnect channels to the floodplain, and improve aquatic diversity in backwater habitats. Migratory birds and other terrestrial organisms will have access to improved habitat for resting, feeding, nesting, and escape cover. Large river fish and other aquatic organisms will gain improved access to important habitats for several life stages, such as spawning, rearing and over wintering. These areas will also provide an important feeding area for aquatic organisms and serve as a production area for small fish and invertebrates that other terrestrial organisms

feed upon. The proposed Clarence Cannon HREP will be beneficial to a variety of fish and wildlife resources. The Service fully supports the proposed Clarence Cannon HREP.

THREATENED AND ENDANGERED SPECIES

To facilitate compliance with Section 7(c) of the Endangered Species Act of 1973, as amended, Federal agencies are required to obtain from the Service information concerning any species, listed or proposed to be listed, which may be present in the area of the proposed action. Therefore, we are furnishing you the following list of species that have ranges that include the concerned area:

<u>Classification</u>	<u>Common Name (Scientific Name)</u>	<u>Habitat</u>
Endangered	Gray bat (<i>Myotis grisescens</i>)	Caves and mines; rivers and reservoirs adjacent to forests
Endangered	Indiana bat (<i>Myotis sodalis</i>)	Caves, mines (hibernacula); small stream corridors with well-developed riparian woods; upland and bottomland forests
Endangered	Fat pocketbook (<i>Potamilus capax</i>)	Rivers
Endangered	Sheepnose (<i>Plethobasus cyphus</i>)	Bourbeuse Rivers
Threatened	Decurrent false aster (<i>Boltonia decurrens</i>)	Disturbed alluvial soils

There is no designated critical habitat in the project area at this time.

Although the bald eagle has been removed from the threatened and endangered species list, it continues to be protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act (BGEPA). There are known bald eagle nests in the proposed project area and bald eagles frequently utilize the project area. The Service recommends that coordination continue through the design and construction phase of the proposed project to ensure impacts to bald eagles are avoided. The Service developed the National Bald Eagle Management Guidelines to provide landowners, land managers, and others with information and recommendations regarding how to minimize potential project impacts to bald eagles, particularly where such impacts may constitute "disturbance," which is prohibited by the BGEPA. A copy of the guidelines is available at:

<http://www.fws.gov/migratorybirds/CurrentBirdIssues/Management/BaldEagle/NationalBaldEagleManagementGuidelines.pdf>

Colonel Christopher G. Hall

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A biological assessment or evaluation should be prepared for this proposed action. The purpose of the assessment is to identify listed or proposed species likely to be adversely affected by the action and to assist in making a decision as to whether formal consultation should be initiated.

Thank you for the opportunity to provide this Draft Fish and Wildlife Coordination Act Report. If you have questions, please contact me at (618) 997-3344, ext. 345.

Sincerely,



Matthew T. Mangan
Biologist in Charge

cc: USFWS (Clevenstine, Wilson)
MDC (Flaspohler, Sternburg)
IDNR (Atwood)

Attachments: Table 1
Table 2
Appendix A – Literature Cited
Appendix B – Assumptions

Table 1: Habitat Suitability Index (HSI) scores for Existing, Future Without Project (Year 50) and Future With Project (Year 50) for terrestrial species, Clarence Cannon HREP. Net change is the difference between Future With Project and Future Without Project.

Habitat Type	Species	Existing	Future With	Future Without
Nonforested Wetland - Southwest and Central	Mallard	0.15	0.81	0.00
	Least Bittern	0.74	0.91	0.66
	Lesser Yellowlegs	0.52	0.74	0.52
	King Rail	0.54	0.73	0.00
Nonforested Wetland - Northern	Mallard	0.15	0.81	0.00
	Least Bittern	0.77	0.91	0.69
	Lesser Yellowlegs	0.54	0.74	0.54
	King Rail	0.57	0.73	0.00
Nonforested Wetland - Eastern	Mallard	0.15	0.81	0.00
	Least Bittern	0.74	0.91	0.66
	Lesser Yellowlegs	0.52	0.72	0.52
	King Rail	0.54	0.70	0.00
Nonforested Wetland - MSU7	Mallard	0.15	0.81	0.00
	Least Bittern	0.77	0.91	0.69
	Lesser Yellowlegs	0.56	0.74	0.56
	King Rail	0.60	0.73	0.00
Nonforested Wetland - Supply Pond	Mallard	0.15	0.81	0.00
	Least Bittern	0.71	0.86	0.63
	Lesser Yellowlegs	0.49	0.67	0.49
	King Rail	0.51	0.64	0.00
Nonforested Wetland - Big Pond	Mallard	0.15	0.81	0.00
	Least Bittern	0.77	0.91	0.69
	Lesser Yellowlegs	0.54	0.72	0.54
	King Rail	0.57	0.70	0.00
Nonforested Wetland - Riverside	Mallard	0.15	0.81	0.00
	Least Bittern	0.71	0.91	0.63
	Lesser Yellowlegs	0.49	0.72	0.49
	King Rail	0.51	0.70	0.00
Bottomland Hardwood	Mallard	0.00	0.82	0.00
	Wood Duck	0.67	0.75	0.64
	Prothonotary Warbler	0.79	0.88	0.74
Cropland	Mallard	0.53	0.53	0.00
	Canada Goose	0.11	0.11	0.11

Table 2: Habitat Suitability Index (HSI) scores for Existing, Future Without Project (Year 50) and Future With Project (Year 50) for aquatic species, Clarence Cannon HREP.

Habitat Type	Species	Existing	Future With	Future Without
Levee Setback	Smallmouth Buffalo	0.00	0.82	0.00
	Largemouth Bass	0.00	0.82	0.00
	Bluegill	0.00	0.86	0.00
	Flathead Catfish	0.00	0.82	0.00
Historic Meanders	Smallmouth Buffalo	0.00	0.81	0.00
	Largemouth Bass	0.00	0.85	0.00
	Bluegill	0.00	0.90	0.00
	Flathead Catfish	0.00	0.83	0.00

**APPENDIX A
LITERATURE CITED**

- Barko, V.A., D.P. Herzog, and M.T. O'Connell. 2006. Response of fishes to floodplain connectivity during and following a 500-year flood event in the unimpounded upper Mississippi River. *Wetlands*, 26(1):244-257.
- Gallo, E.L., D. Ahearn, R.A. Dahlgren, and E. Grosholz. 2003. River-floodplain Hydrologic Connectivity: Impact on Temporal and Spatial Flooplain Water Quality and Productivity Patterns. American Geophysical Union, Fall Meeting 2003, abstract #H41D-1024.
- Junk, W.J., P.B. Bayley, and R.E. Sparks. 1989. The flood pulse concept in river-floodplain systems, p. 110-127. In D.P. Dodge, ed., Proceedings of the International Large River Symposium. Can. Spec. Publ. Fish. Aquat. Sci. 106.
- Opperman, J.J., R. Luster, B.A. McKenney, M. Roberts, and A.W. Meadows. 2010. Ecologically Functional Floodplains: Connectivity, Flow Regime, and Scale. *Journal of the American Water Resources Association*, 46(2):211-226.
- USACE (U.S. Army Corps of Engineers). 2013. Upper Mississippi River Restoration Environmental Management Program, Definite Project Report With Integrated Environmental Assessment, Clarence Cannon National Wildlife Refuge Habitat Rehabilitation and Enhancement Project. U.S. Army Corps of Engineers, St. Louis District, St. Louis, MO.
- Ward, J.V., and J.A. Stanford. 1995. Ecological Connectivity in Alluvial River Ecosystems and Its Disruption by Flow Regulation. *Regulated Rivers: Research and Management*. 11:105-119.
- Ward, J.V., K. Tockner, and F. Schiemer. 1999. Biodiversity of Floodplain River Ecosystems: Ecotones and Connectivity. *Regulated Rivers: Research and Management*. 15:125-139.

APPENDIX B ASSUMPTIONS

General and site specific assumptions and habitat characteristic information used to determine WHAG and AHAG values and acreage. Taken from Appendix E of the Definite Project Report.

General Assumptions and Habitat Characteristics

1. It was assumed that target years of 0 (existing condition), 1, 5, 25, and 50 (future without and future with project conditions) are sufficient to analyze HUs and characterize habitat changes over the estimated period of analysis.
2. For planning purposes we used existing spillway elevation to determine overtopping flood events for the period of record 1941 to 2011. This was done to ease the hydrologic modeling calculations since the exterior berm and spillway elevations have changed four times. With this assumption, 19 of the 71 years of record (27%) the spillway would have been overtopped. It was assumed that the same percentage of overtopping events would occur over the period of analysis (13 of the next 50 years).
3. For future with project conditions, the exterior berm degrade elevation was set at 441.0 NGVD. This elevation was used in calculating flood frequency, number of days connected, and other hydrological parameters.
4. The duration and severity of Mississippi River floods have increased with changes to floodplain management. Current Environmental Pool Management of the Mississippi River which has led to an elevated water table at the site is assumed to be sustained during the 50-year period of analysis.
5. The water control structures throughout the site are undersized causing flood waters to remain on the site longer increasing the severity of flood impacts. During future flood events, the project would allow for faster removal of flood waters reducing impacts from inundation and sedimentation.
6. After the flood of 1993, tree mortality was severe in forested areas. Most of the oaks and some pecans have died in the period after the flood, likely due to stress from the flood height and duration. There is little natural regeneration of oaks and pecans in these areas. It is assumed that without the project these bottomland hardwood communities would convert to more river front forest dominated by silver maples and cottonwoods.
7. Without the project, USFWS will continue to manage the project area. USFWS will continue to maintain existing infrastructure (including water control structures, pump station, ditches, and spillway) and habitats dependent on funding, staffing, and natural disasters. However, it is assumed no substantial increases to current operation and maintenance budget for the site would occur while efforts to maintain aging infrastructure would increase along with increases in projected prices of consumables (*i.e.*, diesel fuel) which will take away from habitat management.
8. Without the project, it is assumed that the existing exterior berm will not be removed.
9. Under the with-project conditions, water control and movement would be enhanced and operated at a higher level of effectiveness throughout the 50-year planning period.
10. We assumed that operation of Clarence Cannon National Wildlife Refuge would continue under the current management plans and objectives for at least the life of the HREP.
11. Without the project, fish use of the existing water bodies will continue to be restricted in many years by the lack of connectivity with the main channel. Additionally, it was

assumed that without the project, the acreage of existing water bodies would be reduced 10% every 10 years. With the project it was assumed that acreage of the existing water bodies would remain constant through the period of analysis.

12. We assumed that all existing water bodies on site (Rabourn Slough, Crane Pond, Buttonbush Pond, Heron Pond) have similar conditions, and that field data collection during May 2011 accurately represents the conditions of these water bodies.

Feature Specific Assumptions

1. Pump Station. It was assumed the diesel versus electric pump station would generate the same HSI scores.

WHAG Evaluation – We chose to evaluate this feature using the non-forested wetland spreadsheet. It was assumed this feature would directly impact habitat conditions within the managed wetland units on the site by improving water delivery and drainage.

AHAG Evaluation – No fisheries benefits are expected to be generated from this feature, consequently no AHAG evaluation was conducted.

2. New Subunits. It was assumed that each of the newly proposed management subunits created by berm removals and new water control structures would generate the same HSI scores. The difference in HUs between the subunits is tied to the acres. We assumed that material from the berm modification would be used to fill in any adjacent borrow areas. We assumed existing berms provide no habitat benefits. The subunits were grouped into 3 functional management units based on location: South Unit, North Unit, and Riverside Unit.

WHAG Evaluation – We chose to evaluate this feature using the non-forested wetland spreadsheet. It was assumed that restoring larger management areas would increase habitat benefits as it has been observed on site in MSU7.

AHAG Evaluation - No fisheries benefits are expected to be generated from this feature, consequently no AHAG evaluation was conducted.

3. Setback. It was assumed that if the setback with water control structure was chosen, connectivity would be managed to mimic the prevailing environmental conditions. With this assumption, it was assumed that both options (water control structure or exterior berm degrade) would generate the same HSI score.

WHAG Evaluation – We chose to evaluate this feature using the bottomland hardwood, and non-forested wetland spreadsheets. We used the bottomland hardwood spreadsheet for the existing forest and the cropland proposed for conversion to bottomland forest. We used the non-forested wetland spreadsheet to evaluate the non-forested areas impacted by this feature.

AHAG Evaluation – The setback would increase the area available to spring and fall flooding. Stage data and topographic surveys indicate that overbank flooding would occur on land outside of the new berm 85% of the time. Thus, this area would provide habitat for spawning and rearing during these times. The acreage of land that would be placed outside the setback was used in the calculation of AAHUs. Calculated AAHUs were reduced by 15% because overbank flooding does not occur every year.

4. Excavating. It was assumed that excavating of the existing water bodies and historic meanders cannot occur without the setback option due to the high risk and uncertainty of crossing a sand lens ultimately increasing seepage at the site. We assumed excavated material would be used in the construction of proposed setback.

WHAG Evaluation – No terrestrial benefits are expected to be generated from this feature, consequently no WHAG evaluation was conducted.

AHAG Evaluation – According to USFWS, the conditions of the existing water bodies are shallow and lack connectivity to the main channel. It is assumed that the long-term impacts of the disconnection from the river would lead to continued shallow water and eventual loss of the sloughs, backwaters, and old meander scars along with continued degradation of aquatic ecosystem resources. If no action is taken to restore these water bodies and improve connectivity, it is assumed that approximately 70-acres of seasonal fisheries habitat would be reduced by 10% every 10 years. For with-project conditions, it is assumed that the 71 acres would be maintained during the period of analysis. For the historic meanders, it was assumed that these historic meanders would be excavated to approximately 95 feet wide at surface, with 6:1 side slopes, 5 feet deep, and with 35 feet wide at bottom; resulting in 21 surface area acres of aquatic habitat.

5. Reforestation. It was assumed that reforestation using tree planting would not occur without the setback because risk of tree mortality without improving water drainage first is too great. It is assumed that the proposed area for tree plantings would remain in rotational agricultural without the proposed setback project feature. With project alternatives that do not include tree plantings, it is assumed that the 350 acre agricultural field would no longer be cropped and by year 25 trees would naturally regenerate. With project alternatives that did include 300 acres of tree plantings, it is assumed that the remaining 50 acres (less any acres for historic meander restoration) would naturally regenerate by year 25.

WHAG Evaluation - We chose to evaluate this feature using the bottomland forest and cropland spreadsheets. Conversion of the cropland to bottomland forest generated sufficient habitat units over the period of analysis to make it a viable project feature. The cropland acres would be reforested with a variety of bottomland species, utilizing containerized or bare root stock. The forest canopy in the proposed reforested area will ultimately close over the life of the project making this area nearly a solid block of bottomland forest.

AHAG Evaluation - No fisheries benefits are expected to be generated from this feature, consequently no AHAG evaluation was conducted.



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Upper Mississippi River National Wildlife and Fish Refuge
51 E. Fourth Street - Room 101
Winona, Minnesota 55987



August 2, 2013

Colonel Christopher G. Hall, District Commander
U. S. Army Corps of Engineers
St. Louis District
1222 Spruce Street
St. Louis, Missouri 63103-2833

Dear Colonel Hall:

The US Fish and Wildlife Service (Service) has reviewed the draft Definite Project Report and draft memorandum of agreement provided by your staff for the Clarence Cannon National Wildlife Refuge Habitat Rehabilitation and Enhancement Project (HREP), Annada, Missouri. We are pleased to support the proposed HREP and find that the Memorandum of Agreement appropriately defines agency roles and responsibilities as previously discussed by the U. S. Army Corps of Engineers (USACE) and the Service.

The proposed restoration may involve placement of water control structures, pump stations, sedimentation control berms, dredging, and other features consistent with ecosystem restoration. This work would be accomplished under the authority of WRDA 1986 (Section 1103), as amended. The current total estimated costs of the project are approximately \$ 26,350,000 with annual operation and maintenance (O&M) costs estimated at \$ 61,500.

It is the Service's understanding that under the provisions of the USACE's Upper Mississippi River Restoration (Environmental Management Program), this project would be constructed at 100% federal costs (USACE) for those portions of the project occurring on federal lands. As the project sponsor, the Service would be responsible for 100% of the project O & M. The Service's financial support would be dependent on total cost, appropriations authority, O & M responsibility, annual Congressional appropriations, and benefits to the natural resources.

This project will restore key habitat features and provide the Service with significantly improved habitat management capabilities. We look forward to assisting with the completion of this important project and appreciate the professionalism and cooperative approach to this project from the District staff. Should you have questions regarding this letter, please contact Mr. Jason Wilson at (573) 847-2333.

Sincerely,

Kevin Foerster
Refuge Supervisor

cc: FWS (Wilson, Clevenstine)

**WALLA WALLA COST ENGINEERING
MANDATORY CENTER OF EXPERTISE**

COST AGENCY TECHNICAL REVIEW

CERTIFICATION STATEMENT

Project No. 145432

MVS – Clarence Cannon Wildlife Refuge Project

The Clarence Cannon Wildlife Refuge Project Project, as presented by St Louis District, has undergone a successful Cost Agency Technical Review (Cost ATR), performed by the Walla Walla District Cost Engineering Mandatory Center of Expertise (Cost MCX) team. The Cost ATR included study of the project scopes, report, cost estimates, schedules, escalation, and risk-based contingencies. This certification signifies the products meet the quality standards as prescribed in ER 1110-2-1150 Engineering and Design for Civil Works Projects and ER 1110-2-1302 Civil Works Cost Engineering.

As of October 31, 2013, the Cost MCX certifies the estimated total project cost of the two alternatives:

FY 2014 Price Level: \$29,897,000
Fully Funded Amount: \$32,523,000

It remains the responsibility of the District to correctly reflect these cost values within the Final Report and to implement effective project management controls and implementation procedures including risk management throughout the life of the project.



**US Army Corps
of Engineers®**

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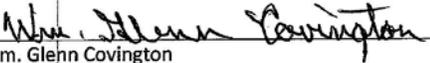
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**Kim C. Callan, PE, CCE, PM1
Chief, Cost Engineering MCX
Walla Walla District**

CLARENCE CANNON NATIONAL WILDLIFE REFUGE
UPPER MISSISSIPPI RIVER RESTORATION –
ENVIRONMENTAL MANAGEMENT PROGRAM
HABITAT REHABILITATION AND ENHANCEMENT PROJECT
DEFINITIVE PROJECT REPORT WITH INTEGRATED ENVIRONMENTAL ASSESSMENT AND APPENDICES

STATEMENT OF TECHNICAL REVIEW
COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the Definite Project Report with Integrated Environmental Assessment for the Clarence Cannon National Wildlife Refuge HREP. ATR was conducted as defined in the project's Review Plan to comply with the requirements of EC 1165-2-209. During the ATR, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses, alternatives evaluated, the appropriateness of data used and level obtained, and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing US Army Corps of Engineers policy. The ATR also assessed the District Quality Control (DQC) documentation and made the determination that the DQC activities employed appear to be appropriate and effective. All comments resulting from the ATR have been resolved and the comments have been closed in DrCheckssm.


Wm. Glenn Covington
ATR Team Leader
CENWK

11-5-13
Date

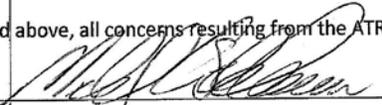

Greg Bertoglio
Project Manager
CEMVS

11/5/13
Date

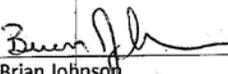
CERTIFICATION OF AGENCY TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows: No Major concerns were identified during ATR.

As noted above, all concerns resulting from the ATR of the project have been fully resolved.


FOR Dave Busse
Chief, Engineering Division
CEMVS

11/6/13
Date


Brian Johnson
Chief, Environmental Compliance Division - RPEDN
CEMVP

11/6/13
Date