- DRAFT Work in Progress -

READ ME FILE ON SITE HISTORIES

(TERRY WRIGHT, Rangeland Management Specialist, 3/15/2016)

The Site Histories were created and designed for:

A. A legacy record of how millions of dollars of public monies were spent on restoration at RMANWR.

B. To serve as a dynamic land management tool, whereby Refuge managers have the opportunity to see active management progressing on the ground by being able to instantly access on the S: drive to find current narratives, descriptions, and photos of fieldwork being completed, fieldwork having recently been completed, or current site conditions.

C. Before Site Histories, there was no single place to find out what work had been accomplished on a restoration project without having to go through multiple years of accomplishment reports and Field Notes. Now it is all together. Anything done (that we know of or documented) to complete a specific project is now in one place for that project.

D. Site Histories will provide future land managers with a record of what cultural practices were best to produce successful results, and will show the typical field practices employed and the time of year when they were used. The RMANWR Site Histories may in fact be the most comprehensive record of intensive prairie restoration ever compiled anywhere (to my knowledge) and will likely have a benefit to other restoration programs and other Refuges anywhere in the United States. The Site Histories incorporate fieldwork commencing from the early 1980's to the present, in addition to an estimated 15,000 site-specific photographs.

THINGS TO KNOW ABOUT THE INDIVIDUAL SITE HISTORIES

The Site Histories were intended as concise summaries of work completed on a specific restoration project. The non-electronic part of Site Histories (the Blue Folders) includes a tremendous amount of paper documentation—restoration plans, Field Notes maps, GIS maps, vouchers, correspondence, and the vegetation monitoring field data sheets. The Blue Project Folders are located in the top 3 gray file drawers in my old office in Building 120, and each Blue Folder is a restoration project. Unlike their electronic cousins, the hard copy folders are organized by project number, starting with Project 1-99, then by F number, and finally by the recent directional section location number (started in 2013 at Nick Kaczor's request). The electronic Site Histories were meant to be more as general summaries; if the reader needs more specific information he can consult the Blue Folder hard copies.

1. Site histories (projects) are always organized and numbered within the Section number in which they originated.

2. Each Site History consists of a WORD document showing a chronological history of land management actions, with the most recent action always recorded at the beginning of the

CULTURAL TREATMENTS AND SITE OBSERVATIONS section. The WORD Site History also contains a synopsis of all the other information a person would need to know about the project—name, location, soils, seed mixes, size, range management data (veg success), and why the project was initiated. I designed a template for this information that is the same for every site history.

The chronological land management narrative for each Site History comes from FIELD NOTES databases (computer and written), 1999 to 2016, Annual Progress Reports (1990-2001), Annual Accomplishment Reports (2001-2013), and Annual Narratives through 2016, available hard copy printouts from the non-functional DPRA veg monitoring database, and personal site observations from qualified staff. Not all projects had work completed in them in all years. (See Appendix)

3. Each Site History (Project Number) electronic folder contains a chronological collection of digital (and eventually scanned 35mm slides) site photos to show the developmental progression of the site from disturbed area to present condition. Few photos were taken from permanent reference points, but photos do document "typical" stand conditions. It has been a major Refuge effort starting from the early 1990's to the present to photo-document the work that has occurred on all restoration projects, something that was required under our earlier Cooperative Agreement with Army.

5. For the Blue Folders (hard copies), Projects that reached their vegetative success criteria are marked by an asterisk (*) if successful or a (!) if they failed on the S: drive folders. The following key is for the Blue Folders:

a. Green dot = successful
b. Red dot = failure
c. Yellow dot = Project that doesn't count towards mitigation
d. Blue dot =
e. No dot = pending

UNDERSTANDING HOW TO INTERPRET A SITE HISTORY LABEL

The project number consists of three identifiers: the section number it is found in, the actual project number, and the year in which it was permanently seeded (spring or fall).

Examples: S31_97_2006sp = Section 31, Project 97, seeded spring of 2006

S31_F34_2012fa = Section 31, Project F34, seeded fall 2012

S31_NE-01_2014fa = Section 31, Project NE-01 (Project 1 located in the NE part of Section 31), seeded fall 2014.

Seeding Definitions: Fall seedings typically go from September to February of the following year. They are dormant seedings. Spring seedings go from February to June.

Background:

a. From 1990 to around 2006, projects were simply labeled numerically as they progressed, starting with the number 1, regardless of what section they were located in. When a project or part of a project failed, they were simply given new numbers (often making it confusing as to how to track fieldwork on the same footprint on the ground). Originally, restoration projects were referred to as Tasks, and in old files are designated with the letter 'T' to indicate such. 'Tasks' were changed to 'Projects' in the mid-2000's for consistency.

b. In 2007, Army and Shell (Remediation Venture Office) asked the Service to use a Primavera construction planning software for all future planning of restoration projects and activities. New projects and "re-do's" of existing projects were given "F" numbers (F stood for 'function' in the PRIMAVERA database structure).

F numbers were stand alones OR they were used with a numbered project, such as 71F21 (F21 being the re-do portion of the original Project 71.)

c. In 2013, Nick Kaczor, Assistant Refuge Manager, requested that new projects be labeled according to their general location within a specific section, e.g. WC-01 (West Central, Restoration Project 1).

The same format however follows for ALL project names: Section number first (followed by underscore), project number second (followed by underscore), and seeding year/season third. There can be more than one Project WC-01, but never more than one in the same section. The section is the basic management unit at RMANWR.

If a project required a portion of it to be re-done or re-seeded, it has been given an 'R-01' or 'R-02' designation as part of the project number, depending on the number of 're-do' areas required within a project.

USING AND UNDERSTANDING THE SITE HISTORY TEMPLATE—HOW TO FILL IT OUT

I created a standardized site history template for each restoration project, new and old. A blank template (SITE HISTORY TEMPLATE copy.docx) can be found for new use at the bottom of the list of Section folders on the S: drive. For each new project, locate the Section Number folders on the S: drive (TASK 2), create a new Project Folder, and copy the Site History Template into it and label it appropriately.

- -

20160225 TRW ← *This is a 'marker' showing the date (year/mo/day) of the last person to record data in the folder. This means that on Feb 25, 2016, I either edited or added new information to the electronic file. It should help keep track of your data entry progress or when others have entered data.*

SITE HISTORY

PROJECT: *The project number goes here. If a new project, follow the 3 identifier components: Section number_Project number_xxxx format (use xxxx without a year/season of seeding if it is a brand new project). The actual year and season (ex: 2017sp = 2017 spring) is entered at the time the project is permanently seeded. When a project is permanently seeded, labeling it with the year and season makes the future 5 year vegetation monitoring time easier to track.*

NAME: *Every project has a name. Although most restoration projects were once tied to specific remedy actions, most projects now can be called 'Restoration of a Previously Occupied Prairie Dog Area' or 'Restoration of Weedy Forbs and Grasses' or 'Restoration of Crested Wheatgrass'. When you name a new project, you also need to add it to the Master List of Restoration Projects at RMANWR (WORD Document), located on S: drive, in the same folder as Section Folders are located.*

LOCATION: *The part of the specific section it is found in, or any other unusual geographic or man-made boundaries it is next to help identify the location.*

SIZE: *Acres. Recommend that the final project acreage should be GPS'd and those acres used as the size. GIS acreages should be used as final.*

DESCRIPTION OF PROJECT: *This is an important section. The description should be short and concise, a few paragraphs only. It should include such items as*
1) Why was this chosen as a restoration project? Include any baseline observations of vegetation or specific weed treatment issues
2) What are the habitat goals of project?
3) Any unique site considerations that affected restoration?
4) Any unique vegetative conditions?
5) Any resource concerns (e.g. remnant native prairie restoration)?
6) Is there anything unique about this particular project?

The compiler of this info should always document himself/herself and the year he/she made the entry. Example:

(W Kutosky, 2017): This Project was initially occupied by prairie dogs, but after lethal control in 2016, it became feasible to restore the area to native perennial grassland to improve the habitat for Refuge wildlife and improve bison forage availability by establishing a native perennial grass community. Prior to restoration efforts were initiated, it was dominated by mullein and cheatgrass Etc Etc.

SOIL TYPES/SEED MIXES: *Put the actual soil type here.*

Put the actual seed mix used here. They can be copied from the Seed Mixes folder in the Site History folder. It should be in table format, labeled as the name of our real seed mixes: (2015 Ascalon/Bresser mix for Project S35_C01_2016sp *as an example. Make sure to specify the seeding rate in terms of PLS/Square Foot.*

2015 Weld loam mix for Project S23_NW01_2018sp, at 40 PLS/Square Foot

SPECIES	COMMON NAME	VARIETY	% OF MIX
Pascopyron smithii	Western wheatgrass	Arriba, Native	10.0
Etc etc			
		TOTAL	100.0

If more than one seed mix was used, you need to enter it in another separate table, immediately below this one. The first seed mix table should be the one with the largest acreage and/or the one that was seeded most recently. If you know the acreage of each mix being seeded, it would be very helpful to add that in each Table title.

IRRIGATED (Y/N): *A simple* Y *or* N *is adequate—you can also specify the type of irrigation used.*

SG (Shortgrass), MG (Mixed-grass), TG (Tallgrass) or OTHER: *Other would be trees or shrub plantings.*

USFWS OR ARMY/PMC SEEDED: *This will almost always be USFWS, unless completed by Volunteers. This was needed because some of the older restoration projects were done by MK, Total Terrain, or PMC, and not by the Service.*

DATE(S) OF PERM SEEDING: *Put the actual date(s) of permanent seedings here, including broadcast seedings or any other type of permanent seedings. If a second seeding was done, put that date here as well.*

DATE STAND MET VEG SUCCESS CRITERIA: *Type in 'Pending' if project is not ready for veg monitoring. If the success data has been already been calculated, use this format as an example:*

2014 (10th Growing Season)

Success Criteria Evaluation: (T Wright, Rangeland Mgmt Specialist, 10/24/2014)

1. On Seeded Species: (Bresser mix evalutation): PAS SMI, PAN VIR, CAL LON, BOU GRA, AND HAL, BUC DAC, SCH SCO, BOU CUR, SPO CRY = 9 of 16 grass species seeded = 69%, stand passes. *Note—if more than one seed mix is used, you have to make a list of all the different grasses between the two, and use that as your list to evaluate the % species seeded. At least 50% of seeded species is the criteria for a project to pass.*

2. Per cent cover by natives: 81.77%, stand passes. *At least 30% is criteria for passing.*

3. Maximum single species live cover: PAS SMI, 35.44%, stand passes. *No more than 45% is criteria for passing.*

4. Total Ground Cover minus Soil: 95.58%, stand passes. *Minimum of 70% ground cover is required for success.*

NOTE: This is one of the highest quality, diverse mixed-grass restoration sites at RMANWR. Eighty percent (80%) of the live vegetative cover on site consists of seeded native grasses. The site also has lots of penstemons (PEN ANG) that flower every spring. Project passes. *This project was easy; it passed on all counts. If you are evaluating one that doesn't, but you still think in your professional judgment after site inspections that it does pass, use the 'NOTE' format to justify your decision.*

Once a project passes, you need to enter it on the Master Success List of Restoration Projects (currently NOT in the Site History folder, work in progress) and record all of the above numbers in that document + comments + acreage. A project no longer requires additional veg monitoring once it reaches its success criteria, but it has to be at least 5 growing ***seasons*** *old before it is eligible for its first evaluation.* ***Growing seasons never begin when a project is seeded in the fall—it is always the following spring.***

Remember evaluation is also, maybe even moreso, a function of professional on-site judgment than just going with what the numbers are. Typically, I have found most stands do not meet the Seeded Species requirement (50% or more) because they become dominated by western wheatgrass over time, but that does not necessarily mean they fail, especially if they are near occupied prairie dog areas (see USFWS Habitat Restoration Plan success criteria, page 43). The question you must ask is, "Would I work up this site again and re-do it? Or is it functioning well enough for wildlife and is it a relatively stable native community? Is this what we want on the Refuge?"

CULTURAL TREATMENTS AND SITE OBSERVATIONS: *This is one of the most important sections in the site history, really the nuts and bolts of what things were done and when. Entries are compiled from annual Field Maps of practices, personal observations on site, or FWS spray records. Always use the data entry format shown below. (NOTE: The most recent activity is ALWAYS FIRST/ON TOP, the oldest field activity is at the bottom of the list. This gives managers an idea of the last thing that was done on the project without them having to scroll down to the bottom of a long list.) Example:*

2017 08-02 (W Kutosky): Sand dropseed has significantly appeared in the stand after the mowing treatment.

2017 07-14 (S Tukua): Mowed the entire project. (2017 Field Notes Map)

2017 04-03, 04 (W Kutosky): Sprayed cheatgrass with 1 pint of Roundup per acre on 10 acres located in NW corner of project. (USFWS Spray Record)

Use 4 digit year, followed by month-day(s), followed by the first initial and last name of the person in parenthesis who completed the fieldwork (or made an observation) followed by a colon, then the description. Never use initials only, no one knows or remembers who that is. If you don't know who did it, leave it blank or use UNK. Note how each record is not only

personalized (we are not just numbers and we do leave our own legacy for work completed here!) but the source of the record is documented as well. Using the first initial and last name is a way to honor workers for their hard work and assistance and leave a human legacy to the work, as well as recording a valid source for the information recorded.

VEG MONITORING/RANGE TREND DATA: *This section was mainly used for older projects in the late 1990's and mid 2000's that were receiving veg monitoring the third season of growth and every 5th season thereafter. If you completed any baseline vegetation monitoring, you could summarize that information here, otherwise this section is not used much for newer project anymore.*

- -

As of this writing, the site histories and associated photos represent some 33 gigabytes of extremely valuable information as to how restoration occurred at Rocky Mountain Arsenal NWR. There are approximately 200 restoration projects and 10-15,000 photos that it consists of. This database should be "READ ONLY" on the S: drive, with editorial privileges to one or two people. Field records should only be added to by a competent permanent professional FWS employee with at least an average knowledge of photography and a good knowledge of land and habitat management practices, and a good range management background. It represents the legacy of restoration at RMANWR and is a priceless record of restoration at an EPA highly contaminated Superfund site. (T Wright)

WHERE DO I FIND THE PERMANENT SEED MIXES USED IN A GIVEN YEAR TO PUT INTO THE SITE HISTORIES?

Electronic copies of each seed mix by year are found within the Site History Section folder on S: TASK 2

WHAT DO I USE AND HOW DO I DETERMINE VEGETATIVE SUCCESS FOR EACH PROJECT?

[Excel spreadsheet for each project that calculates veg success, to be located in Site History folder when complete]

HOW IS EACH HARD COPY BLUE FOLDER ORGANIZED TO INCLUDE NEW PROJECT INFORMATION?

The hard copy Blue Folders for each project (in Bldg 120) are organized in specific fashion. They are 5-tab folders.

1. Tab 1 (inside front cover): All field information, filed in chronological order, most recent always on top. Primarily includes work completed on Field Maps; seed mix used on project.

2. Tab 2: Any planning maps, copies of a project plan, or planning information used to plan the project.

3. Tab 3: Any pertinent correspondence, in chronological order (most recent on top) dealing with the project.

4. Tab 4: Can be used for any miscellaneous materials

5. Tab 5 (inside back cover): Veg monitoring data sheets always go here, most recent on top. Always include the aerial photo map showing the transect numbers and location for each set of data sheets.

HOW DO I KEEP THE BLUE FOLDER HARD COPIES UPDATED WITH INFORMATION?

Hard copies of completed fieldwork maps are eventually placed in each Site History Project Blue Folder at the end of the field season. A hard copy of the actual seed mix used should be placed in each as well. Remember everything is filed chronologically with most recent on top.

APPENDICES:

A. RECORDS USED TO COMPILE AND DATES OF THOSE RECORDS

Site data sheet printouts from DPRA database up to 2008
Field Notes from Field Notes 3-ring notebooks 1999 to 2015 (these no longer exist)
Primavera planning sheets for projects when it was being used as a substitute for project plans (mid 2000's)
USFWS/Army Progress reports 1990 to 2000
Annual reports 2000 to present
Army year end reports 2001 to present
Collected files organized by project from A Thornburg (Annual Field Season Summaries and Schedules), F Krampetz, B Hastings, T Wright, and others

B. SEEDING NOTES

1. From 2006 to present, forb seeds were not included in seed mixes due to intensity of IPM occurring (mowing and spraying). It made no sense to spend the money to seed them, then just mow or spray them the following growing season.

One thing that did happen: I believe many of the seed mixes from about 2006 to 2011 were not adjusted accordingly to seed at the full 100% PLS/Square Foot recommended seed rate because we stopped including the 5% forb seeds and 5% shrub seeds. Typical seed mixes always had 90% grasses, 5% forbs, and 5% shrubs. Calibrating with only the grasses meant that a seed mix was only 90% full. In other words, if your seeding rate in terms of PLS/Square Foot was 40 PLS, you were actually only seeding 90% of 40 PLS which was 36 PLS/Square Foot.

C. BEST RESTORATION PROCEDURES (A LOOK BACK)

I have always felt that the condition and quality of the seedbed was the most important factor to successful restoration. The best way to "mellow" the soil (that's for you Tom) and eliminate weed competition is to put the seedbed into cover crop (sorghum-sudangrass, forage sorghum (not grain sorghum), or oats) for at least a full growing season prior to permanent seeding, and use the appropriate herbicide regime to treat weeds on the seedbed during this time period.

Although we seeded a lot of projects at 35 PLS/Square Foot, I would recommend we stick at 40 PLS/Square Feet in the future, due to the rough nature of many seedbeds.

Mowing remains in my mind a fairly critical operation, but we typically fall behind most every season in getting the projects mowed at the right biological time. The rule is simple: for projects new to 3 growing seasons old, keep the weeds mowed at a 1' height.

Forb and/or shrub seed should be broadcasted in the fall/winter (over snow works good) on restoration projects at least 3 growing seasons old, or preferably when they reach their success criteria where the need for mowing and chemical app is minimal.

Restoration projects will not be successful if occupied by prairie dogs at any density after permanent seeding.

SOILS CONTAMINATION TERMS (To Use With Older Restoration Site Histories): (From PMC Specification 01560—these are ranked from most contaminated to least contaminated)

1. HHE: Human Health Exceedence – Soil that contains a contaminant or group of contaminants that, through various exposure pathways such as ingestion, inhalation, or skin contact, could result in a health effect to workers in excess of acceptable EPA allowable risks.

2. Biota soils: Soil contains a contaminant or group of contaminants that may pose a risk to animal populations. The primary risk of Biota includes bioaccumulation and bio-magnification of contaminants in the food chain. The biota soils do not exceed EPS's Human Health Risk range.

3. P1 and P2 Soils: Native surficial soil from 0 to 12 inches below the existing ground surface with contaminant concentrations considered to pose a low level risk to wildlife after remediation of all ROD (Record of Decision) specified areas. (P2 soils are slightly lower risk than P1 soils but definition is essentially the same—Scott Ache, 9/9/2002 email in Project 79 Blue Folder.)

P1 and P2 soils usually had the top 12" removed by PMC before they were turned over to the Service for restoration. They were always soil amended before we got them.

4. SAR = Study Area Report. These reports were a revision of CAR (Contaminated Area Reports). The CAR reports were completed in the mid 1980's, and were essentially a mapping of miscellaneous sites thought to be contaminated. They were catalogued on the "tri-color" contaminated sites map.

The SAR sites were a revision of the CAR sites, and were done in the late 1980's. The purpose was the same, and they are found on the "pink" map that shows all the contaminated sites.