FIELD SUMMARY REPORT
GREAT BEND SE, KANSAS

I. INTRODUCTION:

The purpose of this field trip was to ground truth aerial photography in order to obtain general information on hydrologic systems, ecosystems and specific wetland signature indicators within the mapping area to facilitate wetland photo interpretation with a high degree of accuracy.

A. Map Name (1:100:000):
Great Bend SE, Kansas

B. Quads with check sites:

Zaggy	Sterling SW
Nickerson	Ellinwood SW
Alden	Big Salt Marsh
Alden NW	Ellinwood NW
Little Salt Marsh	

C. Personnel:
Les Vilchek, Donley Kisner, Lynn Ashby, Cindy Bohn - Martel Laboratories
Chuck Elliot, Ken Huntington - USFWS

D. Date of trip:
April 8 - 11, 1985

E. Available Photography:
All aerial photography is color infrared at 1:58,000 scale. The photography was taken by NHAP on the following dates: 9/27/84, 8/1/82, 10/26/81, 9/29/81, 10/19/81. (Listed in order from east to west.)

F. Collateral Data:
USGS 7.5' quads - 32 quads - Great Bend SE.
USGS 1:250,000 map - Great Bend, KS.
USFWS 1:250,000 Ecoregion and Land-Surface Form Map - Great Bend, KS.
USDA Soil Surveys for Rice, Reno, Stafford, Barton and Pawnee counties.

"Description of the Ecoregions of the United States "Robert G. Bailey, USDA, Forest Service, 1978.

"The Audubon Society Field Guide to North American Trees, Eastern Region." Elbert L. Little, 1980.

"The Audubon Society Field Guide to North American Wildflowers, Eastern Region." William Niering, 1980.

USGS Water-Data Report KS-81-1, "Water Resources Data Kansas Water Year 1981."

"Common Marsh, Underwater, and Floating-Leaved Plants of the US and Canada," Neil Hotchkiss, 1972.

"Land-use Conflicts with Natural Vegetation in the United States" Jeffrey M. Klopatck and others, Environmental Conservation, 6:191-199.

Personal conversation with Jim McCullum, refuge manager, Quivera National Wildlife Refuge.

Personal conversation with Stan Wood, refuge director, Cheyenne Bottoms State Wildlife Area.

II. OVERVIEW:

The entire mapping area is classified within the Humid Temperate Domain - Tall Grass Prairie Province - Bluestem-Gramma Prairie Section Ecoregion as noted by Bailey (2533L). The northeastern corner and extreme northwestern corner exhibit Mid-continent plain and escarpment terrain of 100-300 ft [(111-6)B2b]. The remainder of the area is gently rolling High Plain [(111-14)A1] (See Diagram).

It has been estimated by Klopatck (et al.) that the state of Kansas is less than 38% naturally vegetated and this part of Kansas has less than 20% potential for natural vegetation. Our mapping area more than typifies these findings. By far, the majority of the area has been altered for agriculture, grazing, or other man-induced usage. "Undisturbed" vegetation when found was primarily prairie grasses but not the tall-grass species that originally grew here. Woody vegetation is generally contained along water courses or as planted windbreaks.

Climatically the area has a typical continental type climate characterized by large variations in temperatures both seasonally and diurnally. Precipitation does not exceed loss by evaporation (average of 40"/yr) and is therefore classified as "dry subhumid". Precipitation totals for the year average around 25 inches. More than 75% of this annual amount falls as light rains during the growing season of April through September. Snowfall averages about 20 inches a year.

III. BIOLOGICAL CHARACTERISTICS OF WETLAND HABITATS:

Marine: Not Present
Estuarine: Not present

Riverine:
The most developed riverine system is the Arkansas River and basin. The Arkansas is a lower perennial river with a wide flood plain, extensive flat development and terracing.

Historically, the river flats are scoured annually to remove encroaching vegetation but due to the marked reduced flow of the river both scrub-shrub and emergent communities have been established. Additionally, this reduced stream flow has allowed the Arkansas River to dry up during drought years and is continuing to change the character of the river. (R2UBH-R2UBG). The Little Arkansas River is also a lower perennial river but with much less flood-plain development and more confined boundaries in the headwaters which are found in our area (R2UBH).

The smaller streams feeding the Arkansas River - Peace Creek, Cow Creek, Rattlesnake Creek, Walnut Creek and Salt Creek have taken on a more intermittent nature, again, due to increased water usage and manipulation. (R2UBG-R4SBF). The 1982 USGS Kansas Water Resource Data Report will be used to determine these classifications. These streams are generally much smaller, entrenched and show little flood-plain development.

Numerous other streams feed the tributaries of the Arkansas. However, they are intermittent streams and carry flow only in wet times or from agricultural runoff. (R4SBC). Often, these are impounded or leveled to enhance agricultural practices.

In addition to the natural waterways, agriculture has allowed for the development of extensive canal systems and drainage ditches. The larger diversion canals supply irrigation water regulated from the Arkansas River. Although intermittent, many of these canals (R4SBFx) have better flow than the original tributaries. The smaller canals and road ditches either disburse water or collect runoff on a seasonal basis (R4SBCX).

Lacustrine:

There are two areas of large natural sinks that occur in this region of Kansas. Although historically intermittent, both are currently being managed by state of federal agencies for wildlife refuges. The 19,000 acre Cheyenne Bottoms, operated by the Kansas State Game and Fish Commission, is a series of canals and retention pools that supply or hold water diverted from the Arkansas River or natural runoff from nearby creeks. The inner pool, although the largest and most permanent, seldom exceeds a water depth of more than 24 inches. However, it is only exposed in years of extreme drought (L2UBGh). Manipulation of the water levels in the five surrounding pools is a major tool in the management of the refuge. These are dewatered on a yearly basis to control unwanted plant growth. (PEMFh).

The other large natural lacustrine sink area is managed by the USFWS as Quivera National Wildlife Refuge. Here also, a series of impoundments and structures have been erected to control and manipulate water levels for fishing and waterfowl usage. However, this is a much more saline environment and the water is held primarily in two smaller, natural basins - Big Salt Marsh and Little Salt marsh. The surface water habitats of the marshes are controlled to only be dewatered during extremely dry years. Both basins become dominated by aquatic plants especially Potamogeton sp. by the end of the growing season. (L2ABG). The smaller lakes formed through impoundments are also dominated by these and other aquatic species although less permanent. (L2ABFh).

Borrow pits form the only other lacustrine system recognized with the Great Bend area. Although size alone would not dictate their inclusion as lacustrine, these pits are usually steep sided and deeper than 6 feet. Because of this and their excavated nature, aquatic growth is not promoted. (LIUBHx).

Palustrine:

This region of Kansas contains a surprising diversity in number and kinds of palustrine wetland communities. The majority of woody wetland vegetation, both forested and scrub-shrub, occurred as riparian habitats along the rivers and streams. Wet forested stands of Populus deltoides, Salix spp., Franxinus pennsylvanica, and Ulmus americana dominate the temporarily flooded areas in oxbows and lower floodplain terraces (PFOA). Thick growths of scrub-shrub, predominantly Salix spp., have become established on sand flats adjacent to the waters edge and in the river bed. Once, completely scoured by violent spring stream flows, the decreased stream flows have allowed their survival. Occasionally, a mix of 30% emergent vegetation mostly Spartina spp. will understory the willows. (PSS/EMC). Predominant emergent communities of Spartina spp., Carex spp., Cyperus spp., Typha sp., and others appear in smaller stream beds (PEMC) and in road ditches and agricultural fields throughout the region (PEMCx-PEMFx).

Basin formations also support emergent communities. These small basins and pockets throughout agricultural fields contain Spartina cordata, Scirpus spp., Juncus spp., Eleocharis spp., and other seasonally wet vegetation. (PEMC). Many basins are being partially drained (PEMAd) or completely filled (u) to expedite tillage.

Wet meadows of the dominant Spartina cordata or Districhalis sp., (depending on salinity) with Cyperus spp., Eleocharis spp. and Myosursus minimus occur on flat expanses associated with hydric soils or soils that have hydric conditions. The saline conditions are mostly noted in the slickspot complex and Drummond series. The Plevna, Platte, and Dillwyn soils (among others) tend to support more fresh water species.

Thousands of acres of emergent vegetation surround the water and adjacent flats of the lacustrine sinks at Cheyenne Bottoms and Quivera refuges. The salt tolerant species of Scirpus and Typha latifolia, dominate the wetter environs (PEMF-PEMC). The more mesic areas and flats were almost entirely Distichalis spp. (PEMA). Because of the eventual emergence of saltgrass onto the flats, they will be classified as emergent. (PEMA).

The freshwater environment at Cheyenne Bottoms supports nearly pure stands of Typha latifolia despite management efforts to eradicate them in favor of a more productive food source for waterfowl. Scirpus acutus, and Polygonum sp ., communities grow adjacent to the cattail marshes (PEMF).

Palustrine aquatic bed communities were basically limited in the mapping region to semipermanently flooded impoundments or excavations. No aquatic species were found at field time because of the time of year but collateral data suggests these impoundments support abundant species of aquatics especially algal throughout the growing season. (PABFh, PABFx)

Imagery:

The photography ranges from very good to somewhat poor in quality. Although the resolution is good throughout the 1:100,000 mapping area, there is a slight problem with strip three. It appears as though the developing process resulted in an exaggeration of blue tones. This, in turn, resulted in less differentiation between water regime signatures and an increased reliance on topographic and hydrologic situations and other external photo interpretative clues.

The photography dates range from 9/29/81 to 10/26/81 with one exception being one and one-half frames which were flown in 8/1/82. Photosynthesis is drastically reduced by September and October, resulting in a weaker vegetative signature than would be present in the earlier spring or summer months. Also, with photographs this late in the year, most temporarily and some seasonally flooded areas were drier and thus less evident. This is compensated for by using a more liberal judgement where these water regimes are concerned.

It was concluded during field reconnaisance that the 8/1/82 photography was taken following a substantial rainstorm. This resulted in extremely wet conditions which must be compensated for during photo interpretation. Overlap from surrounding frames of 1981 photography will be utilized to depict more normal conditions. In general, the October photography also showed a slightly wetter condition than the September.

GREAT BEND SE, KANSAS
PI GUIDELINES

1. Small Basin Situations:

Distinct basins containing open water on the photo will be delineated as PEMC. These are assumed to be vegetated by the end of the growing season. (Checksite #1).

Small contained basins with a dark green or slate blue signature will also be PEMC. (Checksite #1).

Shallow basins (less distinct than the C basins) with water or plow marks will be considered temporary - PEMA.

The key to delineating in the mottled field is to make sure the basin or pocket is well confined, not spread out.

Basins with obvious ditches or drainage will be classified with a "d" modifier (usually PEMAd). If ditch is not obvious don't use modifier.

2. Linears:

Stay away from grass waterways. Look for well defined linears, good evidence of water, strong vegetation signatures and avoidance of plowing in the channel.

Make linears vegetated if possible, probably PEMC w/dark green signature or PSSC or PFOA if shrubs or trees are directly in stream bed. Well defined channels will probably be R4SBF or C.

Pull out as many road ditches as possible. If open water is present - PEMFx, vegetated signature, usually a dark green or dark red - PEMCx.

One can force hydrologic connections for a 1/4 - 1/2 mile or so, but make sure linear is worth pulling. Also, it is acceptable to switch classification from EM 1 FO - etc. for longer sections.

3. Rivers and larger streams:

Do not use topo to make R2 vs R4 break. Use Kansas Water Resources Book for as many streams as possible.

On most of the smaller streams, the adjacent terraces will be U, most likely. Only dark contained signatures next to these creeks will be wet. (Checksite #2).

The Arkansas River will be R2UBH-G.

- -Use the photography to determine amount and kind of vegetation delineated regardless of field report, which will at times indicate vegetated flats even though vegetation does not show up on photo.
- -The flats will be delineated as seen on photo - either USC or SSC. You can mix with emergent subclass if signature (dk green) dictates and is definitely more than 30%. These will remain C. Call vegetation SSC if in doubt between EMC and SSC.
- -Forested areas along the river will be a mix of U and FOA. Look for tighter compacted crowns (like "tall shrubs"), and any topographic hints or scouring to determine the low terraces. Upper terraces are U. (checksite #4)
- -Try to give every reasonable chance to delineate a PFO along the river in oxbows or small water channels.

4. Slickspots and Drummond Soil Complexes:

The slickspot soil complex is about a water regime wetter than the Drummond but the two have similar characteristics.

Greater percentage of the slickspot soil will be wet. Keep delineations confined to darker green signature and the slate gray spots - PEMC. There will be basins and linears throughout these soils that will be C. The temporary signatures are a lighter green/gray stain, not confined as the C. The wetland/upland break is very subtle. Stay away from any hint of pinks.

Drummond soil delineations will need to be much more conservative than the slickspot. The wetland/upland break is more difficult and more of the "stained green" signature is U. Reduce thinking from slickspot about 1 water regime. (See photo 179-4, strip 5.)

Other soils may have the potential for containing wet areas or wet pockets. Check soil survey for description and capability classes. Look for changes in land use or absence from agriculture as clues to possible delineation.

5. Sand Hill Areas:

Dark green signature - similar to the classic PEMC, was U (wild plum). Be conscious of terrain and changes in relief and knolls before delineating. (Checksite #5).

Pockets of slate gray or blue occur throughout these areas. These will be PEMC. (Checksite #6, #7)

Slickspot soils occur on the edges of some of the above areas and contain wet fields (PEMA). The signature is again a slate blue but is not confined. Stay away from pinks - U.

6. Quivera Wildlife Refuge:
In this area, some pink tones will be used to indicate wetlands - PEMA. These are found in the fields and on the flats adjacent to the saltmarshes. (Checksite #10, #11).

All open water signatures will be classified as vegetated. The flats around the water will be delineated as PEMA. (Checksite #12). The shallow water areas will be PEMC. The deeper OW signatures in the smaller impoundments - ABF. The large OW signatures in the heart of Big Salt Marsh and Little Salt Marsh will be ABG.

The semipermanent signatures directly adjacent to the open water areas include "fluffy pinks", dk greens, browns, which are mostly bullrush and some cattails. Look for texture more than signature. Little Salt Marsh will not have a very large semipermanent zone.

On the outskirts of the marsh area the darker signatures will be EMC. Here cattail and sedges takes on a drier more seasonal characteristic. The lighter mottled signatures are spartina and saltgrass and will be PEMA. These are usually more associated with the impoundments and the very outer reaches of the marsh.

Around the diked situations, be more lenient with the temporary delineation. Switchgrass is a transitional species and when mixed with spartina (as is the case here) will be A. Further out it will be U.

It will be difficult to make an U/wetland break out away from the marsh. Use associations and field delineations to supplement signatures. Look for trees and shrubs (cedar or wildplum - dark green) to distinguish U ridges.

Don't forget to use "h" and "x" modifiers whenever appropriate. Give as much indication of purposeful manipulation as possible. (Don't use modifier for non-related or accidental situations such as roads.)

7. Cheyenne Bottoms:

Open water areas will not be classified as AB in the refuge. There is too much wind generated wave action to promote or allow AB.

The inner pool will be classified as L2UBGh. The outer pools are semipermanently vegetated with cattail. Therefore, these will be classified as PEMFh regardless of water on photo. Pool 3 and 4 will also have some PEMA areas associated with it, mostly on the outlying areas. (Checksite #13, #14).

The large diversion canal and transfer canals at the refuge will be classified as R4SBCx.

Use "h" and "x" modifiers throughout.

The water level in the pools at the time of the photography is extremely high because of a very wet year and heavy rains.

8. General:

Excavated barrow pits will be L1UBHx.

Mottling in fields does not necessarily mean wet conditions. Check soil surveys and restrict delineations to basins and known signatures.

The use of a wetland in agriculture does not negate it from being considered a wetland for our purposes.

Small excavations showing white return will be PUSCx. If showing water delineate as PABFx, as aquatics will dominate by the end of the growing season. Impoundments will be vegetated PABFh, PABGh, etc. Include entire wetland as one delineation.

Generally, the only wet forested areas will be adjacent to streams. Be careful in delineations so not to include windbreaks or isolated trees that look like wet pockets. They must have drainage or some kind of water connected with them. Depression symbols on topo do not necessarily indicate wetter conditions. (Checksite #9).

CB/kkp/NWI7

NOTES TO USERS

SPECIAL INTERPRETATION CONSIDERATIONS

GREAT BEND SE, KS.

Users should give consideration to the following factors which, tovarying degrees, affected the photointerpretation, delineation and classification of many of the wetlands portrayed on the maps of the study area.

Nature of Photo Interpretation

The map documents were prepared primarily by steroscopic analysis of high altitude aerial photographs. Wetlands were identified on the photographs based on vegetation, visible hydrology, and geography including land-use. The aerial photographs typically reflected conditions during the specific year and season when they were taken. In addition, there is a margin of error inherent in the use of aerial photographs. Thus a detailed on-the-ground and historical analysis of a single site may result in revision of the wetland boundaries established through photographic interpretation.

In areas of high wetlands density and complexity, there may occur small upland areas which, because of their relative size and the scale of the photography, were left as inclusions within larger intricate wetland delineations. This technique helped to relieve potential confusion in areas of extreme complexity and improve the overall readability of the maps. The above procedure was also used where wetlands of different periods of inundation were co-mingled in extreme complexity. For example, some smaller, seasonally flooded pockets may be "lumped" in with temporarily flooded wetlands. In addition, extremely small wetlands or wetlands obscured by canopy may not be included on the map inventory.

The quality of the photography used ranged from somewhat poor to good in quality. In some cases, blue emulsion made interpretation of temporary signatures and differentiation between water regimes difficult. To retain consistency overlap of surrounding frames were used as reference.

The photography dated primarily from 9/27/81 to 10/26/81. Photosynthesis as well as rainfall are drastically reduced by this late in the growing season making detection of wetland vegetation and water bodies less reliable. Field inspection notes, soil, land-use patternsand other interpretative clues were utilized in conjunction with the photographic signature to make the final classification.

Wetland vs. Wetland Signature

The signatures of temporarily flooded meadows (associated with Slickspot and Carwile soils) and the drier, upland soils containing wet inclusions (Drummond, Natrustolls and other complexes) appeared very similar and the distinguishing tones were very subtle. Soil survey and land use pattens were relied upon heavily in making the wetland/upland determination.

The saline conditions of many soils made distinction between dry salt deposits and wet unconsolidated shore signatures difficult. Changes in relief viewed stereoscopically, and topographic contour data provided the primary clues in analysis. Unconsoliated shore signatures were often classified as emergent vegetation or mix classed as emergent/unconsolidated shore because of the eventual domination of emergent hydrophytes and the possibility the emergent signature was obscured by glare.

Common in agricultural areas are numerous small temporarily and seasonally flooded basins and depressions whose photographic signatures were obstructed by land use practices. A great attempt was made to identify as many of these areas as possible using contour data and depression notations from USGS topographic maps and county soil surveys, as well as photographic signature.

The amount of forested and shrub riparian areas included as wetland along rivers and streams was a function of the degree of entrenchment of the water course, the topographic contour data, and the examination of the vegetation for possible wetland understory signatures. Changes in relief and terrain levels were often obscured by the canopy.

Man Induced Factors

In large wetland communities under direct and purposeful control for use as a wetland, determination of the classifications were based on information gained through research of management practices as well as the water conditions the instant of photography. This is particularly the case with the interpretation of Cheyene Bottoms and Quivera wildlife refuges.

However, the classification of the Arkansas River floodplain was based on the date of photography only. Reduced streamflow has allowed for the encroachment of vegetation onto the flats historically denuded by ice flow. No attempt was made to restrict the amount of vegetation identified or approximate the historical condition.

Partially drained wetlands are signified by using a "d" modifier. In no way does this reflect the condition, operation, or effectiveness of the ditches, drains, pumps, or siphons in use. Other factors such as hydrology, irrigation paractices, draining, etc. were taken into account.

The diked/impounded modifier (h) was given to all wetlands that were believed to be influenced by water levels controlled by any impoundment. It is difficult however, to determine exactly the definitive boundary as to the water level's impact on soil and vegetation as a result of the dike. In addition, a variety of different management objectives involving water level manipulation further obscures the use of the "h" modifier resulting from impounded water.

The excavated modifier "x" was given to all wetlands formed by excavations. Ponds and canals for agricultural purposes are the primarily wetlands identified as such. These were classified according to size, depth, presence of water, and liklehood of vegetation.

HYDRIC AND POSSIBLE HYDRIC SOILS

HYDRIC SOILS - as listed in SCS plant list

Seasonal
Kingman
Plevna
Ness

SOILS WITH HYDRIC POSSIBILITIES - as interpreted from soil surveys

Seasonal
Wet Alluvial

Seasonal to Temporary
Carwille
Elsmere-plevna Complex
Lesho
Platte
Waldeck
Slickspot Complex

Temporary to Upland
Dillwyn
Hobbs
Uly
Zenda

Upland with Wetland Inclusions
Carwille-Farnum Complex
Dillwyn-Plevna Complex
Dillwyn-Tivoli Complex
Drummond Complex
Elsmere-Tivoli Complex
Farnum-Slickspot Complex
Natrustolls
Pratt-Carwille Complex
Tabler-Drummond Complex
Tabler-Slickspot Complex

WETLAND PLANT - INDICATOR SPECIES

Intermittently Exposed (G)
Potamogeton, sp. (AB)

Semipermanent (F)
Potamageton, sp. (AB)
Polygonum, sp. (EM)
Typha latifolia (EM)

Seasonal (C)
Carex, spp. (EM)
Cyperus, spp. (EM)
Polygonum, sp. (EM)
Salix, spp. (SS)

Temporary (A)
Distichlis, spp. (EM)
Eleocharis, spp. (EM)
Populus, deltoides (FO)
Rumex, sp. (EM)
Spartina, spp. (EM)