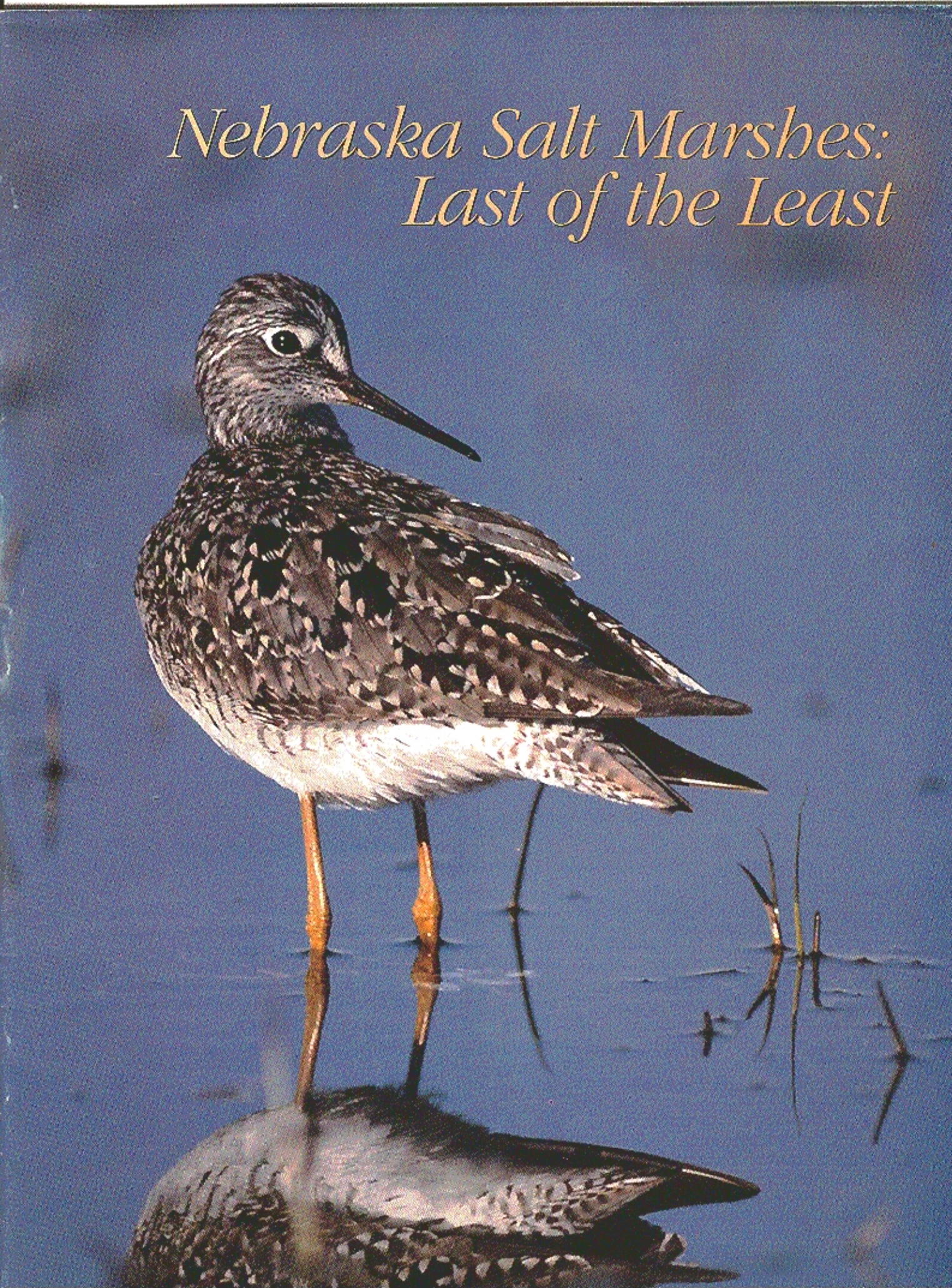
Nebraska Salt Marshes: Last of the Least



Salt marsh. The words are foreign to most Nebraskans- " and if they bring to mind any image at all, it is probably .-1 an image of the coastline of Virginia or the Carolinas; of blue and fiddler crabs, oysters and screaming mobs of gulls and terns; perhaps it is an image of seemingly barren, land-locked waters: the Great Salt Lake in Utah or the Salton Sea in California. The mention of Nebraska salt marshes brings only looks of puzzlement, but Nebraska has salt marshes, and, al- though small by comparison, they have much in common with those elsewhere on the continent.

All are born of saltwater and sustained by it. We recognize a kinship through the plant names they share: cordgrass, alkali bulrush, saltwort, sea blite and widgeon grass. Nebraska's salt marshes are smaller than the coastal salt marshes, and receive no twice-daily wash of ocean tides, but in a manner of speaking, their saline waters are the flow of an ancient inland sea.

If salt marshes in Nebraska seem unlikely, it is with good reason. Even before settlers laid claim to what would one day be Nebraska, salt marshes were few in number and small in extent, essentially limited to the floodplains of Salt Creek and its tributaries in Lancaster and Saunders counties. Today, these unique saline wetlands, with their communities of salt-loving plants, are even fewer in number. Those which remain are smaller and have suffered much at the hand of man. They are Nebraska 's most rare and most threatened natural community, truly the last of the least.

A **History Entwined**

The story of eastern Nebraska 's salt marshes is also the history of Salt Creek and the city of Lincoln. Through geologic and human history, their courses have been inextricably entwined. Salt Creek and its tributaries shaped the landscape and supplied the water, both saline and fresh, which created these unique wetlands in eastern Nebraska. At least in part, it was because of the saltwater basins that Lincoln was founded and became the state's capital.

Salt Creek traces the western and northern edges of Nebraska 's capital city. Near Lincoln, Salt Creek today is a deep canal contained by levees. Its floodwaters no longer threaten the city, and it efficiently performs the uncomely task of carry- ing away the discharge of Lincoln 's gutters and processed sewage. It bears only scant resemblance to a natural stream. it was not always so:

> As we viewed the land upon which now stands this great busy city, we had the exciting pleasure of seeing for the first time a large drove of beautiful antelope, cantering across the prairie about where the government square is (9th and O streets]. We forded Salt Creek, just by the junction of Oak Creek, and what a struggle we had in making our way through the tall sunflowers between the ford and the basin. There was something enchanting about the scene that met our eyes. The fresh breeze sweeping over the salt basins reminded us of the morning breezes at the ocean beach.
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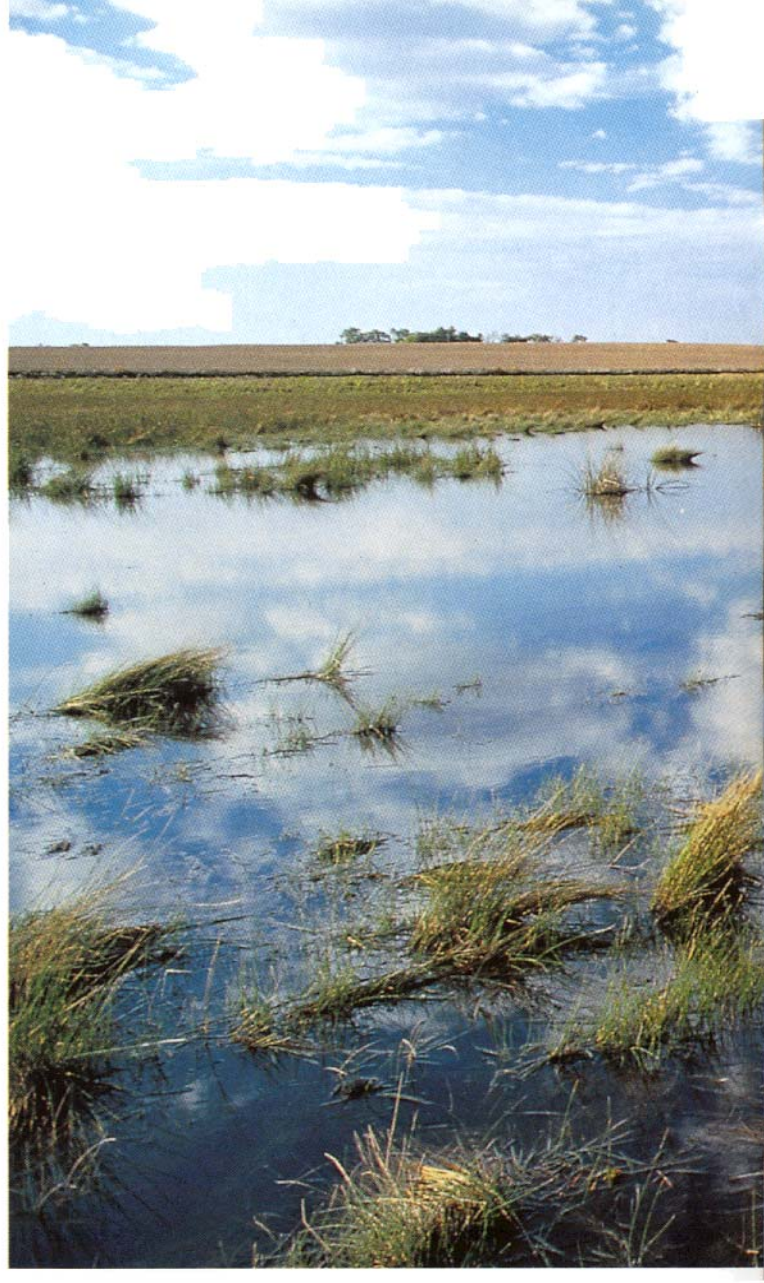
> *W W Cox,* 1888. *Describing the Lincoln landscape of July* 1861.

Cox noted that "elk and antelope were plentiful," that Salt Creek and Oak Creek were "wonderfully supplied with fish," and said "the basin was a great place for wild water fowls to congregate. Geese, brant, swan, ducks and pelicans were there



by the thousands, and it was the hunter's paradise."

The basin Cox referred to was Salt Lake, west of shlt Creek about two miles west of Lincoln, variously known over the years as Chester Basin, The Great Basin, Gregory Basin, Bur- lington Beach and, most recently, as Capitol Beach. Near this basin, numerous small tributaries joined Salt Creek, and game trails radiated out from it like spokes from a hub. While Salt Lake was the largest of the salt basins it was only one of many:

> The Great Basin ...covers an area of about 400 acres. The brine issues from a large number of places all over the surface, but in small quantities. All the salt water that comes to the surface from this basin unites in one stream, and we estimate the entire amount of water that flowed from this basin at from six to eight gallons per minute. The second salt basin lies between Oak and Salt creeks and covers an area of two hundred acres. The third basin

Moderately saline wetlands, such as those along Rock Creek, do not have complete communities of salt-tolerant plants.

is on [lower] Little Salt Creek, called Kenosha Basin, and covers two hundred acres. Numerous small basins occur on Middle Creek, which occupy in all about six hundred acres. Between Middle and Salt creeks are several small basins, covering 40 or 50 acres. From the surface of all these basins more or less spring ooze out.

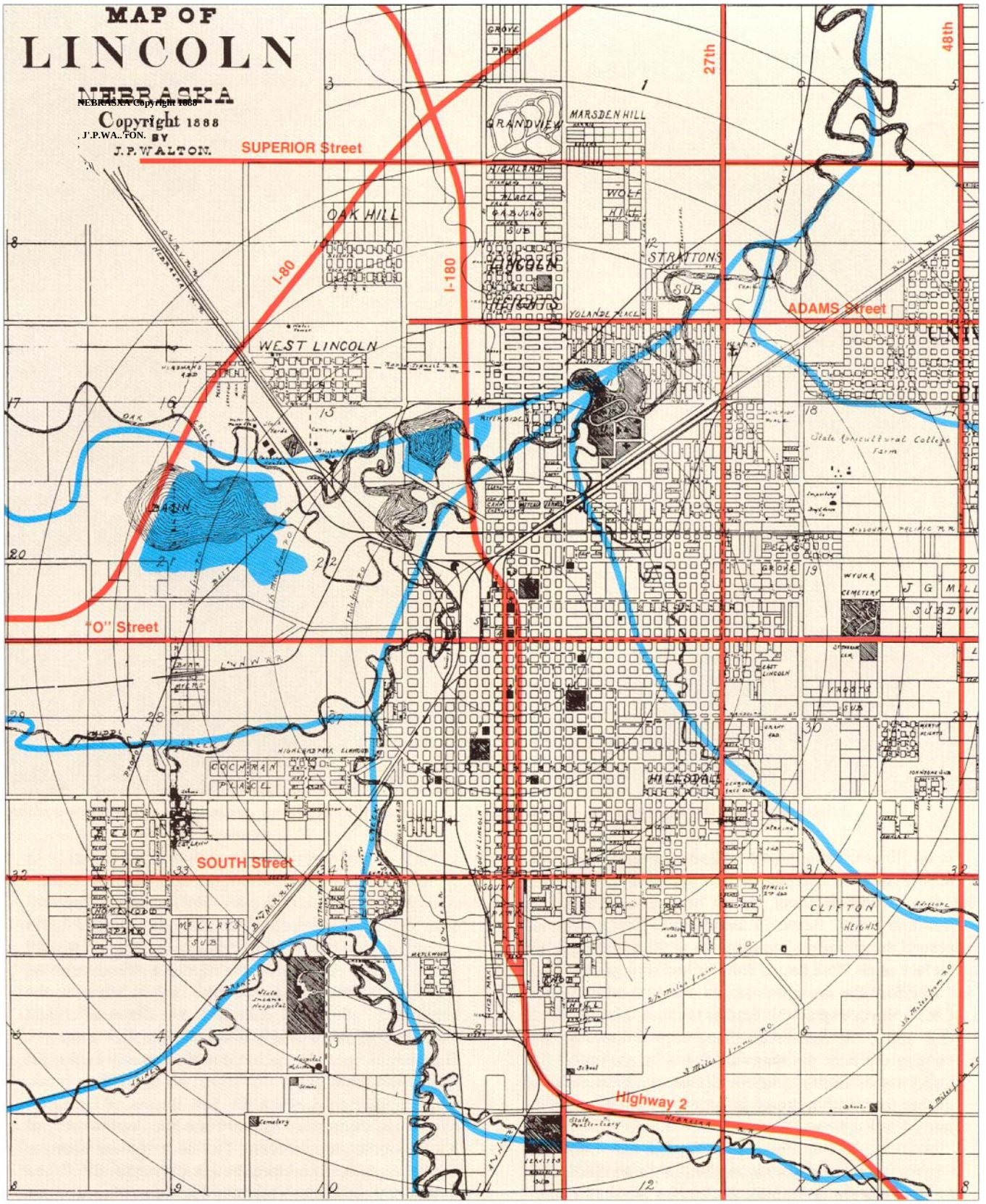
Besides the numerous basins above mentioned, Salt Creek, Hayes's [probably Haines] Branch, Middle Creek, Oak and Little Salt creeks have each a dozen springs coming out near the water's edge. One spring on Salt Creek issues from a sand-rock [Dakota sandstone], and gushes forth with a stream as large as a man's arm, at the rate of four gallons a minute.

F.V Hayden. U.S. Geologist. First Annual Report of the United States Geological Survey of the Territories. Embracing Nebraska. 1867.

Other accounts describe a less well-watered basin:

Approaching Lincoln from the east, the first remark- able object that meets the eye of the stranger is a succession of what appears to be several beautiful lakes extending along the lines of Salt Creek to the northward and westward of the town, the nearest a mile distant. As their crystal surfaces glisten like molten silver in the sunlight the illusion is complete, and the most critical landscape painter would be deceived as to their character. But there is no water enclosed in their grassy banks, yet one is not undeceived till he arrives upon their brink. These apparent lakes are the Salt Basins of Lancaster County, in themselves natural curiosities well worthy of a long journey to visit them. The floor of these basins is hard clay, smooth and level as a brick-yard and polished as that of a Hollander's kitchen. They are covered with a white layer of crystallized salt,

An 1888 Lincoln map shows existing and proposed divisions of the city, original stream courses and larger wetlands. Most wetlands have been filled and streams channelized. Stream courses and standing water today are shown in blue. Several principal streets and highways are indicated in red. Salt incrustations, opposite,form on seasonally dry wetlands as saline water evaporates.



Wonderfully pure, and in more or less abundance according to the length of time that has elapsed since the last rain. Intersecting these salt floors are little streams of salt water, so strongly impregnated that it will almost abrade the tongue and lips when tasted. Upon the west side of Salt Creek the whole surface of the soil for two or three miles around the basins is covered with salt, but this peculiarity does not occur on the east side.

Nebraska Commonwealth, Sept. 7, 1867.

Because so little time passed between the first written descriptions of the salt basins and the time when settlers began LO reshape them, it is not clear how often these wetlands held water or how much water they held. Accounts suggest the basins fluctuated between being "so flooded with water that it was impossible to define any portion of them as saline lands," and being dry lake-beds with "floors of compact earth, covered with a layer of saline crystals." Probably both descriptions are accurate, depending on when in the annual (or long-term) cycle of precipitation the observer happened to see the basins.

Salt of the Earth

The explanation of the origin of these salt marshes lies under the region's mantle of fine loess soil and along the network of streams which have carved through it. Salt Creek has its source in the southwest corner of Lancaster County, 20 miles south- west of Lincoln. Salt Creek's two uppermost branches, Olive Branch and Hickman Branch, join near Roca to form the main stream. South of Lincoln, Salt Creek is fed by several freshwater streams, but tributaries from the west and north carry saline waters. About 13 miles northeast of Lincoln, below the mouth of Rock Creek (a mildly saline tributary), more freshwater streams flow into Salt Creek before it releases its burden of water to the Platte River east of Ashland. Salt Creek is an anomaly among Nebraska streams in that it flows principally to the northeast. About 52 miles long from headwater to mouth, Salt Creek drains an area of about 1,627 square miles.

The saline tributaries which gave Salt Creek its name share a common characteristic: their waters originate from, or flow through, Dakota sandstone, the only underlying rock formation naturally exposed in the region. For the most part, this porous, rust-colored, ferruginous sandstone is soft, crumbles under little pressure, and weathers quickly. The ultimate source of the saline waters, though, lies deeper, in ancient shales laid down in Cretaceous times, the Age of Reptiles, some 70 to 160 million years ago, when much of central North America was covered by a vast inland sea.

The first government survey of the region, in 1857, noted the potential wealth to be harvested from eastern Nebraska's salt basins. Settlers, and Indians long before them, had gathered the salt from natural deposits for their own use or for barter. Commercial exploitation began in earnest in the late 1850s, and the "salt boom" continued well into the 1880s. During the early years, salt was simply scraped from the surface, but soon commercial production by a variety of techniques began. Brine was pumped with windmills, concentrated in evaporation vats, and boiled in large kettles. By the early 1860s, several commercial ventures were extracting the basins' wealth of salt.

So promising was the salt industry, at least to some individuals of considerable influence, that it was a significant factor in the selection of the city of Lancaster as the site of the new territorial capital when it was moved from Omaha. At the time, Lancaster, soon to be renamed Lincoln, claimed no more than 30 residents, most engaged in gathering salt. Designated the state's capital in 1867, optimism for the future of Lincoln soared. The *Nebraska Commonwealth*, a Lincoln newspaper and strong supporter of the salt basin site, noted in September of 1867 that "The development of the saline resources of the Basin would of itself, were there no other inducements, in- evitably attract the iron arms of commerce to Lancaster County, and with no other aid, a town of great commercial importance is bound to be located on Salt Creek." For a time, there was noteworthy commercial production; in 1866, one company alone produced 125,000 pounds of salt for sale.

Much of the hope for the development of a salt processing industry hinged on tapping a supposed buried "mother lode" from which the salty brine rose to the surface as seeps and springs. In October of 1869, a well was sunk for that purpose on the east bank of Oak Creek, about a mile above its confluence with Salt Creek. At 600 feet, drillers "struck a strong artesian flow," but neither aquifers of concentrated brine nor rock salt deposits were encountered. Subsequent wells were equally disappointing. In 1887, in an attempt to determine the validity of the purported commercial-value salt deposit, the state of Nebraska contracted for a deeper well, this one about two miles west of Lincoln on the south shore of Salt Lake. Drillers encountered salt water at about 200 feet and flowing water at about 600 feet. When the work stopped at 2,463 feet, there was no indication ofa salt deposit, and the strongest brine came from a band of sand and gravel at about 200 feet. This revelation, coupled with the development of easily mined salt deposits in Kansas, and the arrival of railroads bringing an unlimited supply of cheap salt, dashed all further hopes of a salt industry in Lincoln's salt basin. Lincoln's saline waters were not totally without commercial value during the city's early years, however. Popular in the late 1880s and early 1890s, were several Lincoln bath houses and sanitariums featuring sulphosaline waters purported to possess all varieties of curative powers.

Lincoln would never be the region's salt production center, but it was entrenched as the state's capital, and, in the eyes of many, it was situated in a most undesirable location:

While this one-time famous salt basin yielded no important benefits to mankind, it unfortunately in- fluenced the commissioners to unwisely plant the capital city in a semi-basin in its uncomely and otherwise in- jurious contiguity, from which, year by year, it instinc- tively shrinks toward the sightliness, salubrity, and unsalted water supply of the adjacent but originally slighted slopes.

Illustrated History of Nebraska, 1906.

The city of Lincoln lies in a roughly elliptical dish about 12 miles from north to south and 25 miles from east to west, a dish carved from the once rolling landscape by Salt Creek and its smaller tributaries which merge there. A nearly level terrace, one- to three-quarters of a mile wide, and 15 to 20 feet higher in elevation, bounds Salt Creek's floodplain. On this terrace, Lincoln 's first buildings would rise, and the central business district would reside. From that terrace, the land gradually rose to become rolling grassland. The selection of this site as the state capital would ultimately sound the death knell for most of the salt marshes over which Lincoln would one day sprawl.

Reshaping the Landscape

Nebraska 's Salt Lake did not sit idle after it was abandoned by the short-lived salt industry. The test well dug by the state on the south shore of Salt Lake in 1887 continued to discharge its briny waters into the basin, and in 1895, a pair of entrepreneurs envisioned yet another path to riches by way of the salt basin. By diking the east end of the basin and diverting Oak Creek into it, a pennanent lake about a mile long and half as wide was created. Soon the waters were plied by an excursion steamboat, and were lined with groves of trees, pavilions, bath houses and restaurants. A Burlington Railroad spur carried visitors from Lincoln and the surrounding area to Nebraska's inland beach, and so it was named Burlington Beach.

Burlington Beach's crowds and the lake itself shriveled when the dike began to leak. In 1906, the development was revived under new ownership and a new name, Capital Beach (more commonly spelled Capitol Beach today). Less than a decade later, the "Coney Island of the West" was again on the decline and, against the advice of the *Lincoln State Journal,* the city of Lincoln decided against a proposal to purchase-for $100,000-875 acres encompassing Salt Lake as a city park:

Anyone with a spark of imagination cannot help view- ing with enthusiasm the prospect of Capital Beach as a part of the city's park system. Here is Lincoln in the midst of a level plain, without rugged scenery and without a river. It seems like a special providence that at its very gates there should be a lake a mile long and a mile wide which could be made into a free vacation resort for the entire city. This lake, surrounded by trees and walks and drives, as it would be, and with ample park space on all sides is undoubtedly the city's greatest potential natural asset.

Lincoln State Journal, August 2, 1915.

ln the 1920s, Capitol Beach was once again revived as a privately owned amusement park and saltwater resort. Until the early 1960s, the area flourished, featuring a saltwater swimming pool, dance hall and amusement park.

From the beginning, Salt Lake, for one reason or another, was seen to have some value. Smaller wetlands near Lincoln were not viewed so kindly. Salt marshes and streams merging in the basin over which Lincoln was expanding were considered impediments to progress. In the first half of the 20th century, most of Lincoln 's growth had been to the east and south, the city instinctively cringing from the low-Iying and frequently flooded marsh ground to the west and north. Although not by grand design, a pattern emerged which would subdue Salt Creek and fill the wetlands associated with it. The destruction of Salt Creek's saline wetlands was accomplished directly by draining and filling low-Iying areas, and indirectly by straightening and deepening Salt Creek 's channel and the lower reaches of several of its tributaries.

The early history of wetland destruction in the Lincoln area is not well documented, but apparently lowlands between downtown Lincoln and Salt Lake were targeted for filling early in the century. From the 1930s until the mid-1950s, low ground and wetlands near Oak Lake, just to the east of Salt Lake, were used as the city dump. Today, grass grows over former wetlands filled with two decades or more of Lincoln 's garbage, and 1-180 severs Oak Lake.

As recently as the 1980s, wetlands west of downtown Lin- coln were still being filled with rubble-spoil from construction sites, demolished buildings, trees, bricks, anything that could be hauled, that had to be disposed of and would raise the level of the land. Most of the wetlands east and south of Salt Lake, on both sides of West O Street and south to the Burlington Railroad Yards, were filled and prepared for industrial, com- mercial and housing developments. Additional impetus for draining and filling these wetlands was provided by America 's mosquito phobia of the 1950s.

Saline wetlands on Lincoln 's northern edge survived a bit longer. Many were still attractive to waterbirds and waterfowl hunters in the 1950s, some into the 1960s.

A handful of these wetlands, particularly those on lower Little Salt Creek, are still hunted today. But, just as a city dump had filled the wetlands surrounding Oak Lake, the new landfill on North 48th Street north of Superior Street claimed several of the best saline wetlands on Lincoln's northern edge from the mid-1950's until it was closed in 1988.

Perhaps the best known of these wetlands was Roper's Pond, located west of the landfill and bounded on the north and west by a bend of Salt Creek. During the 1940s and 1950s, hunting blinds on Roper's Pond were frequented by many of Lincoln's prominent citizens, as were other wetlands along Little Salt Creekjust to the north. Retrieving dog field trials were regularly held on Roper's Pond. East of Roper's Pond, south of Salt Creek and just west of Highway 77, was a series of narrow wetlands, probably oxbows left behind when Salt Creek changed its course. At least one of these lakes, Reller's Pond, was deep enough to be used as a pay-to-fish area. Although altered by land changes near it, Roper's Pond has survived, but today, Reller's Pond and other wetlands to the east of Roper's Pond are covered by the former Lincoln landfill.

Prior to the 1960s, many other wetlands and oxbow ponds along Salt Creek northeast of Lincoln were frequented by both waterfowl and waterfowl hunters. All these wetlands on Lincoln's northern edge were known by name to local hunters and to young boys who regularly sneaked onto them for a chance shot at a duck.

Salt Lake, west of town, was also a popular waterfowl hunting spot. Even in the early 1950s, right up to the time Salt Lake was drained in 1958 so construction of 1-80 could begin, there were eight to 10 blinds on the lake. The lake was still surrounded by pasture and haystacks, and shooting was said to be reliably good for early-migrating ducks and occasional geese, particularly snow geese.

In the summer of 1958, two ditches drained Salt Lake into Oak Creek in preparation for the construction of Interstate 80.

An aerial view, looking slightly north of due west (a sliver of Highway 77 is in lower right hand corner) shows Roper's Pond at a bend of Salt Creek on Lincoln's northern edge, Little Salt Creek entering Salt Creek from the northwest and saline wetlands north of Salt Creek. Lincoln's North 48th Street landfill, covering several former wetlands, is at bottom ofphoto. A 1914 *hunting scene shows Rex Fair and his spaniel, Buster, waterfowl hunting on a marsh "north of Lincoln, " probably along Rock Creek near Ceresco. At that time, Saline wetlands were still abundant on Lincoln's northern edge and along Little Salt and Rock creeks.*

FRANK SHOEMAKER PHOTO, COURTESY LOVE LIBRARY, UNL

Today, twin bands of concrete pass over the old lakebed, and the west quarter of the lake is isolated. Water from its saline seeps is now carried away by ditches. When Salt Lake was drained in 1958, a Lincoln newspaper noted the remains of a hunter's straw blind on the lakebed and that "an eyeless wooden duck mocks the waterless lake."

Beginning in the 1960s, the land around Salt Lake east of 1-80 was developed as a residential area. Today, the lake is lined with houses except on the east and northeast sides, and is supplemented with water pumped from Oak Creek. Most of the small wetlands once found on the east end of the lake have been filled with construction spoil. Only degraded remnants remain, and yet, each spring, a few waterbirds return to them.

In the 1970s and 1980s, most of the remaining small wet- lands along Superior Street between 27th and 56th streets in north Lincoln were filled to accommodate a growing industrial park. To the north and west, Lincoln had finally broken through the flood-prone, lowland barrier which had retarded the city's growth in those directions.

Straightening Salt Creek

Even before the turn of the century, Salt Creek and its tributaries had been modified to make them more compatible with human interests. Sanitary District No.1 of Lancaster County was organized in 1891 and soon initiated "stream improvement" work such as channelization and bank stabilization, a mission the District pursued until the early 1960s when it ceased to exist, leaving little of Salt Creek and the lower portions of several of its tributaries untouched.

Although flood control was certainly a benefit of channel improvement, the principal mission of the Sanitary District, at least initially, was to ensure that Lincoln's sewage was carried away as quickly and directly as possible. The District's early work straightened and widened Salt Creek through Lincoln to accommodate larger peak flows. Levees, constructed principally with spoil excavated from the streambed and banks, further confined the creek to a straight, narrow channel.

Channelization of Salt Creek from Lincoln to Ashland was done piecemeal, a section at a time, from 1917 to 1942, much of it during the 1930s. Salt Creek was straightened by cutting off meandering loops of the original channel, and thereafter, its velocity increased, widening and deepening the channel.

Channel modifications on Salt Creek and its tributaries above Lincoln were limited to relatively minor channel- straightening projects undertaken by individuals. In the 1950s, Salt Creek south of Lincoln was described as "small and tor- tuous, its banks overgrown with trees and brush, with high banks forming natural levees." This condition, described in rather undesirable terms in a 1957 U.S. Army Corps of Engineer's report, is today protected, in part for those same natural features, as part of Lincoln's Wilderness Park.

In addition to modifying Salt Creek itself, the Sanitary District altered the channels of several Salt Creek tributaries in the Lincoln area.

Salt Lake, opposite, now called Capitol Beach, was the Lincoln area's largest saline wetland. After Interstate 80 *(upper left of the photo) split the lake in the late 1950s, it was encircled by residential development. Several small salt marsh remnants remain east of the lake, below, which were still being filled with construction rubble (lower left hand corner of the wetland) in the 1980s.*

The lower half-mile of Haines Creek was straightened and its banks stabilized, as were two miles of Middle Creek above its mouth. Antelope Creek and Deadmans Run, both passing directly through Lincoln, were straightened over the years, mostly during the 1930s. Between N and Vine streets at the eastern edge of the downtown district, Antelope Creek was confined to an underground tunnel.

The greatest modifications occurred on the lower portion of Oak Creek. Originally, Oak Creek meandered along the north and east sides of Salt Lake before entering Salt Creek west of the University of Nebraska City Campus (see 1888 map). Because it frequently flooded residential, railroad and industrial areas, between 1909 and 1913, a new channel approximately four miles long was cut from the north side of Salt Lake east to join Salt Creek north of the State Fairgrounds. Later, during construction of the Lincoln Air Base in the mid- 1940s, and to protect the Lincoln airport from flooding, the Oak Creek channel in that area was straightened. Today, Oak Creek from Highway 34 northwest of lincoln to its mouth is essentially manmade.

In spite of the best efforts of the Sanitary District, Salt Creek and its tributaries regularly continued to spillover their banks. The May 1950 flood was among the most destructive, inundating nearly 20,000 acres of land, claiming 9 lives, and causing damage estimated at nearly $3 million, more than half in the Lincoln area. Because of Lincoln's location in 1he basin, the western and northern portions of the city were frequently awash in floodwaters. After the 1950 flood, the Salt- Wahoo Watershed Association began pushing for more extensive and effective flood control.

In the 1950s, both the U.S. Army Corps of Engineers and the U.S. Department of Agriculture developed flood control plans for the Salt Creek drainage. The Corps plan centered on the construction of large reservoirs and channel improvement along principal streams. The Department of Agriculture proposed improved conservation practices on farmland in the watershed to control runoff, and the construction of many smaller reservoirs. In 1954, with the involvement of many local interests and watershed organizations, a comprehensive plan was adopted. The most conspicuous product of the projects was the construction of levees along Salt Creek through Lincoln, from Calvert Street on the south to Superior Street on the north, and the construction of 10 Salt Valley reservoirs during the 1960s. From the mid-1950s to 1980, a host of smaller impoundments were built on smaller tributaries and upstream from the Corps of Engineers dams.

Salt Creek was straightened by cutting off its meandering loops, many of which, like those northwest of Waverly, below, are still visible. Although many saline wetlands have been destroyed or altered, the location of former saline wetlands can be identified by the soil types with which they are associated, indicated by the salmon color on the map, opposite.

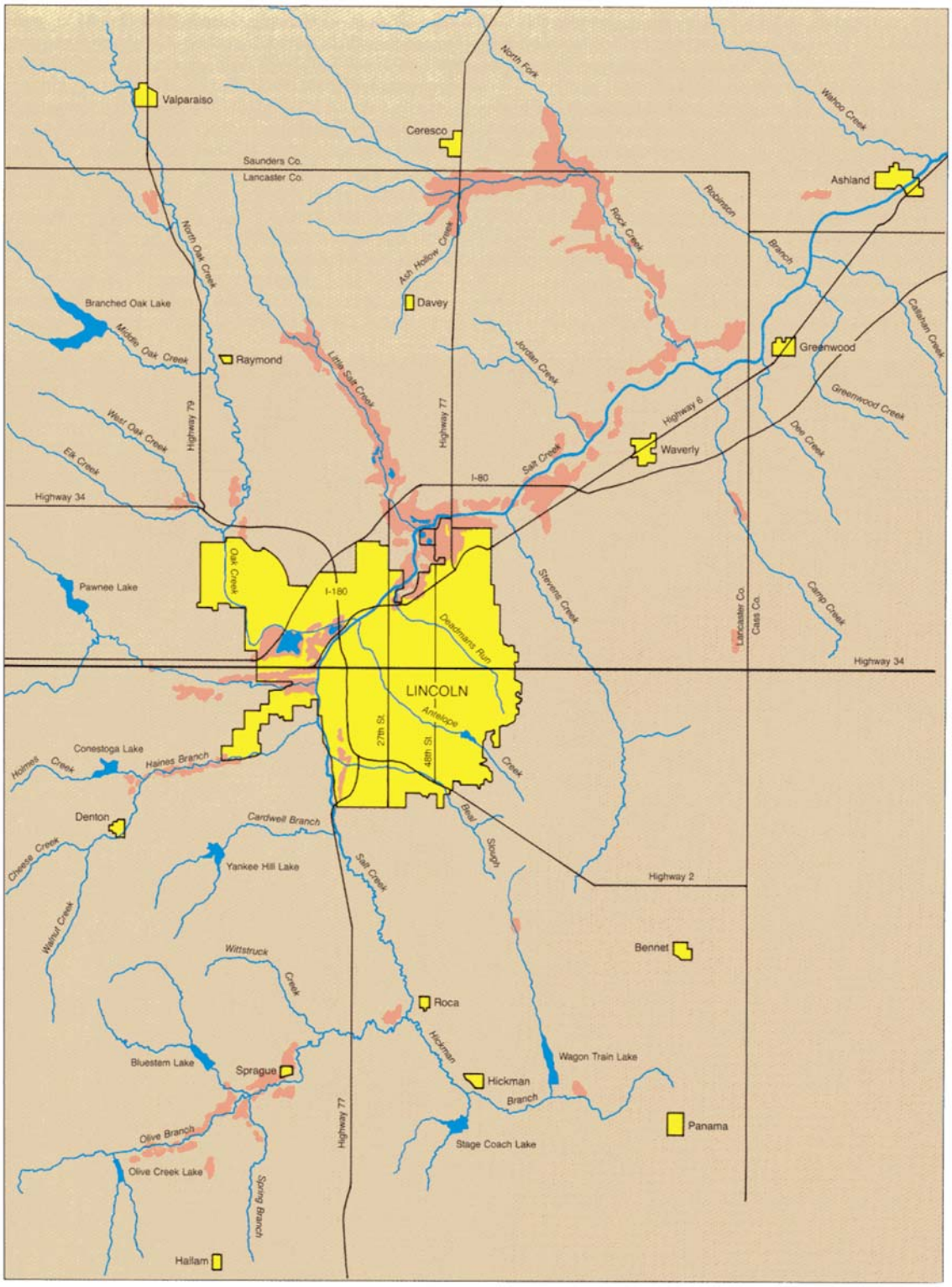
Since construction of levees through Lincoln in the 1960s, modifications to Salt Creek and its tributaries have been comparatively minor, principally maintenance and bank stabilization. Salt Creek has not flooded in the Lincoln area since 1963. Salt Creek and its tributaries finally seem under control, but at the expense of the region's formerly abundant wetlands.

Head-cutting Tributaries

Compared to Salt Creek and the lower reaches of its tributaries in the Lincoln area, Little Salt Creek and Rock Creek to the north were treated with gloved hands. Settlement of their watersheds was much like that of most of rural eastern Nebras- ka. Small towns sprang up here and there, county roads criss- crossed on the mile lines, and farmers plowed what land could be farmed. What could not be plowed was used for pasture. Because much of the bottomland was too wet to farm and periodically flooded, it remained untilled and in native grass. Many wetlands escaped destruction because they attracted waterfowl. Some were purchased outright by waterfowl hunters, others were leased from farmers by hunters. Although saline wetlands along Little Salt Creek and Rock Creek escaped destruction from urban sprawl, substantial losses and degrada- tion occurred as side effects of agriculture.

A few wetland sites were tiled and drained. More often, native vegetation declined in abundance or disappeared and was invaded by less desirable species because of chronically poor pasture management. Probably the greatest alteration of saline wetlands in the Little Salt Creek and Rock Creek drainages resulted from the channelization of Salt Creek. With its course straightened and confined, the water velocity of Salt Creek increased and its channel cut deeper. In turn, Salt Creek's tributaries began head-cutting, carving deeper into their beds to adjust their gradients, leaving eroded, unstabilized banks. Lowered streambeds had an indirect, but profound, effect on wetlands associated with Salt Creek and its tributaries.

Historically, saline wetlands in northern Lancaster and southern Saunders counties were filled principally by runoff from surrounding


Valparaiso
Ceresco
Saunders Co.
Lancaster Co.
North Fork
Wahoo Creek
Ashland
Robinson Branch
Rock Creek
Ash Hollow Creek
Davey
Branched Oak Lake
Middle Oak Creek
Raymond
North Oak Creek
Highway 79
West Oak Creek
Elk Creek
Highway 34
Little Salt Creek
Highway 77
Jordan Creek
Greenwood
Callahan Creek
Greenwood Creek
Highway 6
Waverly
Dee Creek
Salt Creek
I-80
Oak Creek
I-180
Pawnee Lake
Stevens Creek
Lancaster Co.
Cass Co.
Camp Creek
Highway 34
Deadmans Run
LINCOLN
27th St.
48th St.
Antelope Creek
Conestoga Lake
Holmes Creek
Haines Branch
Denton
Cardwell Branch
Cheese Creek
Yankee Hill Lake
Salt Creek
Bear Slough
Highway 2
Walnut Creek
Bennet
Wittstruck Creek
Roca
Hickman Branch
Bluestem Lake
Sprague
Wagon Train Lake
Hickman
Panama
Olive Branch
Stage Coach Lake
Highway 77
Olive Creek Lake
Spring Branch
Hallam

uplands, and by the high-water flows of streams which periodically spilled into the floodplain's basins and depressions. Springs and seeps contributed water to some wetlands on a more regular but limited basis.

As channels cut deeper, they could accommodate higher flows, and adjacent wetlands were less frequently replenished. Although the hydrologic relationship between Salt Creek tributaries and their stream-side wetlands is not completely understood, it is suspected that a deeply entrenched creek functions much like a drainage ditch, lowering the water table, at least immediately adjacent to the creek where most wetlands are located. As a consequence, groundwater seeps away from wetlands more rapidly than it once did.

The conversion of uplands in the Salt Creek watershed from grassland to cropland has also affected saline wetlands. Years of runoff from surrounding uplands deposited silt in many depressions where wetlands existed. Today, most surviving wetlands in the Salt Creek drainage are shallower than they once were, and have a diminished water-holding capacity.

Unlike Salt Creek, Little Salt Creek and Rock Creek escaped channelization. From the air, oxbows are still evident, and some are filled with water. Most wetlands associated with Little Salt Creek are along its lower reach. The most extensive complex of saline wetlands along Rock Creek is in a basin four miles southeast of Ceresco where the North Fork merges with Rock Creek. Below the mouth of the North Fork there are fewer wetlands, and cropland edges up to the banks of Rock Creek.

Birds of the Basins

During the last century, more than 230 species of birds have been reported from the salt basins of Lancaster County, more

than half the total number of species reported for the state. Of particular interest are the waterbirds. At the turn of the century, the bird life of Salt Lake west of Lincoln and of other saline wetlands in the area was lavished with attention, largely because of the wetlands' uniqueness and their close proximity to University field naturalists. Among the waterbirds they noted during migration were western and eared grebes; Caspian, Forster's, black and least terns; Hudsonian and marbled god- wits; white-faced ibis; herring gulls; northern phalaropes; buff- breasted sandpipers; red knots; long-billed curlews; and snowy, mountain, American golden and black-bellied plovers. Short- eared owls and northern harriers were probably regular nesters in the low grasslands associated with the saline wetlands of Salt Creek and its tributaries, as were small songbirds which fre- quent low grasslands and marsh edges. Most species of ducks and geese reported in Nebraska frequented Salt Lake. A century ago, king rails, snowy egrets and the now-threatened piping plover nested near or on its shores.

In recent years, there have been unexpected sightings of black and king rails, black-necked stilts, white-faced ibis and black-legged kittiwakes in the remnant salt marshes of Lan- caster County. Uncommon breeders, such as the great-tailed grackle, common moorhen, king rail and least bittern, have been observed nesting.

Just as shorebirds and waterfowl were attracted to the saline wetlands, so too were hunters. At the turn of the century and for some decades thereafter, these wetlands were a frequent close- to-town hunting destination:

> During the fall and spring migrations of the water fowl it [Salt Lake] seems to be a very attractive spot for them. During the two seasons there is scarcely a day but that one may see one or more flocks of ducks or geese, and numerous shore birds. There is so little concealment that the ducks do not have much trouble in keeping out of range of a gun. Most ducks are killed from boats. Two local hunters the past fall killed 157 ducks of various species during six afternoons in a boat. Days when, in a twenty or thirty miles' tramp along the creeks one will not see a duck, there will be several nice flocks at the lake. I have seen quite often as many as four or five thousand ducks on the water at one time.
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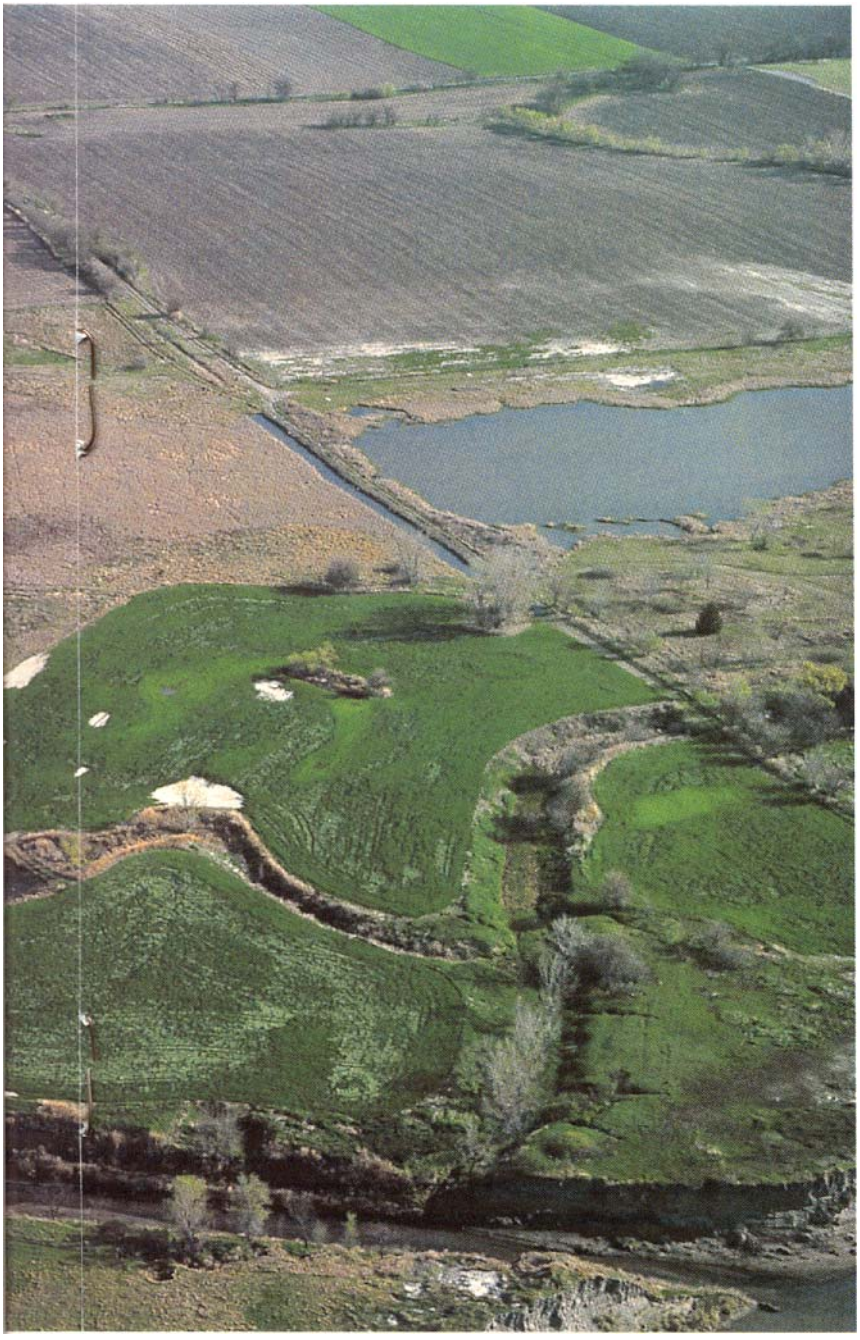
> *J.S. Hun/et;* 1899.

Wetlands associated with lower Salt Creek in the Ashland area, several ofwhich were saline, were the frequent destination of Sandy Griswold, sporting editor of the *Omaha World-Herald* from 1898 to 1929, particularly when common snipe, “jacks," as he frequently referred to them, were pausing during migration. Even then, he could foresee the day when these wetlands would be a thing of the past:

> Continued ditching and tiling have left these once almost limitless bog lands largely in a perfectly tillable condition, and the farmers up there consider them to be the very choicest of all the choice agricultural territory that abounds in the neighborhood, and the jacks will doubtless ere many years surrender that scope of country entirely for better and broader grounds. Huge drains and ditches crisscross the old grounds in all directions, and while there are still the struggling and isolated pools remaining, the drainage is so perfect that there is but little available grounds surrounding them. The progress and thrift of the American farmer is something that even the jacksnipe cannot check, and if the ravages of improve- ment, to use a somewhat anomalous expression, seem great today, what will they seem ten years hence?
>
> *Omaha World-Herald, April* 25, 1915.



Channelization increased Salt Creek's velocity, and its channel cut deeper. In turn, Salt Creek's tributaries carved deepe r into their beds, and could accommodate higher flows. Thus, streamside wetlands were less frequently replenished when creeks flooded, and groundwater seeped away more rapidly. This process is illustrated by eroded gullies fingering out into a saline wetland adjacent to Little Salt Creek, left.

During the last century, more than 230 *species of birds have been reported from Lancaster County salt marshes. Once, a varied array of waterbirds frequented these wetlands. Today, the kinds and numbers are more limited, but still include such rarities as white-faced ibis, below, and more common species such as the American bittern, opposite.*

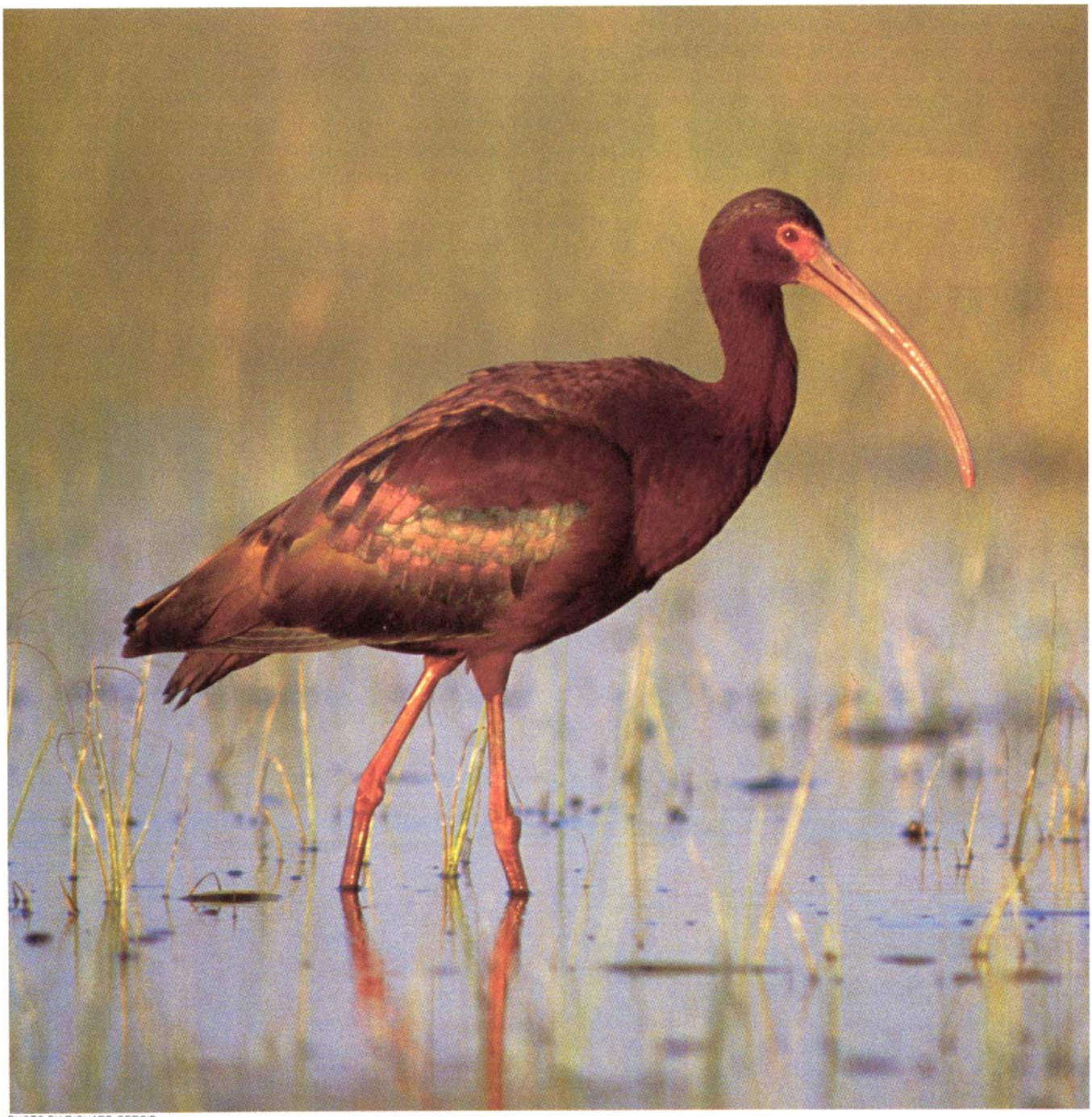


PHOTO BY RICHARD GERSIB

Because saline wetlands are characteristically shallow, and their waters frequently retreat, revealing expanses of mudflats, they were favored by migrating shore and wading birds. Larger waterbirds, particularly the puddle ducks-mallards, teal, gadwall, wigeon, shovelers and pintails-found the more permanent wetlands with stable water levels attractive. Because it was the largest of the saline wetlands, Salt Lake, west of Lincoln, also attracted diving ducks-canvasbacks, redheads, scaup, buffieheads and ruddy ducks. Geese, especially snow geese, regularly layover on the saline wetlands during spring migration, particularly on the Ceresco flats and even on Capitol Beach Lake until Lincoln encircled it in the 1960s. Snow geese still pause on wetlands near Ceresco during spring migration when the wetlands hold adequate water, and they are occasionally taken by hunters in the fall.

Beetles, not birds, provide a curious sidelight to the fauna of Salt Lake. At the turn of the century (as they do today) tiger beetles attracted as much, perhaps more, attention from

University naturalists than did the rich variety of bird life. Several species of tiger beetles associated with wet saline sites are found in the Salt Creek drainage, but of particular interest is a variety of one species, *Cicindela nevadica lincolniana*, known only from the saltflats of two saline wetlands near Lincoln. The large number of specimens in University of Nebraska collections indicate this tiger beetle was once abundant. Today, because of the draining and filling of salt basins, its populations are much reduced.

Salt-loving Plants

The process by which salts concentrate in floodplain soils of the Salt Creek drainage system is not fully understood. As for most natural phenomena, there is probably no single explanation. Springs and seeps issuing from exposed Dakota sandstone along streams or on the margins of basins, or up through soils on the basins' floors, are the obvious sources of these briny waters. For thousands of years, these saline waters flowed into basins and streams in the Salt Creek watershed, and the salts were concentrated by repeated evaporation. While not all saline wetlands are fed by saltwater springs, the natural movement of water and periodic flooding probably carried salt-impregnated waters throughout the floodplain.

Less direct natural processes could also contribute to the accumulation of salts. It is likely that salts are leached from some upland soils, carried by runoff into the floodplain, and concentrated by evaporation, much as they are in alkaline wetlands in Nebraska's western Sandhills. It is also probable that salt-laden waters from shallow aquifers are wicked to the surface during prolonged dry periods.

What is known is that Dakota sandstone deposits are the pathway through which saltwater moves to the surface in the Salt Creek drainage, and year after year, as surface water evaporated during dry periods, salt concentrations in soils and wetlands increased. In time, salt levels in the upper 12 inches of these silty-clay soils were high enough to dictate the plant life that could grow there. It was at this stage that freshwater wetlands became saline wetlands.

Plants, like animals, have evolved many strategies for sur- vival. Some are generalists, adapted to a broad range of growing sites; others are specialists and can survive only where an exact mix of soil type, water chemistry, moisture content, exposure to the sun and evaporation rate occurs.

Salt-tolerant plants are specialists, so precisely adapted to their saline environment they are unable to compete with plants

found in prairie or freshwater wetlands. Conversely, few other plants can compete with salt-tolerant plants in the saline wetland's inhospitable environment.

No one saline wetland is exactly like another. Each is shaped by its physical circumstances and a century of alteration by man. Some saline wetlands, particularly the larger ones, like Salt Lake west of Lincoln, occur principally where major tributaries merge with Salt Creek, and are easily recognized as basins. Others are smaller, occupying a relatively narrow strip of floodplain between a Salt Creek tributary and the hills which confine it. Some saline plant communities are no more than narrow bands at the edges of saline streams.

Compared to most plant communities, the number of species in a saline wetland is typically small, and one species usually dominates in abundance and coverage on a particular part of the wetland. It is unusual for a single wetland to have all species of salt-tolerant plants native to the region, and the most complete communities of salt-tolerant plants are found on more highly saline basins associated with Salt and Little Salt creeks. While many salt-tolerant species occur in the Rock Creek drainage, they do not develop extensive saltflat communities, probably because of lower soil-salinity levels in those wetlands.

The site where a particular salt-tolerant plant grows is dic- tated by precise distinctions in degree of soil saturation and salinity. These environmental conditions are in a constant state offlux, and consequently, so too are boundaries separating plant communities. For convenience, we can imagine a basin where all salt-tolerant species are present and arranged in an orderly, albeit simplified, transition from the center to the margins.

If the center of a basin holds water most of the year, it may support an aquatic plant community. On a saline wetland, sago pondweed is the most common submerged aquatic plant. At the water's edge, colonies of prairie bulrush, narrow-leaved cat- tail, or widgeon grass may establish. Often, small depressions, called pans, are found elsewhere in the basin, and hold water consistently enough to support the same aquatic plants. Frequently, the most permanent water is not found at the center of the wetland at all, but below a seep near the basin's margin, and it is here that colonies of broad-leaved cat-tail can be found. As water from seeps flows to the center of the wetland, salt concentrations increase, and broad-leaved cat-tail is replaced by more salt-tolerant species such as narrow-leaved cattail and prairie bulrush.

Encircling the aquatic plant community is the saltflat, where a saline wetland's most interesting plant communities grow. Typically, the saltflat dries each year, or several times a year. The soils of the saltflat are mucky, with a high clay content. Because clay particles are small, soil aeration is poor and evaporation reduced, resulting in soils with excellent water- holding properties.

Even on the seemingly uniform saltflat, there are subtle environmental distinctions which dictate where particular plant species can grow. Soils on the inner portion of the saltflat remain more moist, keeping salts in solution. The outer portion of the saltflat dries deeper and more frequently, and salt precipitating out forms white encrustations on the soil surface. If the entire basin dries for extended periods each year, a saltflat will also occupy the center of the basin.

The dominant plant on the innermost band of the saltflat is saltwort, a short, compact, succulent plant, usually four to eight inches tall. Under optimum growing conditions, saltwort plants grow close together, forming compact colonies, but at less favorable sites they assume a miniature shrub-like appearance and are more widely spaced. Saltwort has occasionally been found growing at one location in central Kansas, but Lancaster County, Nebraska is considered the southernmost permanent extent of the species' range.

Encircling the saltwort, on slightly drier portions of the saltflat with higher salt concentrations, is a band of sea blite. Typical of many saline plants, sea blite has narrow, nearly round, fleshy-to-succulent leaves. A bushy plant, it may reach 18 inches in height, and in the fall turns a rich, reddish purple. Like saltwort, individual plants are widely spaced at highly saline sites, and develop a low, spreading form.

Although usually found in pure stands, sea blife is often in the company of saltwort and inland salt grass. A water-filled, two-inch-deep hoofprint in a sea blite colony may create a micro-habitat where saltwort establishes. Saltgrass growing on a saltflat exists at the limit of its tolerance for soil saturation and salinity levels. Consequently, it is dwarfed in size and grows as isolated plants. Both saltwort and sea blite are sensitive to drought, and may disappear completely during prolonged dry periods. Both, however, are annuals and produce abundant seed crops during favorable years, seeds which can lie dormant until acceptable conditions return.

The greatest diversity of plant species on a saline wetland is found in a transition zone between the saltflat and surrounding prairie. Soils in this zone are saturated or inundated frequently enough and for long enough periods to be considered a part of the wetland, but for too short a duration to develop salt con- centrations which favor plants tolerant of highly saline soils. Within this transition zone, salinity levels decline, and two distinctive bands of vegetation establish, each with its own characteristic group of plants.

The band encircling the saltflat is dominated by two species, foxtail barley during spring and early summer, and marsh elder from midsummer into autumn.

Found only on saline soils, saltmarsh aster, opposite, is reported from Nebraska only in Lancaster County. Saltwort and salt grass grow on a highly saline '"pan " on a Little Salt Creek wetland, below. A less saline area in the background is colonized by prairie bulrush. As they were in 1915, bottom, the Lincoln salt flats are a frequent destination of entomologists collecting tiger beetles.

Both species prefer sites with moderate-to-low salt concentrations and soil saturation, but can invade more moist sites with higher or lower salt concentrations. Other species present in this band include prairie bulrush, sea blite, spearscale, spikerush, silver-scale saltbush, white aster, saltmarsh aster, panicled aster, seaside heliotrope, bearded sprangletop, curly dock, western wheatgrass, Texas dropseed, prairie cordgrass and plains bluegrass.

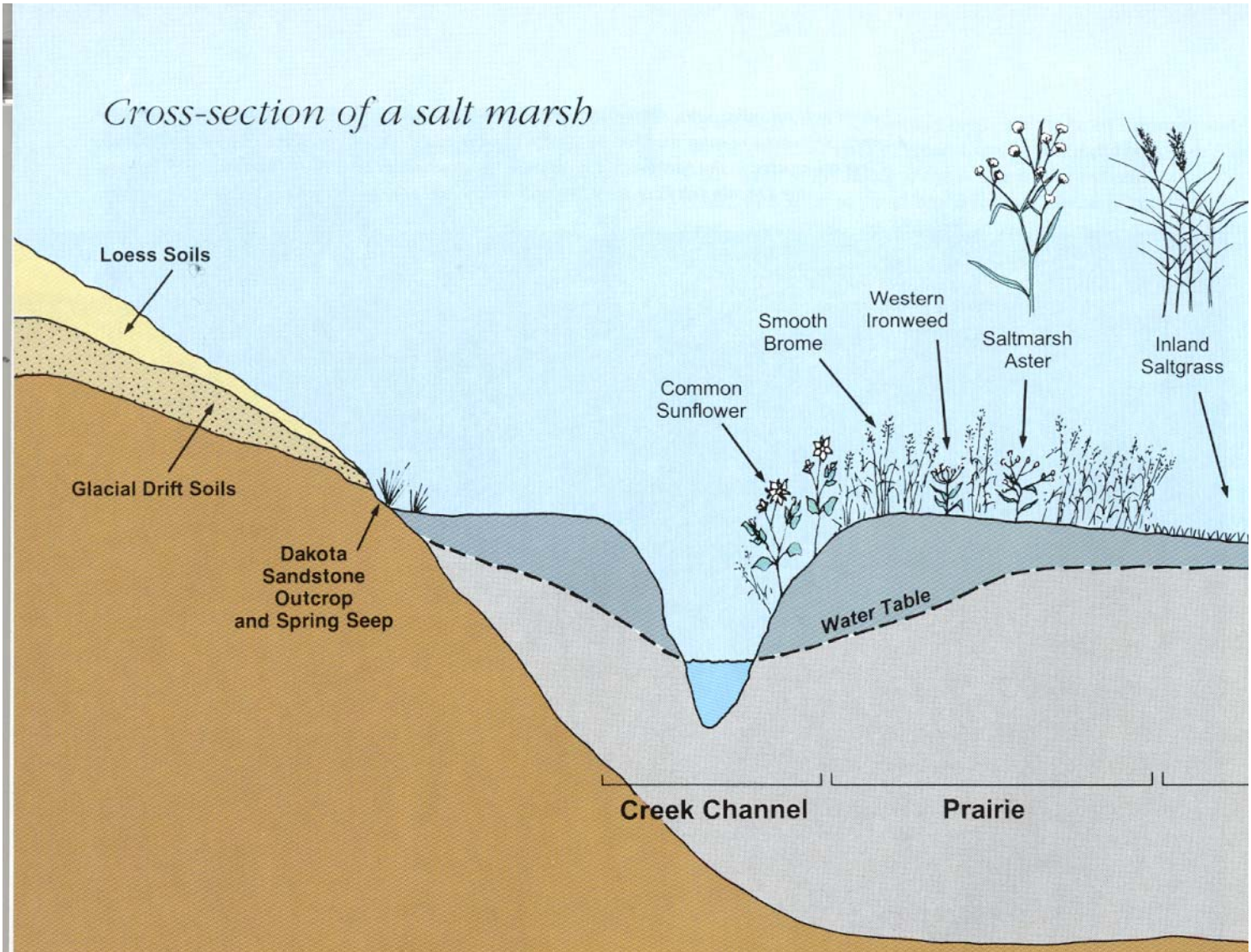
Typically, a band of inland saltgrass is the final transition from saline wetland to surrounding prairie. Here, on better drained and less saline soils, saltgrass is not dwarfed in stature, and grows as a dense, low carpet from an extensive network of underground stems. Saltgrass is a resilient, perennial grass able to survive prolonged drought.

The inland saltgrass association is dynamic. Disturbance from the cyclic extremes of drought and high water may bring alternating invasions of upland and wetland plants that thrive on somewhat disturbed soils. These invaders often include foxtail barley, marsh elder, white aster, curly dock, common sunflower, gumweed and western ironweed.

Although the soil found in the saltgrass band may be slippery when wet, it is rarely mucky or sticky as are soils where saltwort and sea blite grow, and even during prolonged dry weather, the surface rarely cracks. Soils under saltgrass usually have a higher sand and lower clay content, contributing to better drainage, higher evaporation rates and shorter periods when water stands on the surface. Soils under the saltgrass band do not accumulate high salt concentrations, as runoff washes salts to lower portions of the basin. Except for slightly higher concentrations of clay and salt, these soils are similar to those found under the prairie encircling the wetlands.

Before man altered the water regime of Salt Creek, its tributaries and associated basins, the saline wetlands of northern

FRANK SHOEMAKER PHOTO. COURTESY LOVE LIBRARY. UNL



Dakota sandstone, a formation of porous, rust-colored rock, underlies the soils of much of eastern Nebraska. Where streams have cut down through overlying soils, Dakota sandstone is exposed, and saline waters from still deeper rock formations rise to the surface as springs and seeps which flow into depressions in the floodplain. Repeated evaporation of saline water in these shallow basins over thousands of years concentrated salts in floodplain soils, setting the stage for the formation of saline wetlands.

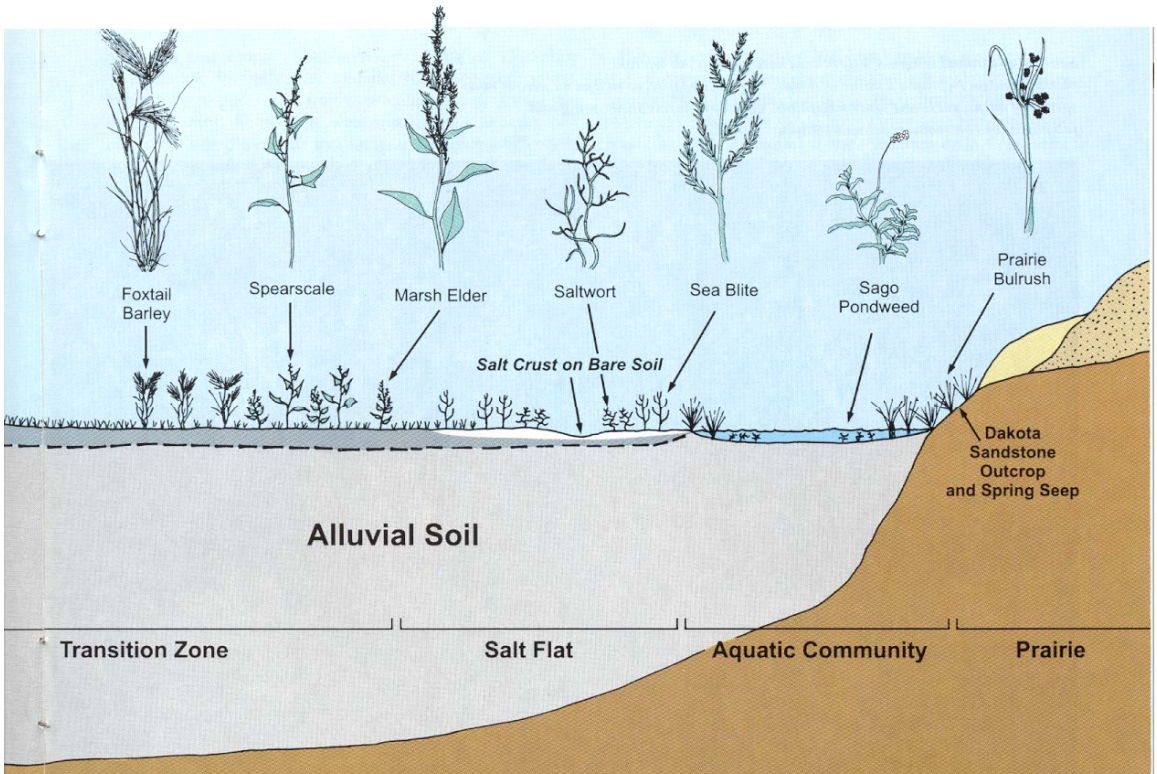
Compared to other plant communities, the number of plant species growing on highly saline soils is small. Each species has adapted to a particular part of the wetland, a micro-environment defined by minute variations in soil saturation and salinity. The idealized saline wetland shown above illustrates how salt-tolerant plants are distributed throughout a Nebraska salt marsh.

If the lowest portion of the wetland is inundated much of the year, it will be colonized by submerged aquatic plants such as sago pondweed, an important food plant for waterfowl. Prairie bulrush, a salt-tolerant rush, may encircle the standing water.

Surrounding the standing water and aquatic plant community is a saltflat. Saltflat soils have a high clay content, are saturated with water, and have the highest salt concentrations. The portion of the saltflat nearest the center of the wetland is the wettest, keeping salts in solution, and salinity levels moderately high. Here, saltwort, a plant found nowhere else in Nebraska, thrives. Beyond the wetter, inner ring of the saltflat, evaporation frequently dries the soil surface, concentrating salt near the surface. Sea blite occupies this slightly drier, central portion of the saltflat zone. Inland saltgrass, dwarfed in stature and sparsely spaced, is often the only plant which can survive on the dry, salt-encrusted outer portion of the saltflat, the most inhospitable growing site on a saline wetland.

The greatest diversity of plants on a saline wetland is found in a transition zone between the saltflat and prairie at the outer edge of the wetland. Closest to the saltflat, foxtail barley and marsh elder dominate, but many other species also grow here, including spearscale, saltmarsh aster, seaside heliotrope, bearded sprangletop and Texas dropseed.

The outermost band of the transition zone, and of the saline wetland, is usually colonized by inland saltgrass. Here, where soil saturation and salinity is lower than on the saltflat, saltgrass is not stunted and often forms a dense carpet.



The plants of a saline wetland are seldom arranged in so orderly a manner. The boundaries between zones where one species or another is favored are constantly changing as soil saturation and salinity fluctuate, and a mixing and merging of plant species occurs. Frequently, the most consistently wet portion of a saline wetland is not at the center, but below spring seeps emerging from the foot of hills at the edge of the floodplain, as illustrated here. Saltflats on large basins may have small depressions or "pans" which periodically hold water, where plants most tolerant of high salinity and saturated soils grow.

Characteristic plants of a Nebraska salt marsh:

AQUATIC PLANTS
- Sago pondweed, *Potamogeton pectinatus*
- Widgeon grass, *Ruppia maritima*
- Prairie bulrush, *Scirpus maritimus* var. *paludosus*
- Narrow-leaved cat-tail, *Typha angustifolia*
- Broad-leaved cat-tail, *Typha latifolia*

SALTFLAT PLANTS
- Inland saltgrass, *Distichlis spicata*
- Saltwort, *Salicornia rubra*
- Sea blite, *Suaeda depressa*

TRANSITION ZONE
- Western wheatgrass, *Agropyron smithii*
- White aster, *Aster ericoides*
- Panicled aster, *Aster simplex*
- Saltmarsh aster, *Aster subulatus*
- Silver-scale saltbush, *Atriplex argentea*
- Spearscale, *Atriplex subspicata*
- Spikerush, *Eleocharis macrostachya*
- Gumweed, *Grindelia squarrosa*
- Common sunflower, *Helianthus annuus*
- Seaside heliotrope, *Heliotropium curassavicum*
- Foxtail barley, *Hordeum jubatum*
- Marsh elder, *Iva annua*
- Kochia or fire-weed, *Kochia scoparia*
- Peppergrass, *Lepidium virginicum*
- Bearded sprangletop, *Leptochloa fascicularis*
- Plains bluegrass, *Poa arida*
- Curly dock, *Rumex crispus*
- Prairie cordgrass, *Spartina pectinata*
- Texas dropseed, *Sporobolus texanus*
- Western ironweed, *Vernonia fasciculata*

Saltwort and inland saltgrass, below, are characteristic salt-tolerant plants found on Nebraska's saline wetlands. Pintails, opposite, as well as numerous other species of duck.s', geese and other waterbirds, still pause during their spring and fall migrations on remnant saline wetlands.

Lancaster and southern Saunders counties were dominated by salt-tolerant plant communities. Channelization, draining, filling, diking, diversion, supplemental pumping with fresh water or some combination of these alterations deprived many saline wetlands of water, or altered the delicate balance of salinity which created the specialized environment where salt-tolerant plants thrived. Today, only remnants of Nebraska's salt marshes remain, and the salt-tolerant plants are threatened by competition from less specialized freshwater and upland plant species.

Preserving the Remnants

Although not be comprehensive design, a century of growth by Nebraska's capital city and modifications of Salt Creek and its tributaries have destroyed nearly all the region's saline wetlands. Even before settlement of the region began, the saline wetlands of Lancaster and Saunders counties were perhaps the most restricted natural community in Nebraska. Historical references documenting the original number and acreage of these wetlands are limited, and typically each account describes only an individual site. An exception is a November I, 1862, news item in the *Nebraska Advertiser:* In that article, a *Scientific American* correspondent estimated that four basins near Lincoln covered a total of 16,000 acres. No information has been found describing other saline wetlands in the Salt Creek water- shed, but soils that evolved under saline wetlands are fingerprints of where they have been.

A 1990 inventory of the saline wetlands in Lancaster and Saunders counties, funded in part by the U.S. Environmental Protection Agency and conducted by the Nebraska Game and Parks Commission, estimated that only 1,200 acres of saline wetlands remain in the Salt Creek and Little Salt Creek

drainages near Lincoln. The inventory identified 133 saline wetlands and 99 freshwater wetlands that once were saline. While they ranged in size from approximately one acre to just over 200 acres, the majority were smaller than 20 acres. Not one of the saline wetlands had escaped the adverse effects of overgrazing, silt deposition, drainage, filling or dilution with fresh water. Virtually all of these saline wetlands are fragmented remnants which have been extensively modified and degraded.

Wetlands are among the earth's most productive natural factories, converting raw materials of sun, water and soil nutrients into an almost incomprehensible array of self-perpetuating life forms. The importance of wetlands to wild creatures is especially evident during the breeding season, when they are crowded to capacity. Wetlands are equally valuable to people. Some of the services they render to mankind are evident, others are not.

Because of their proximity to a large and growing urban center, the saline wetlands of Lancaster and Saunders counties can continue to provide enjoyment and recreation to hunters, birdwatchers, nature photographers and others who occasional- ly need to retreat from the bustle of city life. They are natural laboratories with tremendous potential as outdoor classrooms for scholars ranging from elementary school students who have never seen a marsh, to university graduate students delving into the subtle distinctions between tiger beetle species and races.

But wetlands perfonn other, less heralded, services. wetlands are natural pollution controls, trapping, and often rendering hannless, pesticides, fertilizers and sediment washed from lawns and fields before they can contaminate streams or under- ground aquifers. Because of their location on a floodplain, saline wetlands provide flood control by capturing heavy runoff and releasing water slowly through seepage and evaporation. All these functions provided naturally by wetlands are particularly important near population centers where man's impact on the environment is greatest.

In the 1980s, the unique qualities and benefits of eastern Nebraska 's saline wetlands became more widely recognized, and efforts were initiated to preserve and restore the fragmented remnants. An action as simple as plugging a drain tile or filling a ditch and letting nature take its course is often all that is required to restore a degraded freshwater wetland. However, reestablishing historic water levels and regimes is only the first step to restoration of a saline wetland. The wetland must then be allowed to fluctuate between periods of high water and periods of drying to restore the complex soil and water chemistry which favored their unique plant communities. After years of being dry, the downward movement of water in a fonner wetland may have leached salts from the soil. The restored wetland may initially revert to a freshwater wetland.

Deepened stream channels adjacent to saline wetlands, or

altered flows from spring seeps make restoration difficult ifnot impossible at some sites. Pumping water from shallow saline aquifers into wetlands to replace saline water once supplied by natural seeps, and constructing small dams to prevent further down-cutting by streams and to restore former streambed levels, are promising but untested remedies.

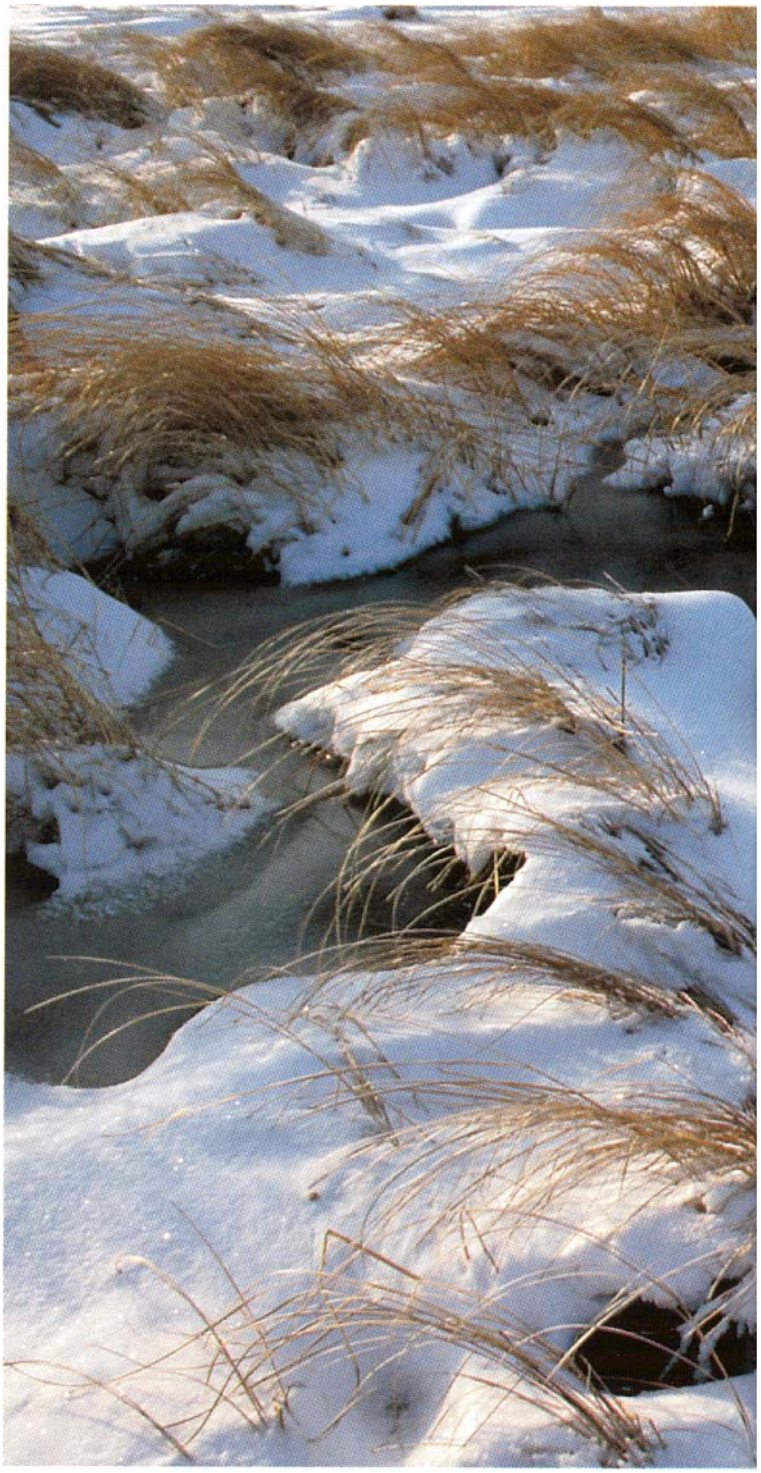
Some saline wetlands were deepened by excavation or diking, and periodically filled with fresh water to maintain more permanent water levels. Such wetlands dried less frequently than they would have naturally, and salts were forced deeper into the soil, not concentrated near the surface. In time, these former saline wetlands became freshwater wetlands. Restoration of such sites requires the re-establishment of historic water levels by the removal of dikes and the filling of excavated areas. As a more normal water regime returns, evaporation will again draw salts to the surface by capillary action, and salt-tolerant plants will reestablish if they or their seeds are still present.

Seeds produced by salt-tolerant plants can lie dormant in wetland soils for many years. This seed bank serves to buffer the effects of drought or high-water years when growing conditions are temporarily unfavorable. When altered wetlands are restored, these long-dormant seeds can reestablish native, salt- tolerant plant communities. Unfortunately, this seed bank has a limited shelf-life. Salt-tolerant plants may have to be reintroduced to saline wetlands which have been dry or inundated with fresh water for too many years. Restoration of the complex hydrology which created saline wetlands is possible, but expensive, time consuming and only the first step toward reestablishing a saline wetland in all its complexity.

Currently, nearly 1,000 acres of land containing some remnant saline wetlands are protected by the Nebraska Game and Parks Commission on the Jack Sinn Memorial Wildlife Management Area on Rock Creek south of Ceresco. This area provides habitat for both upland birds and waterbirds, while preserving saline wetlands. In 1990, an earthen dike was constructed to capture runoff and create a shallow wetland of about 17 acres. This shallow wetland is designed to dry periodically and provide habitat for both waterbirds and saline plants. Additional dikes may be constructed in the future. Other saline wetlands may be restored by removing silt which has washed in over the years and decreased their water-holding capacity.

Two saline wetland areas near Ceresco are protected under perpetual conservation easements by the Lower Platte South Natural Resources District. Under these easements, landowners receive a one-time payment based on the appraised value of the land and its income-producing potential. The easement agree- ment remains with the land through subsequent owners. Terms of each easement are specifically tailored to the site. While land-use restrictions to protect the wetland are imposed, grazing is often permitted, but the number of animals and the duration they are pastured is regulated to protect the natural vegetation. The Lower Platte South NRD easement program has targeted wetlands for protection, particularly those in the Rock Creek and Little.Salt Creek drainages.

Arbor Lake, a saline wetland just north of Lincoln, was acquired by the City of Lincoln as mitigation for the destruction of a smaller saline wetland filled when the Capitol Parkway West bypass was constructed southwest of downtown Lincoln. Arbor Lake is managed for the city by the Nebraska Game and Parks Commission.



A water control structure is now in place to maintain historic water levels, to reestablish salinity levels, to encourage the recovery of salt-tolerant plants and to provide migratory habitat for shorebirds and wading birds. Arbor Lake is open to public access, and will have an elevated boardwalk and observation platform to allow visitors to observe a saline wetland's plant and animal life without threatening its survival.

In the course of a hundred years, we reshaped the Nebraska landscape. That we did so is understandable. During the early decades after settlement, extracting a living from the land was

Winter's snow, trapped by prairie cordgrass, promises wet salt marshes in early spring.

a matter of survival. Later, intensive use of the land brought a higher standard of living. Not until recent decades did we glance

back and realize the cost to our natural heritage of this prosperity. Most of Nebraska's other natural ecosystems were once measured in hundreds of square miles, and some still are. While proportionately much of each of those ecosystems was destroyed, significant amount remain. But even before settlers scraped salt from the Salt BasIn, salIne wetlands were few, both , in number and extent. Today but a handful remain. They are the ! state's most imperiled natural community. 1

Nebraska Salt Marshes was funded in part by the U.S. Enyironmental Protection Agency under assistance agree;ment number X 007451-01-0 with the Nebraska Game and Parks Commission. It may not necessarily reflect the views of the EPA, and no official endorsement should be inferred. Additional copies are available from the Nebraska Game and Parks Commission, P.O. Box 30370, Lincoln, NE 68503. Text by Jon Farrar and Richard Gersib. Photos, unless otherwise credited, by Jon Farrar. Published July 1991.