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The Effects of Internal Ditching on Waterfowl Use of a 40-acre Slough at Kindersley, Saskatchewan

Alex Dzubin

Introduction

During the past ten years across the Canadian prairies there has been a marked yearly and seasonal fluctuation in the number of sloughs which waterfowl utilize for breeding purposes. Especially in the grassland habitat, these fluctuations can be large from year to year depending on a number of factors which include rainfall, snowfall, wind velocities, temperature changes, etc. With winters of low snowfall and light spring rains, certain sloughs contain sufficient water in the spring to attract breeding pairs but do not contain sufficient water to allow broods from the nesting activities of these pairs, to reach flying stage. Because of increased evaporation rates during the summer months, the number of sloughs that are used by breeding pairs in May are usually decreasing in number through July and August. Flightless broods must therefore move from sloughs that are drying.

Mortality associated with such movement can be low if water areas and suitable brood sloughs are available within 1/4 to 1/2 mile, as they are in parkland habitat. However, as it often happens in grassland habitat, suitable brood sloughs are invariably considerable distances apart and any movement between areas is usually ineffective as young birds perish.

With decreasing water levels and deteriorating breeding conditions as have been experienced through much of the grassland and parkland during the past three years, certain large sloughs which are utilized by breeding pairs and later by broods, have been drying up prior to the time when broods are fledged. In some cases, if sufficient water could be diverted into sloughs to last another 3-4 weeks more young could possibly reach flying stage. Thus production could be increased from these "fringe" breeding areas.

History

Early in 1956, preliminary discussions were held with Mr. Tom Sterling, Saskatchewan biologist, Ducks Unlimited, J.B. Gollop, C.W.S. biologist, and myself relative to the feasibility of internal ditching. It was agreed in principle that any work that could increase permanency of "fringe" sloughs would be to the advantage of waterfowl, especially during periods of decreasing water levels. Thus a location for an experiment in "internal ditching" was tentatively scheduled for the Canadian Wildlife Service Study Area at Kindersley, Saskatchewan. Subsequent discussions with Mr. Herb Moulding and Bill Leitch consolidated these plans and it was agreed to initiate the project during the fall of 1957 when water levels were low.

Preliminary planning and field work were carried out by Mr. Don Kimberley, Project Manager, Ducks Unlimited, during the summer of 1957. Various plans and kinds of ditches were discussed and the plans were finalized by summer's end to include several islands and a number of different types of ditches. Tractors completed the cutting and earth moving in October of 1957. By February of 1958, all ditches were partially filled with hard packed snow (which see picture report, 1958).

Objectives

1. To evaluate the success of various-sized internal ditches in holding breeding pairs.
2. To evaluate the success of ditches to hold broods to fledging.
3. To determine if the type of ditches were suitable and to formulate possible plans for future ditching.

Criteria for Evaluation

It should be realized that it is only a few of the larger types of sloughs and marshes that can present to all species of waterfowl all of their breeding requirements. For years it has been known that a community relationship of water areas and upland cover exists, each playing a small part in the overall breeding requirements of pairs. This community relationship is the usual rule for optimum duck breeding habitat across the prairies. Therefore, any manipulation of one segment of these requirements (courting areas, waiting areas, feeding spots, loafing and resting areas, brood sloughs) may not have a measurable effect on the final production from this area, unless this segment is critical or limiting production.

In the present case (as will be seen later) numerous pairs utilized the ditches but the overall effect on final production of the 10 1/2-square-mile study area can not be measured. Whether more mallards nested in the surrounding nesting cover because of the ditches is unknown. Population levels have been falling since 1956, and water levels have also been dropping, causing the remaining pairs to crowd in on any available water.

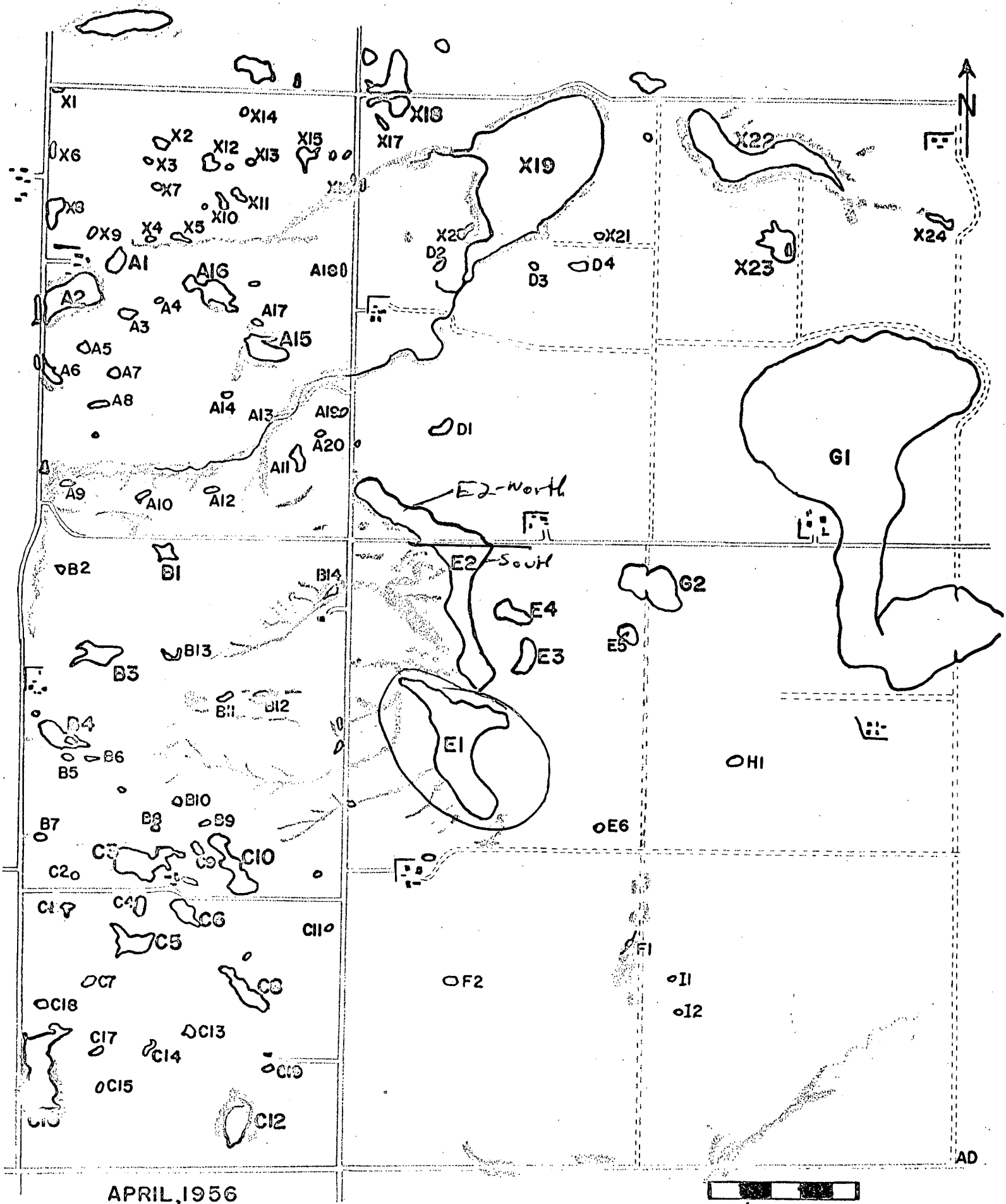
Breeding pair counts have been made on the study area since 1956, usually at several-week intervals. A comparison of populations on a 80-acre slough 1/2 mile south of the ditched area, on the ditched area itself, and on the remaining portion of 22, north of the road, will be made (see attached map).

The Study Area

The Canadian Wildlife Service study area is located 12 miles west and 5 miles south of Kindersley, Saskatchewan. It is 3 1/2 miles by 3 miles in extent. The block is in the gently rolling mid-grass prairie area. It contains 94 water bodies in a wet spring. Only 5 sloughs might be considered permanent in a "normal" year. (See map)

GOLLOP MEMORIAL STUDY AREA

Kindersley, Saskatchewan



APRIL, 1956

1/2 MILE

Birds utilize the various water areas for feeding, loafing and waiting areas and fly onto the uplands to nest. Nesting cover consists of extensive masses of buckbrush (Symphoricarpos) and Rose (Rosa) which grow in the coulees and around the sloughs. (Plate I)

Slough E2, the one chosen for ditching, was a saline area with sparse growths of wild barley (Hordeum), spikerush (Eleocharis), three square bulrush (Scirpus), goosefoot (Chenopodium),and saltwort (Salicornia). A grid road cut the slough almost in half with a 35-acre area to the north and a 40-acre portion to the south. (Plate 2) (Fig. I).

In 1954 and again in 1955, some 150 young mallards were trapped and banded in this slough. In 1956, no more than 35 were banded, while in 1957, less than 10 were captured here.

The ditches consisted of A) two islands 54' x 87' and 84' x 88' surrounded by 20'-22" moat. Material from the ditches was scattered on one of the islands and removed from the other. (Plates 3 and 4)

B) four ditches 65' - 70' x 21' strung out in a north south direction and some 32'-41' apart. (Plate 5)

C) one large dugout type excavation 100' x 40'. (Plate 6)

D) one long ditch 217' x 20'.(Plate 7)

The ditches varied in depth from 3 to 5 feet (from the original slough bottom). The sides were slightly angled as were the ends. However, little shallow water was present in the ditches themselves.

By autumn of 1958, Chara sp. and a few stalks of Myriophyllum were located in several of the ditches. Water crowfoot, Ranunculus sp., was noted in nearly every ditch in 1959, as was arrowhead (Sagittaria). Sago pondweed (Potamageton) was planted in all except one of the ditches on June 15, 1959.

The ditched slough contained sufficient runoff water to flood the area between the ditches until June 25 in 1958 and May 14 in 1959. This flooded area undoubtedly had some influence in attracting breeding pairs and, as will be shown later, had a marked bearing on whether broods utilized the slough itself. Water was available in the ditches until freeze-up in October of 1958. In 1959, there were 24" of water left in all ditches on July 23, indicating that they would last another 8 to 12 weeks.

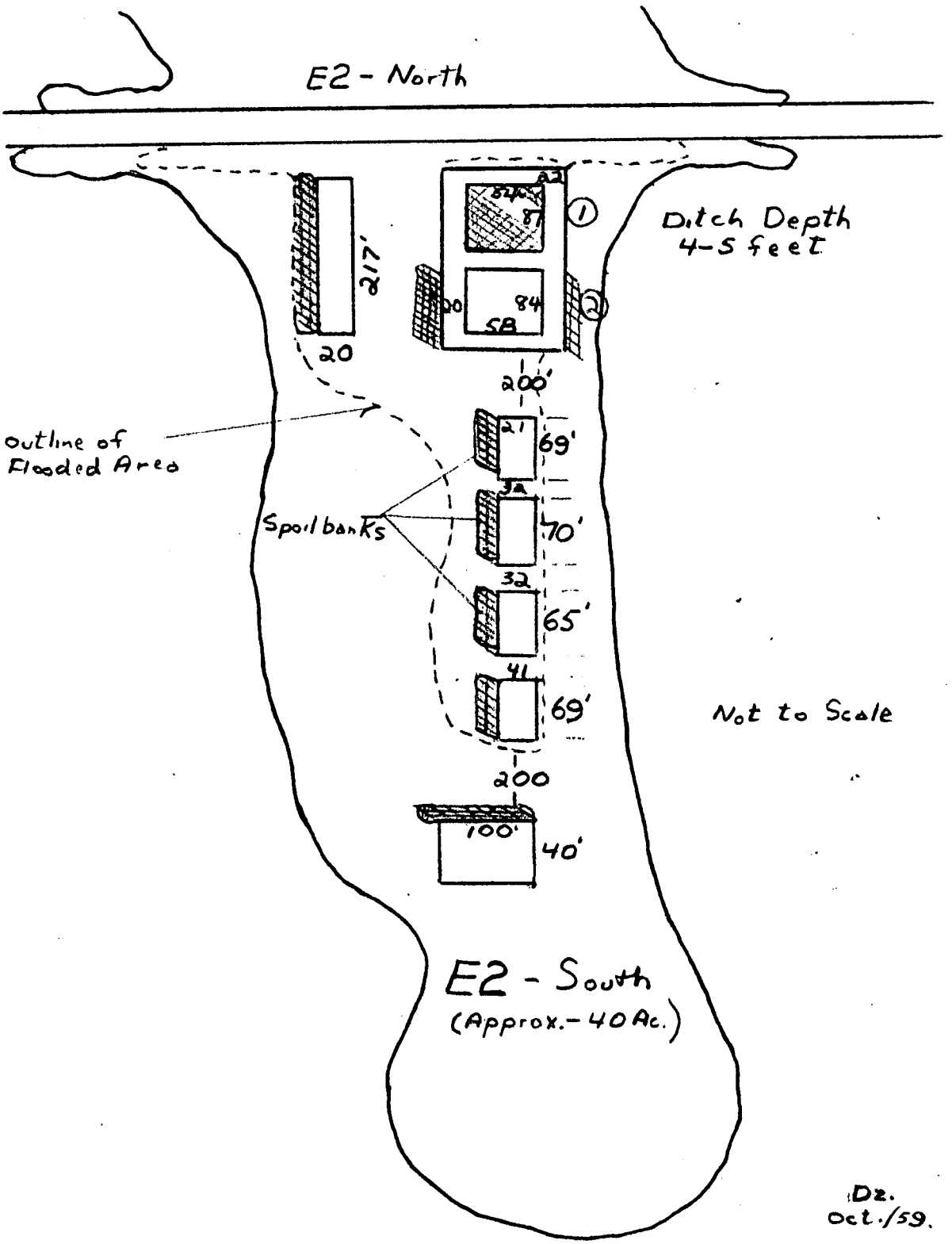
The Breeding and Nesting Population

Counts of pairs, lone drakes and grouped drake mallards, pintails, gadwall, baldpate and bluewings, indicated that prior to ditching in 1957, E2-south (the ditched area) was slightly favored by birds over E2-north (Figure II).

PLATE I - Aerial photo of the centre part of Canadian Wildlife Service Study Area showing ditched pothole in centre of plate with unditched portion north of road.
Pothole E1 is the depression to the left of pothole E2.
The nesting cover is seen along the sides of the coulees.

September, 1959.

Figure I Outline of Pothole E2-South showing location of ditches.



Dz.
Oct./59.

PLATE 2 - Ditches along road grade between north and south portions of pothole #2 - the ditched area is at the left. (Looking West)

April, 1959

PLATE 3. First island with ditch fill on centre to promote growth. (Looking South-west)

April, 1959

PLATE 4 - Second island with ditch fill removed to one side. Cover mostly of saltwort and wild barley. (Looking North-west)

April, 1959

PLATE 5 - Series of 4 short ditches with fill removed to one side. (Looking North)

PLATE 6 - The large "dugout-type" ditch. (Looking West)

PLATE 7 - The "long-ditch". (Looking South)

Pothole E1, even though smaller in size, usually contained more birds than both E2-N and E2-S.

After the first year of ditching E1 did not hold as many indicated pairs as E2 after the 4/24 census (Fig. II). Similarly, the ditched portion of E2 started to attract more birds as the breeding season progressed. This may have been due to a drying trend in E2-North with the birds simply moving over the road into the ditched areas. Again, the effect on nesting is unknown, but what is important is that the ditches were heavily utilized by birds even after there was no flooded area between them (see 5/31/59 count, Fig. II).

Pairs were noted to use the spoil banks of ditches to a heavy extent for loafing and resting. These spoilbanks make excellent vantage points for birds and for the first year contained no weedy growth to hinder the birds' view of possible danger. Pairs fed heavily in the flooded area between ditches, but few were seen to feed in the ditches themselves, probably because they were so deep.

Again in 1959 the ditches were heavily utilized by breeding pairs (Fig.III). Since both E1 was dry by May 8 and E2-North contained no water except a road-side ditch, the breeding population for the surrounding block was probably restricted to the ditched areas. However, the place of the ditches in holding birds and in having a direct effect on their nesting within 1/2 mile is unknown. It may be that the 9 mallard hens nesting to the west of E1 and the 10 mallards that nested to the west of E2 (plus 2 pintails, 4 gadwalls, and 3 baldpate) would not have attempted to nest here if the water in the ditches was not present. The nearest large water was pothole K19 - 1 1/2 miles away. Certainly some of the mallard hens trapped this year had "homed" to their previous nesting areas, but if water is not available next to their nesting areas, would these birds have nested here? One can therefore only speculate as to the possible effects of the ditches in helping final production. Without doubt, the ditches had a positive effect in holding pairs during the nesting season (especially in dry 1959). They may also have had a positive effect in influencing females to nest where they did.

The Brood Population

The southern portion of E2 was fairly heavily utilized by young mallard and pintail broods prior to the time when the flooded area between ditches was present. (Fig. IV). After this area dried, very few broods used the slough. The reasons for this may be twofold. Firstly, the flooded area provided ample feeding grounds for the young, but as soon as the water was restricted to the ditches, no shallow feeding areas remained. Secondly, the ditches may have restricted the activity of broods and, because of their small size, not provided the stimulus of sufficient escape area (i.e. when the area was flooded, hens and broods could readily move from one side of the slough to the other, away from any potential danger. The extended open water provided the escape area. However, when their activity was restricted, no escape area was available within 200 yards because of a total lack of any emergent cover). Broods have been seen utilizing small roadside ditches for extended periods of time, especially if there was any escape cover nearby (trees, sedges, brush). Therefore, as far as water area size is concerned, the ditches were probably suitable. However, it is postulated that since no cover

Figure II

Fair Counts on Potholes E1 and E2 - 1957
(E2-S count - 1 year prior to ditching)

See key bottom Fig. III.

4/25/57

	Mal.	Pin.	Ged.	Bald.	B.W.T.	Total
E2 north	11/5	15/3	-	2/0	-	28/8
E2 south	13/1 2:0	16/3	1/0	1/0	-	31/4 2:0
E1	38/8 4:0	66/9	-	4/0	-	108/17 4:0

5/4/57

E2-N	3/6 2:0	2/6 2:0	2/0	3/0	3/1	12/13 4:0
E2-S	3/3 13:0	5/3 18:0	3/0	1/0	2/0	14/6 26:0
E1	9/20 24:0	16/23 18:0	2/0	6/0	-	53/43 40:0

5/12/57

E2-N	0/2 12:0	0/3 10:0	-	1/2	6/1	7/8 22:0
E2-S	8/5 6:0	5/1 7:0	5/1	5/1	9/2	32/20 13:0
E1	7/13 16:0	10/16 21:2	5/1	5/0	9/3	36/53 37:2

5/31/57

E2-N	2:0	-	1/0	3/1	-	4/1 2:0
E2-S	4/0 19:0	-	1/0	2/1	-	7/1 19:0
E1	4:0	2:0	-	-	1/1	1/1 6:0

Fair Counts on Potholes E1 and E2 - 1958
(First Spring after ditching on E2 - south)

4/24/58

E2-N	1/1	0/2	1/1	2/0	-	4/4	
E2-S (ditched)	3/5 2:0	0/3 2:0	-	-	-	3/8	4:0
E1	7/13 4:0	47/9	1/0 4:1	6/0	-	61/22	8:1

5/5/58

E2-N	2/2 2:0	4/3 11:1	3/0	14/1	2/0	25/6	13:1
E2-S	5/5 13:0	4/6 12:0	4/0	16/1	-	29/12	25:0
E1	8/10 5:0	26/17 28:1	2/0	5/1	-	38/28	33:1

5/10/58

E2-N	3/3 2:0	9:0	-	0/2	-	3/5	11:0
E2-S	2/7	15/11 11:0	6/1	3/0	6/2	32/21	11:0
E1	8/10 15:0	14/18 21:1	5/0	7/0	4/1	36/29	36:1

5/31/58

E2-N	12:0	2/0 15:0	-	2/1	2/0	6/1	27:0
E2-S	3/5 26:0	16/6 75:0	2/2	3/7	4/10 4:0	30/30	105:0
E1	3/6 11:0	2/2 12:0	0/1	0/2	2/2	7/13	23:0

Figure III

Pair Counts on Potholes E1 and E2 - 1959
(E2-S count - 2 years after ditching)

	Mal.	Pin.	Gad.	Bald.	B.W.T.	Total
			4/21/59			
E2-N	1/1	2/1	-	1/0	-	4/2
E2-S (ditched)	12/5	9/5	-	-	-	21/10
E1	2/0	2/0	-	-	-	4/0
			5/8/59			
E2-N	-	1/2	1/0	-	-	2/2
E2-S	10/12 4:0	5/5 2:0	6/0	2/0	1/0	24/17 6:0
E1	dry	-	-	-	-	-
			5/15/59			
E2-N	4:0	-	-	-	-	4:0
E2-S	4/8 6:0	1/2	2/0	2/0	-	9/10 6:0
E1	dry	-	-	-	-	-
			5/26/59			
E2-N	2/0	-	1/0	1/0	-	4/0
E2-S	6/4	1/1	4/0	-	-	11/5
E1	dry	-	-	-	-	-

KEY

4 pairs
↑
4/7
↓
7 lone drakes

4:0 → 4 grouped drakes
6:2 → A group of 6 males and 2 females

existed along the banks of the ditches, the broods tended to move away.

Two mallard young banded in their 1B class in June were later recovered 2 1/2 miles away.

The spoilbanks should in time be covered with weedy growth that will provide the necessary escape cover. If the ditches were shallower for a portion of their length, this might also create more suitable feeding areas and attract broods.

Little known use was made of the ditches in 1959 (Fig. IV) possibly because the number of available nests was less than 1/2 of those found in 1958 and because of an increased predator loss that accounted for over 50% of the active nests found in 1959. Few nests, therefore, hatched and fewer broods reached water, only two being recorded for the census period.

Although presence or absence of broods on an area is the best criteria to use in evaluating a brood area, there are certain inherent faults in census methods that do not measure "brood use" correctly. Censuses are made weekly and nothing is known of brood populations utilizing an area between these times. Also, no weight is given to the use of an area by broods passing from one water body to another or from the nest to a brood slough. In a dry year, the use of a water body as a "stepping stone" to more permanent water may be very important. It is not known if the ditches played such a part, but it is conceivable that they did.

Evaluation of the Types of Ditches

Certain preliminary generalities might be made concerning construction of future ditches.

A. That they be wider - perhaps up to 50' wide with sloping sides of 6:1 or a continually sloping side from outer edge to centre. This is to provide shallow feeding areas for pairs and broods. Their depth at centre might be in the order of 4' to 5' to ensure that no plant growth chokes out the water area. Small, sloping, circular ditches might also be tried.

B. The spoilbanks be located beside the ditch and some attempt be made to plant it to shrubs, weeds, sweet clover, etc. to ensure sufficient escape cover for broods.

C. The ditches do provide the necessary permanency in sloughs that otherwise might go dry. Water is restricted to a smaller area, evaporation decreases, and available water lasts well beyond the brood period. The problem remains of making such ditches more attractive to broods.

D. Ditches of 50' x 20' size be tried in parkland sloughs where cover is not a problem. The location of areas where a lack of permanent brood water occurs at frequent predictable periods is an initial prerequisite to ditching.

Figure IV

Broods Utilizing EE-South, 1958 and 1959

Date	Mal.	Pin.	Gad.	Bald.	B.W.T.	Others	Total Brood
			1958				
5/24	8-1A	6-1A	-	-	-	-	2
5/31	3-1A 5-1B 2-1A	7-1B 6-1B 4-1C 3-1B	-	-	-	-	7
6/6	1 Broody hen 9-1A 6-1B 6-1B 6-1B 11-1A 8-1A 7-1A 9-1B	6-1B 5-2A 7-1A	-	-	-	-	12
6/12	5 Broody hens 12-1B 5-1C 6-1B 4-1A 3-1C	1 Broody hen 2-1C 6-1B	-	-	-	-	11
6/20	4-2A 6-2A 7-1C 3-1B	5-2B 4-2B	-	10-1B	-	-	7
	Flooded area between ditches - dry					shov.	
6/26	-	-	-	7-1B	-	8-1B	2
7/2	-	1 Broody female	-	-	-	-	1
7/11	-	-	1 Broody ? female	-	-	-	1
8/17	2 Flying young?	-	-	-	-	-	-
			1959				
	Flooded area between ditches - dry						
5/28	1 Broody hen	-	-	-	-	-	1
6/4	-	-	-	-	-	-	-
6/12	6-1A 3-2A	-	-	-	-	-	2
6/17	-	-	-	-	-	-	-
7/3	1 mallard hen	-	-	-	-	-	-

Conclusions

1. That internal ditching has a positive effect on holding breeding pairs on an area, in that pairs utilize such ditches as they might a natural slough.

2. That internal ditches of the size used in the present study were not heavily utilized by broods, but may have served broods as "stepping stones" to other permanent water.

3. That ditches of various sizes and slopes be built in breed-slough poor areas and their possible effects again evaluated.

Saskatoon, Saskatchewan,
November 1, 1959.

Canadian Wildlife Service