

JOURNAL 1966

JAMES W. BEE

Wakarusa Valley (Clinton area), Douglas Co., Kansas

Jan 2, 1966

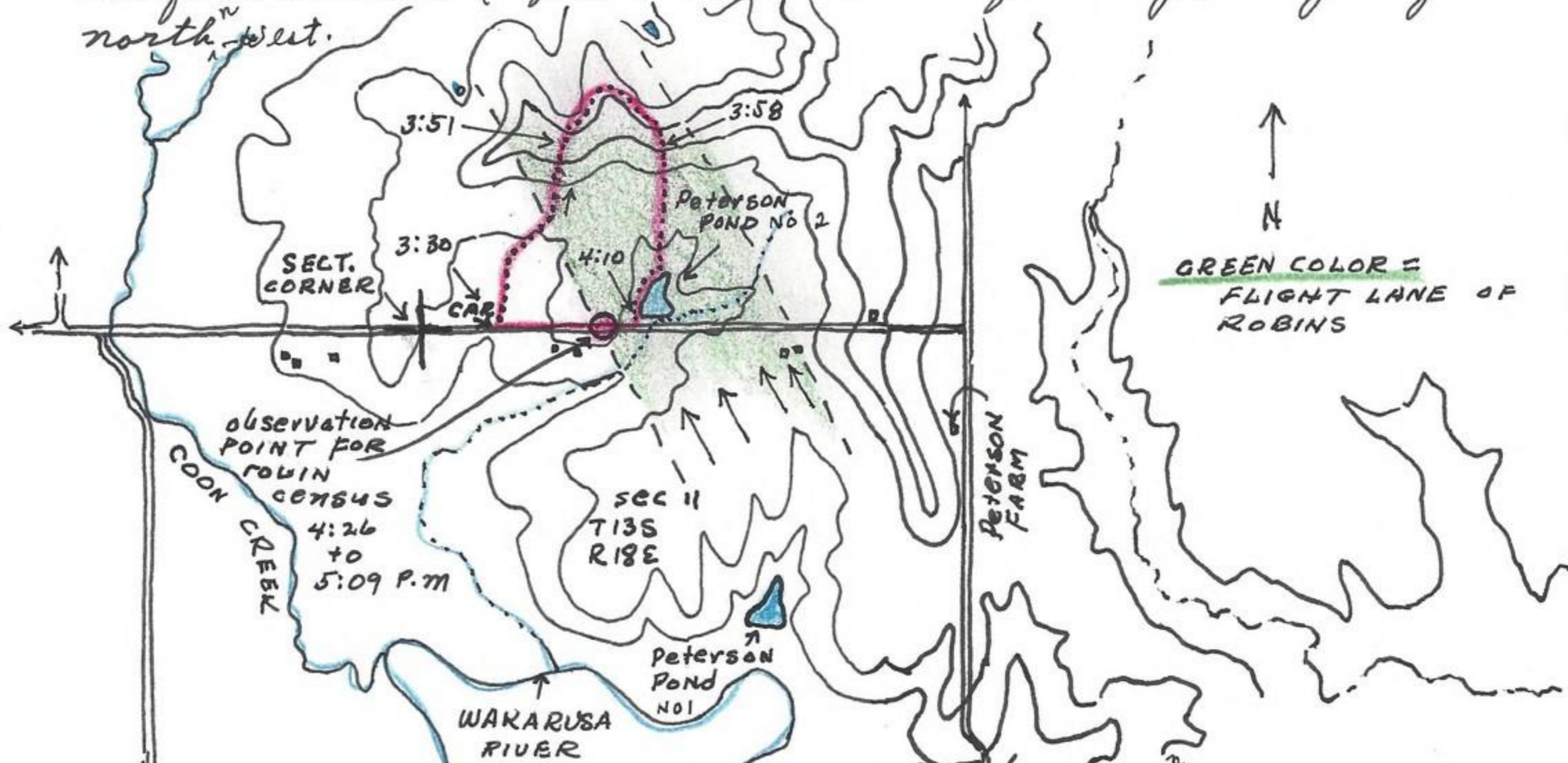
Census of Wakarusa Valley in area to be flooded by the Clinton Reservoir. Followed roads in car at speed of 15-20 miles per hour. At beginning of trip the sky was clear except a few low clouds to east. Temp 38°F, brisk wind from north. Between Lawrence outskirts and Sigel (School House) noted only 6 meadowlarks and 1 loggerhead shrike. Mileage at Sigel (most recently proposed dam site) 85.4 at 12:35 P.M. (middle sec. 8, R19E, T13S). Will keep complete census of birds and mammals. ^{car} mileage meter approx ^(1 mile on car = 9/10 intrinsic mile) 1/10 mile ^{more than mile} and will have to be corrected. 85.0 now to S; 86.6 at "Y" turn near bridge over Wakarusa and continuing W; 86.8 old Microtus field now plowed; 86.8 bridge (small); 86.9 old Microtus field now in winter wheat; 87.2 small bridge from drainage to N; 87.3 N end of the old proposed dam site (opposite old house at NE corner sec. 18, R19E, T13S) no birds observed since Sigel. no snow or ice on any exposure or ice on any body of water which is exceptional for this time of year. Birds scarce. Some trees in creek drainage and along Wakarusa show a yellowish brown as if in bud development. Trees on sidehills without this color. Continued W along straight road; 88.6 passing road that leads N to Petersons, pond and drainage canals like spring floods. no birds observed so far which is unusual; 89.1 crossing Wakarusa bridge, water clear to approx 4 inches deep that is, stems can be seen to 4 inches under water, banks show high waters in fall, no birds, no ice in any exposure. nearly all fields have been plowed, usually some remain fallow or in pasture, thinking that in the next two years the most will have to be realized before inundation. Special contouring and drainage channels are attempts to improve property before government purchase. There is no doubt that this area is taking on a new appearance. 88.7 passing road that turns S to Clinton. 90.4 passing Wakarusa bridge and continuing W on S side of river. at 1/10 mi W of the bridge turnoff noted first birds including, 2 blackcapped Chickadees, 2 blue jays, 4 cardinals, 18 slate colored juncos. Just beyond a hundred feet noted 38 juncos (slate colored). Road possible which is unusual for this time of year. These birds could be associated with farm house and cattle yards on

the other side of the river. 90.8 road turns 90° to S and following an ^{and hillside} benchland of deciduous trees. First robin approx. 100 feet S of bend. Between here and main road 1/2 mile beyond ^{observed so far.} observed one of the largest robin concentrations in Douglas Co. At bend (90.8) noted a redtail circling 2/10 mi N. The first robin noted above numbered 42 individuals, most of them getting up off the ground. This first group was continuous with another group of approx 50 birds. These groups soon become continuous in distribution and in the first 2/10 miles estimated at least 400 birds, all eastern robins with small amount of white in tails or without white and most of them with red breasts as if males but females could be confused because they also carry considerable red. 91.0 robins still in continuous distribution and in some concentrations. 15 to 20 birds in air at all times as I travelled down the road, moving out or down road direction, more frequently among trees below tops, than elsewhere. 91.2 robins still in same concentration 91.5 leaving wooded area and robins end abruptly, none between here and main road or beyond. 91.6 main road. I would estimate that there were at least 900 robins in the last 7/10 of a mile, the concentration nearly evenly distributed but tending to small aggregates of 40 to 100 birds. Continued west along main road. 92.1 turning S. will cross valley, gain upland and then return to the same turn. 93.6 three crows left field and flew E. To west the entire valley floor is in winter wheat ^{1 1/2 inches high} to E plowed but some unplowed weeds. Water in drainage ditch. 93.2 S side of valley at base of hill. no ice on sidehill springs to W which is the usual condition for this time of year. no birds, except 3 crows, across this stretch of valley from 92.1 to 93.2. Continued up hill to top, noting 2 cardinals, 4 slate colored juncos and 1 sparrow of unknown identity. Returned to base of hill at 93.7. At base of hill, scanned to NW in 180° and did not see one red-tail (7x35 binoculars). On return trip across valley to main road noted 1 loggerhead shrike at base of hill, 94.0 2 meadowlarks, 94.3 2 horned larks, 94.8 main road, now to W. 95.1 Wakarusa bridge, more water in river than usual for this time of year. 95.6 2 slate colored juncos; 95.9 turn S from main road; 96.5 small bridge in valley; field in valley either plowed or in winter wheat;

96.8 now to W. (1:35 P.M.), 8 juncos, 97.2 small bridge; 97.4 at
 four corners and turning S across valley; male marsh hawk
 hunting 1 foot above ground $\frac{2}{10}$ mi - E; 97.7 300 horned
 larks, can hear longspurs in flock but did not see them.
 These birds moved from place to place in small subdivisions
 of the ^{main flock} some coming out of their way to inspect the
 parked car. 97.8 turn to W. Fields plowed or in winter
 wheat. 98.0 Wakarusa bridge (2:00 P.M.), fields beyond
 plowed or in winter wheat, 98.3 redtail circling ridge to
 S, the native Andropogon not as heavily grazed as in
 previous years and yellowish ^{golden} brown in color 98.9
 small bridge, 2 yellow shofsted flickers, area E of wind-
 mill not plowed and may be good area for trapping.
 99.3 road turns along river; no horned larks since last
 large flock noted before; 99.5 road now to S, no birds along
 river, 99.6 2 red-bellied woodpeckers, 99.9 now to west.
 mainly plowed field but one of winter wheat, considerable
 grazing to E. 00.4 passing bridge over Wakarusa and
 now to S; 01.1 four corners and now to W, 8 English sparrows
 and 8 starling on farm property housing many cattle.
 01.3 passing over bridge on Elk Creek, 1 blue jay, 1 cardinal
 and 2 slate colored juncos on hill; 01.5 top of first main
 hill and now to W; 02.0 top second hill; 02.9 leaving
 uplands and going down slope to valley three deciduous
 trees; 03.2 bridge; 04.0 crossing valley to Richland, have
 not seen one bird since last one observed above which
 is unusual for the types of terrain (uplands, hillside &
 valley) traversed; 04.4 middle of Richland and now to
 N. 04.9 Wakarusa bridge; 05.1 meadowlark and logger-
 head shrike; 05.4 meadowlark, 05.7 now to E on main
 EW road; 06.3 3 eastern bluebirds. 06.3 now to N 06.5 on
 plateaus; 07.4 turned around and returned to main highway
 at 08.5, no birds on uplands; 09.7 loggerhead shrike, red-
 tail hawk $\frac{1}{10}$ mi to N; 10.7 four corner crossroad on hill side,
 now to S; 11.7 23 juncos; 11.8 bridge over Wakarusa, turned
 around and returned to 4 way corner. 3 cardinals at bridge
 above; 11.9 red bellied woodpecker, 12 juncos & 1 fox squirrel;
 12.1 18 juncos (not those noted on way down. 13.0 four
 way corner, now to E; field to SE of corner, which in previous
 year was cut annually is now grown to high weeds and
 grasses, the native grass cut, leaving irregular & wet areas

uncut. One is impressed how quickly good stands of
 vegetation recede in only one year of non-cultivation,
 13.8 at top of hill just before dropping down into valley
 scanned 180 degrees to S but did not see redtails (7x35
 binoculars); 14.0 now in river valley along edge in
 deciduous trees; 14.5 crossing drainage from reservoir to
 N, 80 cows grazing in field below dam so no chance for
 propagation of marsh land below dam; 2 blue jays
 flew E across valley; 14.6 old area where *Microstonyx*
 were taken, in some condition of cover; sixteen mourning
 doves here; 15.1 four corner road, now to north; 15.3
 18 slate-colored juncos; 16.3 main road, now to E. 16.7
 leaving main road, now going N; 17.1 redtail hunting over
 field to W; 17.4 top of hill and surveyed 180 degrees to W
 with 7x35 binoculars but no redtails (out to 4 miles); 17.7
 crossing dry creek, 7 robins at farmhouse to left; 17.8
 1 meadowlark; 18.0 good native grass from here to N;
 18.1 pond to left with *Andropogon* and should be checked
 for microtines, one meadowlark here; 18.5 still good
 native grass to W; ~~continued N & then~~ continued N & then
 E toward Petersons; 20.2 road from N; continued E to
 point abt 7/10 mi. E Coon Creek on main road where I left
 the car and travelled by foot to ridge to N starting at 3:30 P.M.
 Trended NN E; 3:35 2 black-capped chickadees; this field
 has not been plowed or excessively grazed and supports
 many microtines; beetles active under rocks; 2 meadowlarks;
 3 slate-colored juncos; yellow-shafted flicker; 3:45 one
 yellow shafted flicker; 2 blue jays, 8 juncos; 4:2 juncos;
 one group of birds consisted of 1 mockingbird, 3 cardinals;
 25 juncos, nine Harris sparrows. These birds were among
 juniper near top of ridge; the mockingbird gave a loud
 call something on the order of the shrieking call
 of a night hawk, can hear robins beyond; 3:51 top of ridge,
 country to N without roads and is remote, good stand of
 trees on north exposure; 3:53 2 mourning doves;
 3 crows to N E; 3:55 one chickadee, yellow-shafted wood-
 pecker; 3:58 now dropping off ridge and trending toward
 Peterson reservoir; ^{no. 2} 4:00 one cardinal; 4:03 crow to N; 4:03
 arrived at pond, 18 tree sparrows, 2 song sparrows at N
 E end of lake; 9 blue jays left trees on west side of lake
 and flew E across valley & lake; across N end of lake

down west side noted 4 Harris sparrows, 3 song sparrows, 6 tree sparrows, 1 cardinal. Left dam at 4:10 and at bottom of dam found the area in rank vegetation, mostly ^{on} damp soils. Surrounding are deciduous trees. This area is protected from winds and apparently is used for night roosting of many birds. In this area noted 35 Harris sparrows, 12 slate colored juncos, 5 cardinals, 2 blue jays, 1 downy woodpecker, 2 yellow-shafted flickers, 9 tree sparrows, 6 robins resting in tops of trees and others moving thru the area. 4:20 left above area and started back to car along road. Two flocks of robins flew over head to N, each group about 20 in number. These are the first birds (robins) of the mass movement as I did not see robins when returning from the ridge to the north. To the east for $\frac{3}{10}$ of a mile, I can see other robins crossing N across the road. 4:25 arrived at car and drove E to top of hill before grade down into the Peterson drainage system below the dam. Started to count robins at 4:26 P.M. from the road at top of hill between here and $\frac{4}{10}$ mile to E. as they flew NNW across the road. I would estimate that the main movement of birds started at 4:20. In first minute (after 4:26) 81 robins flew by, all going north^{west}.



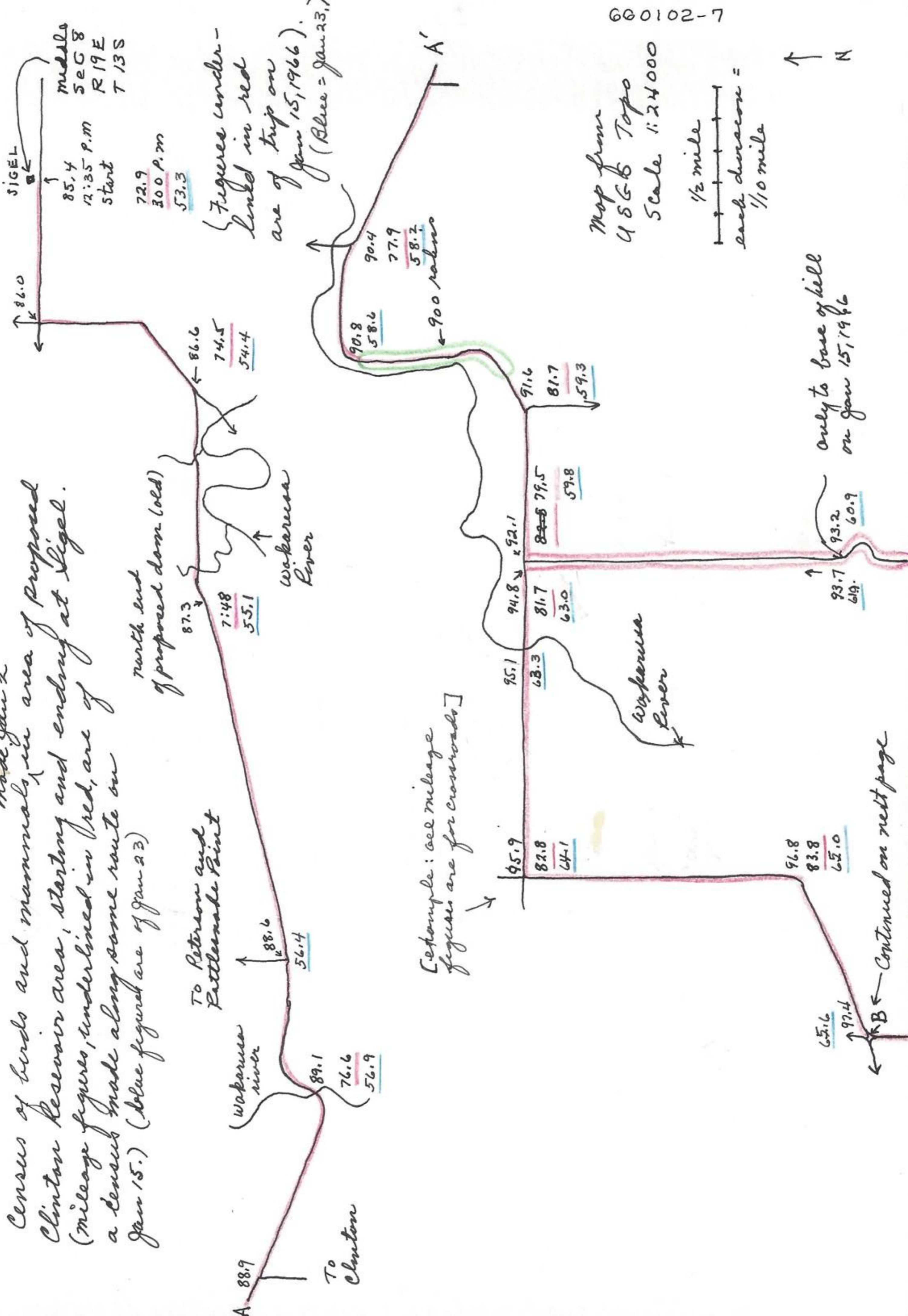
By 4:30, 251 robins had passed by to north^{west}. Only two has passed by to S and these below level of tree tops. The robins were flying mostly just above tree tops, others from tree tops to about 100 feet above the tree tops

while the fewest number were moving among trees below the tree top level. Some were alighting in trees and then, after pausing a few minutes, continued on; others flew non-stop across area. at 4:32 460 have passed. at 4:35 600 have passed. 4:38 700 have passed by. 4:40 810 have passed by. 4:45 1200 have passed by. 4:47 1350 have passed by. 4:48 not a single robin has passed by in the last minute. 4:52 1362 robins have passed by. The main mass seems to have passed by with movement ending rather abruptly. at 4:53 movement picking up again with 80 birds having passed over since 4:52 making the total no 1442. 4:54 1490 have passed by (sun about 25 minutes or less from setting and lights & shadows long and golden). 4:55 1500 birds have passed by (one robin dropped down from tree and started to feed in field). 4:56 1540 robins have passed by. The robin migration has definitely been in two major groups and within a major group, subdivisions of from 40 to 100 birds. 4:56 1600 birds have passed by. 5:00 1680 robins have passed by. 5:01 1710 robins have passed by. Groups of from 30 to 80 seem to arrive and alight in trees and then all leave together when group is activated. 5:04 1800 robins have passed by. 5:07 1850 robins have passed by. Most birds flying just above top of trees. 5:08 there has been an abrupt ending of migration at least there has not been a robin pass by since 5:07 (sun about 10 minutes from setting but lights rapidly fading. At 5:09 the final total was 1858 robins, the last 8 as stragglers. There were no other robins passing by after 5:09. In the bottom of the gully noted (during the observation of the robins), 3 blue jays, 8 cardinals, 18 juncos, 5 Harris sparrows 1 yellow shafted flicker pass across road near ground level and travelling equally in numbers from one side to the other. Checked the area below dam but did not see a single robin, so apparently all ~~to~~ robins were passing over area or thru area on their flight to the N.W. A greater percentage of robin alighted in trees on ridge to north but always moved on, perhaps to trees on N side of ridge. Left census area

(continued 4 page beyond)

Census of birds and mammals in area of proposed Clinton Reservoir area, starting and ending at Sigel. (mileage figures, underlined in red, are of a census made along same route on Jan 15.) (blue figured are of Jan 23)

Made Jan 2



Figures underlined in red are of trip on Jan 15, 1966. (Blue = Jan 23, 1966)

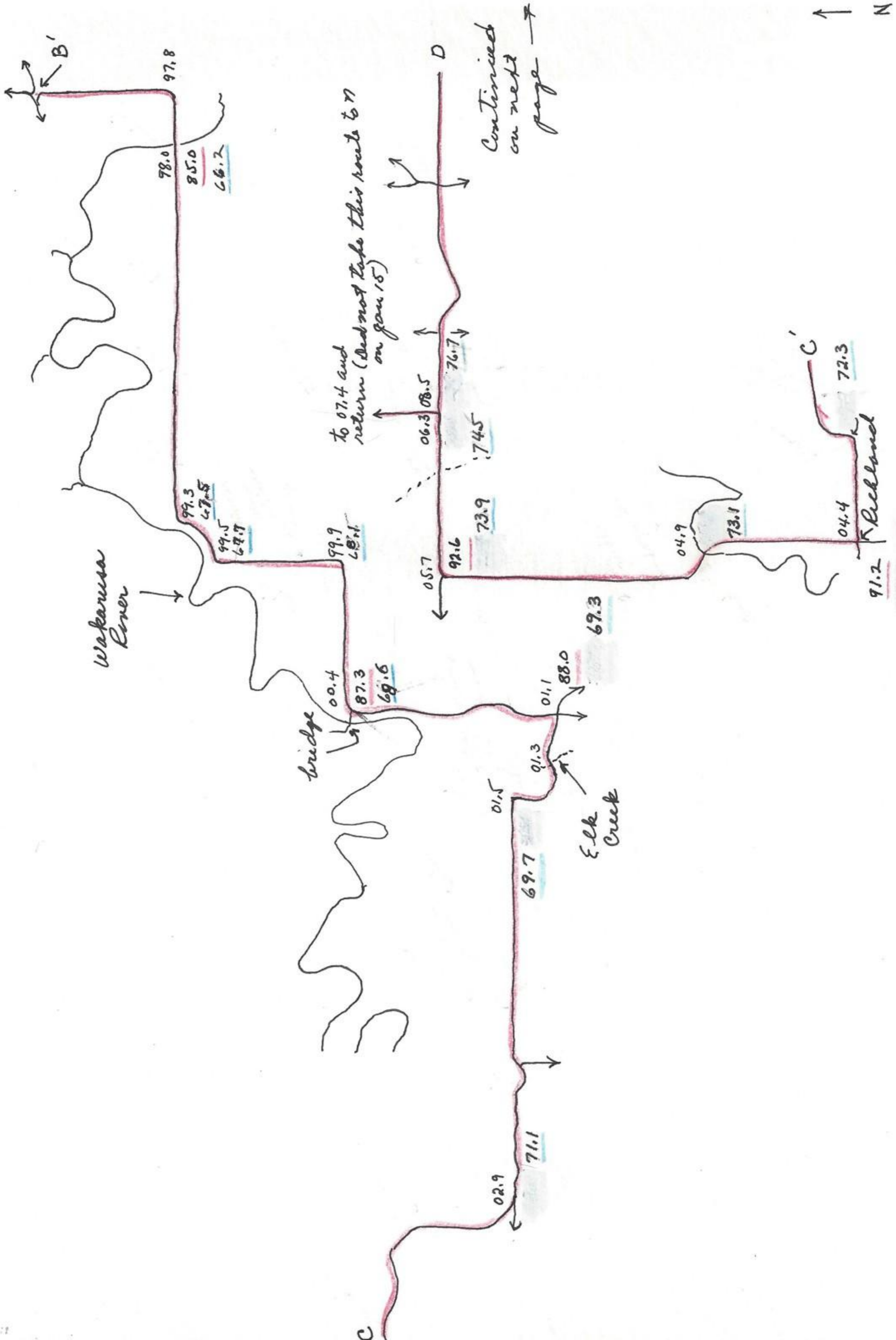
[Example: all mileage figures are for crossroads]

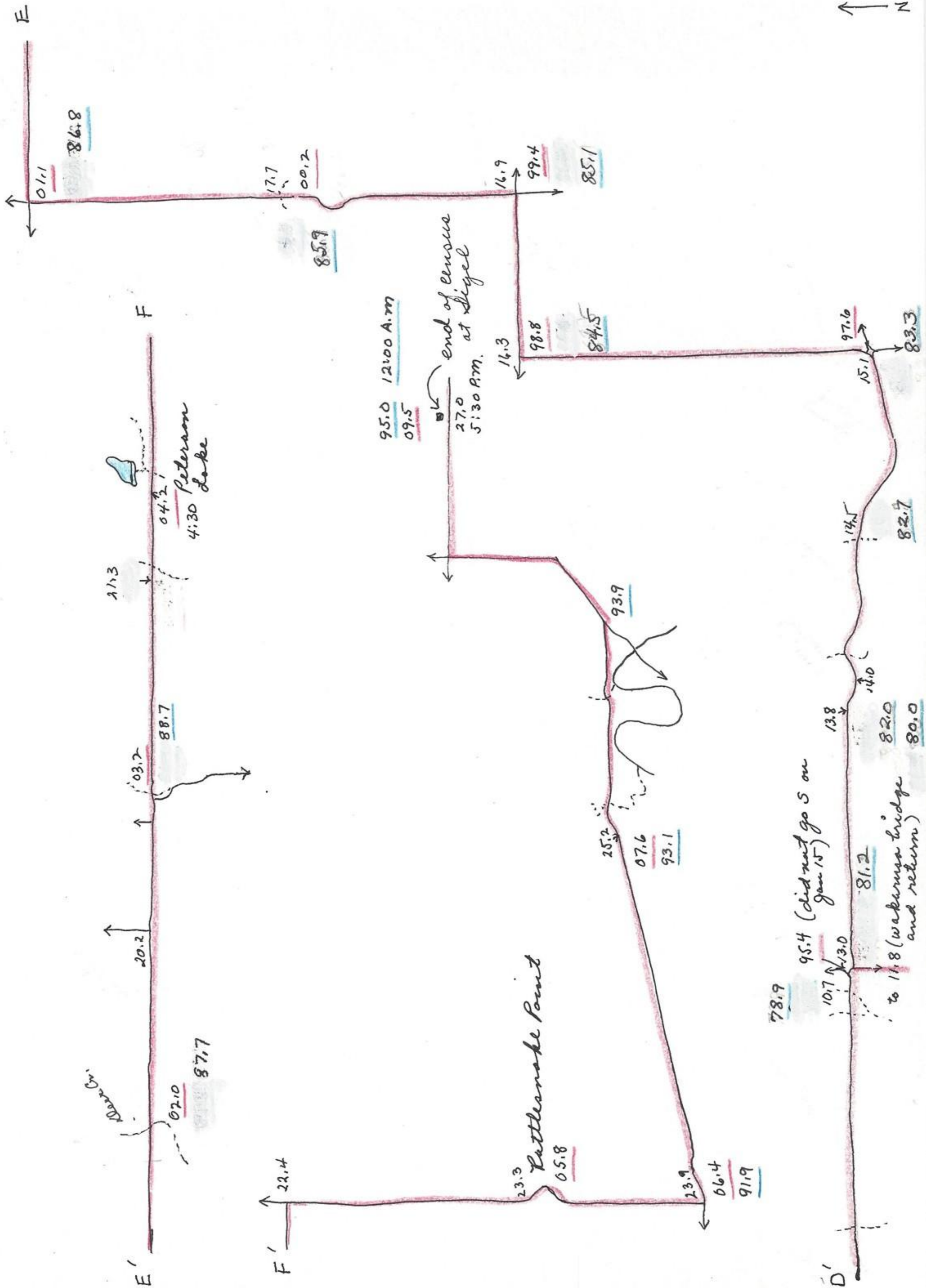
Map from USGS Topo Scale 1:24000
 1/2 mile
 each division = 1/10 mile

only to base of hill on Jan 15, 1966

Continued on next page

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at 5:20 P.M. 22.4 at Peterson corners, now going S.
 23.3 Rattlesnake Point, 23.6 horned lark, 23.9 now to E.
 25.2 old dam ~~site~~ site (N. end) at 5:27 P.M. 27.0 Sigel
 School (new N end of proposed dam site of Clinton reservoir)
 at 5:30. Arrived home at 5:45 at mileage 33.3 or 41
 miles of road census in The proposed Clinton Reservoir
 area

Univ. Kansas, Lawrence, Douglas Co., Kansas

Jan 3, 1966

marvin Raasche noted a great horned owl on top of a
 building on the campus, in full view of many student
 and passing cars. It called softly. Approx. 5:30 P.M.

Jan 8, 1966

Approx 28 robins on campus. ¹⁵ Starlings were associated
 with these robins. 28 juncos

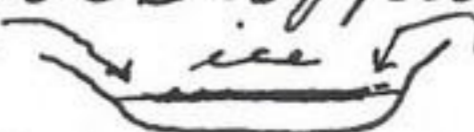
Jan 13, 1966

60 robins at Chancellor's residence, others at various
 points along route from home to Snow Hall. These
 birds seem to be more common this year than in
 previous years.

Clinton area, Wakarusa Valley, Douglas Co., Kansas

Jan 15, 1966

made census of birds and mammals in area of the
 proposed Clinton Reservoir, following the same
 route, with exceptions noted, as of Jan 2, 1966. This A.M.
 sky clear and weather mild. at 2:30 P.M. left Lawrence
 with mileage 46.6. Temp 43°F at 2:37 P.M. will
 keep record of birds to dam site. at 2:30 skies overcast
 and 10% blue sky. Snow predicted for tonight. Country
 dry. Sparrow hawk was the only bird noted between
 Lawrence and N end of proposed dam at Sigel School
 house. mileage at Sigel 72.9 at 3:00 P.M. A shrike about
 1/10 mile W of Sigel, 73.7 2 cardinals, 73.8 meadowlark; 74.0
 2 meadowlarks, 74.5 "Y" turn, 74.8 old proposed dam site at
 3:05; 75.4 2 yellow shafted flickers; 75.5 old oriole
 nest; 76.1 passing road to N, less water than Jan 2; 76.6
 Wakarusa bridge, water clearer than Jan 2; 5 juncos,
 77.3 ^{passing} road S to Clinton; 77.9 passing by Wakarusa ledge.
 78.0 8 juncos, 2 cardinals; 78.3 3 Titmouses, 1 blue jay;

78.4 blue jay, 2 yellow shafted flickers; 79.0 main road. no robins along the wooded area where 900 were observed Jan 2. 3 cardinals at bridge about 1/10 mile or less beyond contact with main highway, 4 juncos; 79.5 now to S; ~~80.6~~ 80.4 at base of hill and turned around to retrace route back to main road, one red-tail hawk left trees on top of hill directly to S; 81.7 main road. This is the first time I have not observed birds along this road across the valley; 82.0 Wakarusa bridge, 82.8 now to S; 83.0 meadowlark, 2 meadowlarks; 83.5 4 juncos, 1 cardinal at bridge; 83.8 turn to SSW; 84.4 4 corners, now to S; 85.0 bridge over Wakarusa, fox squirrel in middle of bridge, black capped chickadee, 1 cardinal; 85.1 14 hairy woodpeckers feeding not over 30 feet from road in plowed field; 85.2 1 horned lark; 85.8 bridge, 86.5 mourning dove; 87.2 4 horned larks; 87.3 passing Wakarusa bridge; 88.0 4 way road at Elk Creek; no birds at cattle yards; 88.2 passing over Elk Creek, 2 crows to W; 88.9 3 crows; 89.2 marsh hawk flying W, high; 89.8 dropping down into valley; 90.0 black capped chickadee at creek crossover; 91.2 middle of Richland, last mile and a half or so with no birds observed; 91.7 Wakarusa bridge, 4:00 P.M.; 92.6 now E on main road; 94.8 yellow shafted flicker, 4 sparrows; 95.4 one meadowlark, 1 downy woodpecker at 4 corners; 96.0 yellow shafted flicker; 96.6 cardinal; 96.9 passing by reservoir canyon; 97.1 5 juncos; 97.6 4 corners now to N; 97.8 5 Harris sparrows, 20 juncos at pond; 98.7 sparrow hawk; 98.8 main road, now to E; 99.2 2 starling; 99.4 now to N; 99.8 red-tail hawk on telephone line; 100.2 Dry Creek; 00.8 20 juncos, 1 cardinal. 01.1 now to E; 01.3 redtail 1/10 mile to S; 10 juncos; 02.0 Deer Creek, 2 cardinals, 2 titmouses, 1 black capped chickadee; thin ice on creek but free at edges ; 02.2 approx. 22 starling; 02.8 6 starlings at cattle pen; 03.2 Coon Creek bridge, three starling; 03.4 approx 100 starling in one compact group; 04.2 stopped top of hill before Peterson reservoir at 4:30 P.M. Checked pond and returned to car. noted 1 song sparrow, 2 cardinal, 1 blue jay and 8 juncos. one group of 12 robins

left pond area and flew n nw to ridge and beyond, following the route used by the mass robin migration of Jan 2; Continued E + ^{few} S past Peterson home; at 05.8 rattlesnake Point, 05.9 at base of hill noted 7 red-wing blackbirds; 06.4 now to E; 07.0 juncos; 07.6 N end proposed down site (original); at 4:53 P.M.; 08.6 loggerhead shrike; 08.8 seven cardinals at small bridge; 09.4 loggerhead shrike; 09.5 Segel School or N end of new proposed down site, at 11.1 noted 1 Cooper's hawk.

Numbers of birds and mammals observed on Jan 2 and Jan 15, both dates having followed the same route.

	Jan 15	Jan 2
tree sparrows	12	18-6-9- (33)
robins	(12)	900-7- (907) 1859 (2766)
black-capped chickadees	+ + + (3)	2-2-1- (5)
red-tailed hawk	+ + + (3)	+ + + + (4)
titmouse	3, 2 (5)	(0)
juncos (mainly slate colored)	1111-8-4-1-5-20-20- (26)	18-38-4-2-8-2-23-12 (241)
yellow shafted flicker	1111-1-1- (6)	18-18-3-8-42-25-12-18 (8)
horned lark	+ + (5)	2-300-1 (303)
longspur (?)	?	?
blue jay	+ + + (3)	2-1-2-2-9-2-3- (21)
mourning dove	+ (1)	+6-2- (18)
cardinal	11-2-3-1-1-1-2-2-7 (22)	4-2-1-3-3-1-1-5-8- (28)
sparrow hawk	+ (1)	(0)
meadowlark	+ + + 2 + (7)	2-1-1-1-2 (7)
bobwhite	+ + (14)	(0)
loggerhead shrike	+ + + (3)	+ + + (3)
fox squirrel	+ (1)	+ (1)
crow	2-3- (5)	3-3-1- (7)
marsh hawk	+ (1)	+ (1)
sparrows sp. ?	4-2- (6)	+ (1)
downy woodpecker	+ (1)	+ (1)
Harris sparrow	5- (5)	9-4-35-5- (53)
starling	2-22-6-3-100 (133)	8- (8)
song sparrow	+ (1)	2-3- (5)
red wing blackbirds	7 (7)	(0)
red-bellied woodpeckers	(0)	2-1- (3)
Eng. sparrow	(0)	8 (8)
E. bluebird	(0)	3 (3)
mockingbird	(0)	1 (1)

Totals of censuses of birds and mammals 660115-13
 on the Clinton area
 (see notes for individual days and exact routes covered)

	Jan 2	total	Jan 15	total	Jan 23	total
tree sparrow	18-6-9	33		0	23-10-10-3-7-17-8-	73
robins	900-1859	2766	12	12		0
b.c. chickadee	2-2-1	5	1-1-1	3	1-1-	2
red-tail hawk	1-1-1-1	4	1-1-1	3	1-1-1-2-2-	7
titmouse		0	3-2	5	2-	2
juncos	18-18-3-8-42-25-12-18 18-38-4-2-8-2-23-12	241	20-10-8-1 1-1-1-1-1-8-4-4-5-20	86	8-3-8-20-8-4-8-12-3-12-4 30-4-18-5-10-18-3-25-8-6	244
y. shafted flicker	2-1-1-1-2-1	8	1-1-1-1-1-1	6	1-1-1-3-3-1-1	11
horned lark	2-300-1	303	1-4	5	1-1-2-1-1-1-	7
longspur		?		?		
blue jay	2-1-2-2-9-2-3	21	1-1-1	3	1-3-2-2-9-1-2-2-1	23
mourning dove	16-2	18	1	1		0
Cardinal	4-2-1-3-3-1-1-5-8	28	2-7 1-1-2-3-1-1-1-1-2-	22	1-1-3-1-2-2-2-1-1-2-1-2 2-1-2-9-4-3-2-3-4-2-	52
sparrow hawk		0	1	1		0
meadowlark	2-1-1-1-2	7	1-1-1-2-1-1	7	17-4-1-1-1-2-26-2-18-2	74
bobwhite		0	14	14		0
loggerhead shrike	1-1-1	3	1-1-1	3	1-1-1-1-1-	5
fox squirrel	1	1	1	1	1-1-	2
Crow	3-3-1	7	2-3	5	4-6-	10
marsh hawk	1	1	1	1	1-	1
sparrow sp?	1	1	4-2	6	1-	1
downy woodpecker	1	1	1	1	2-1-	3
Harris sparrow	9-4-35-5	53	5	5	2-	2
starling	8	8	2-22-63-100	133	4-8-32-	44
song sparrow	2-3	5	1	1		0
red-wing blackbird		0	7	7		0
cowbird		0		0		0
red-bellied woodpecker	2-1	3		0	1-1-	2
Eng. sparrow	8	8		0	3-	3
e. bluebird	3	3		0		0
mockingbird	1	1		0	1	1
hairy woodpecker		0		0	1	1
goldfinches		0		0	18-	18

If one were to exclude the side trip (walking) at the Peterson reservoir, ^{of Jan 2} there is a close correlation of numbers of many kinds of birds. The birds that form flocks seem to vary most in relative numbers.

Potter's Lake, Univ. Kansas, Lawrence, Douglas Co., Kansas

Jan 17, 1966
Potter's Lake now supporting ice thick enough for skaters.

Jan 19, 1966
Potter's Lake still being used for skating. There has been no snow to cover ice.

Wakarusa River, N of Clinton, Douglas Co., Kansas

Jan 20, 1966
Water frozen in Wakarusa River and first time this winter. All creeks also frozen with only rarely open or flowing water. No snow.

2 1/2 mi N and 3 mi. E Lawrence, Douglas Co., Kansas

Jan 22, 1966
made usual census of river valley along old railroad grade to pond, thence S along dike creek. at above location noted approx. 700 starling in one flock feeding in cut grasses along dike and in field to S. They were in a compact formation and moved by the trailing birds flying over the feeding birds and alighting at the front of the flock thereby advancing the birds in a forward movement, as many as 150 feet. They moved by flying as an entire group to various parts of the field. Only other birds were 2 meadowlarks and 5 horned larks. The Kaw River was frozen above the dam and open below the dam to about 2/10 of a mile where ice again cover the water. Beyond the complete ice was intermittent. The Lakes at the Sand Pits were frozen and skaters were using.

Wakarusa Valley (in proposed Clinton Reservoir area), Douglas Co., Kansas

Jan 23, 1966
made census of birds & mammals (see map of Jan 2 for route followed which was precisely that of Jan 2) in the Clinton Reservoir area. Left Lawrence 8:30, sky clear but distances hazy, temp 5°. Will keep record of birds between Lawrence & Sigel. Mileage 46.7. Slight wind from

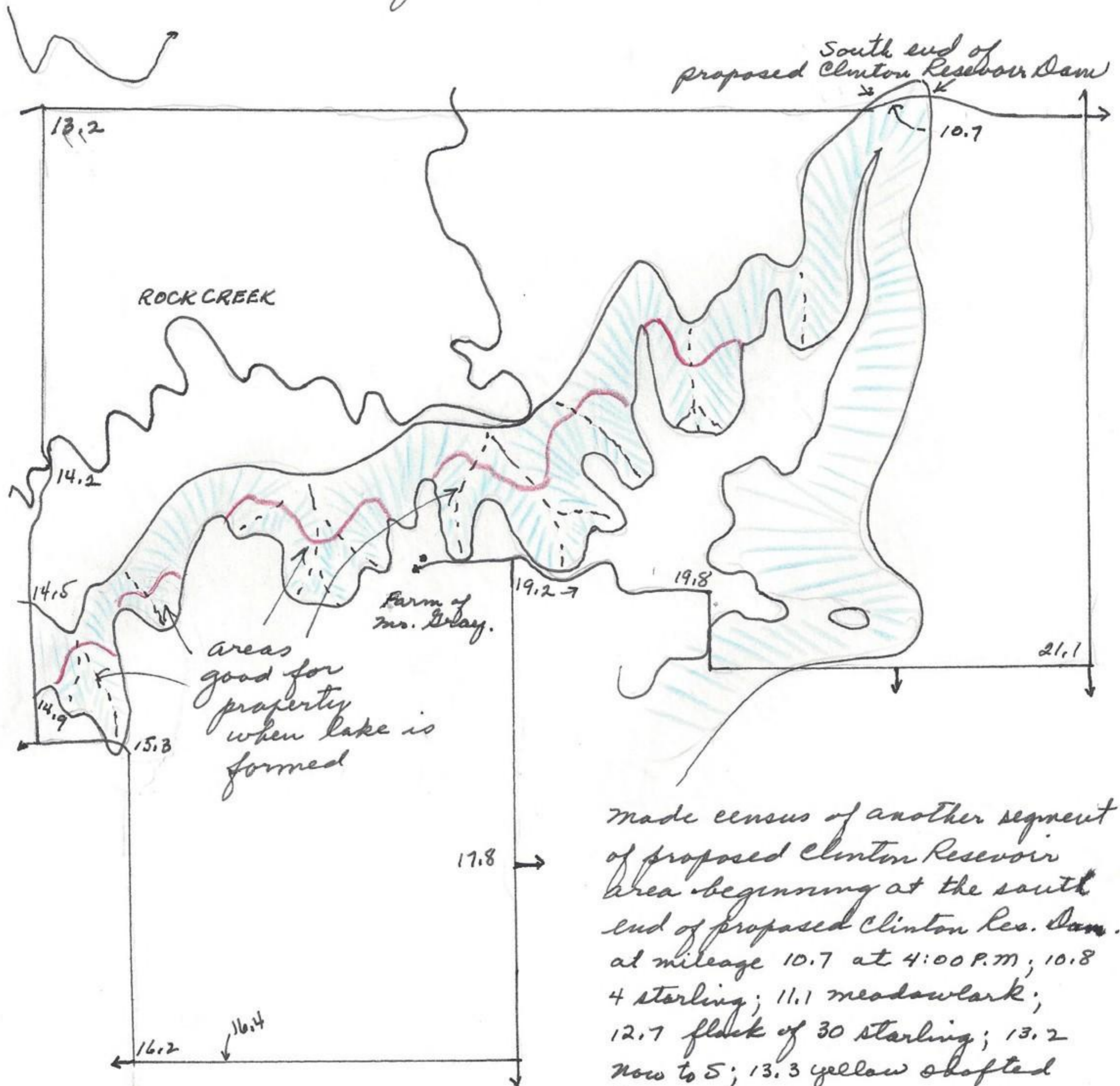
At home before leaving heard a cardinal in song. Blue jay, robin (1), 48.8 beginning no. 6 road to W. Yellow-shafted woodpecker, 20 goldfinches in one flock, meadowlark, crow flying E high, 3 others ^{on ground} where road crosses Yankee Tank Creek (52.8), 2 Harris sparrows, 2 cardinals. 53.3 Sigel School at 8:45. 53.5 30 juncos, most of them slate colored, 53.7 now to S; ^{54.0} 4 juncos, 23 tree sparrows, 18 juncos; 54.2 17 meadowlarks in one flock; 54.4 Y in road; 54.5 blue jay; 54.6 bridge, 2 cardinals, Chickadee, 54.8 Wakarusa completely frozen; 55.1 N end proposed dam site (old); 55.2 cardinal; 55.4 4 crows on ground in field to N; 55.6 4 meadowlarks; 56.4 Peterson Cross roads; 56.9 Wakarusa bridge, water frozen but shows water had been flowing in previous day, no snow in area but ice whitish in contrast to dull slopes, 5 juncos; 57.1 2 Harris Sparrows; 58.0 redtail in top dead tree on high point to S and facing sun; 58.0 2 cardinals, yellow-shafted flicker and 10 juncos; 58.2 passing Wakarusa bridge; 58.5 3 blue jays; 58.6 at turn to S, 9 cardinals, 2 blue jays and 18 juncos; 58.8 two titmouses; 59.0 4 cardinals; 59.1 small bridge; 59.3 main road, 3 cardinals, 1 hairy woodpecker; 59.6 a meadowlark in top of tree and resting on branch facing the sun; 59.8 now to S; 60.2 1 meadowlark; 60.3 1 meadowlark; 60.9 base of hill, 30 juncos, 10 tree sparrows, 2 cardinals; on hill going up hill approx 25 juncos and 3 cardinals; 61.2 8 juncos, small sparrow (sp. ?); 61.3 10 tree sparrows, 4 cardinals, 2 blue jays; 61.4 9 blue jays in one flock travelling along fence row of trees; returned to base of hill at 61.9; 62.4 1 horned lark left road; 62.8 horned lark left road; 62.9 2 horned larks, both with yellow on stripe that crosses above hill; 63.0 now to W on main road; 63.1 marsh hawk 100 ft to N flying E; 63.3 Wakarusa River, 2 cardinals; 63.7 approx 8 juncos; 64.1 now to S; 64.4 flicker flying to E; 64.6 3 juncos, 1 cardinal; 65.0 now to W; 65.6 now to S; 66.2 Wakarusa bridge, one cardinal; 66.6 single horned lark; 66.8 single horned lark; 67.1 single horned lark; 67.5 at river road; 67.7 now to S; 67.8 a red-bellied woodpecker, a blue jay & a ^{fox} squirrel in same tree which was relatively isolated from river course; 67.9 a red-bellied woodpecker was on fence post 6 inches from top and facing sun (back to sun). Stopped the car at 10 feet

and observed this bird for 4 minutes during which time it moved its head only slightly. I walked to post where the bird then left and flew about 50 feet out into a plowed corn field where it alighted on the ground. It flew normally as far as I could ascertain but it was definitely cold and actions on the post were not normal for this bird.

67.9 three tree sparrows; 68.6 passing by Wakarusa bridge;
 68.9 2 blue jays; 69.0 yellow-shafted flicker and 8 juncos;
 69.3 crossroads now to W., 3 Eng Sparrows & 4 starlings at ranch area; 69.7 2 blue jays, 3 cardinals, 20 juncos; 69.9 3 flickers on front lawn of home; 70.0 red tail in dead tree on knoll to N facing east (that is the bird was facing the sun); 70.2 downy woodpecker and one black-capped chickadee; 70.3 yellow-shafted woodpecker; 70.9 8 juncos; 71.1 loggerhead shrike and now dropping down off of uplands; 71.6 4 juncos;
 71.9 cardinal; 72.1 redtail hawk on top of utility pole in farm yard, 7 tree sparrows and 2 cardinal also here;
 72.3 turn of road to W into Richland, 6 crows feeding on scraps at edge of road; 72.6 center of Richland; 73.1 bridge over Wakarusa, 2 cardinals; 73.3 loggerhead shrike;
 73.4 2 meadowlarks; 73.9 now to E; 74.5 to N; 74.6 loggerhead shrike; 75.6 turned around, 24 meadowlarks on lawn of home in one group; 76.7 now to on main road & to east; 76.8 8 juncos & 12 tree sparrows; 78.5 18 goldfinches;
 79.4 2 redtails, one facing the sun and one on shade side of tree a facing away from sun, both left to E; 80.0 bridge, no birds along route except the 2 redtails mentioned above;
 81.2 now at Hillside crossroads and continuing to E; 82.2 12 juncos, 2 cardinals; 82.6 ⁺ 2 redtails in top of tree at mouth of canyon, they flew to E alighting in tops of trees on other side canyon 1/10 mile beyond; these two redtails could possibly be the ones noted at 79.4; 83.1 fox squirrel and downy in same tree, the squirrel returning down tree from a high perch; 83.3 cardinal and 3 juncos; 83.5 loggerhead shrike in bush, the bird 3 feet from ground; 84.5 now to E on main road; 84.8 8 starling and 1 flicker; 85.1 now to N; 85.2 2 meadowlarks; 85.7 cardinal; 85.9 Dry Creek, 32 starling in one flock; 86.5 loggerhead shrike; 86.8 four corners now to E; 86.9 18 meadowlarks in one flock, 8 tree sparrows & 12 juncos; 87.6 ^{mockingbird,} yellow-shafted flicker; 87.7 Deer Creek bridge; 88.7 Coon Creek bridge, 2 cardinals; 89.4 1 cardinal, 4 juncos; 89.7 2 cardinals, 1 blue jay

91.2 2 meadowlarks. 91.9 now to E; 93.1 n end proposed dam (old);
 93.1 cardinal; 93.9 "Y" road; 94.6 6 juncos; 95.0 Sigel and end
 of census at 12:00 A.M. Enroute to Lawrence noted one sparrow
 hawk.

Clinton Reservoir area, Douglas Co., Kansas
 Jan 23, 1966



Made census of another segment
 of proposed Clinton Reservoir
 area beginning at the south
 end of proposed Clinton Res. Dam.
 at mileage 10.7 at 4:00 P.M.; 10.8
 4 starling; 11.1 meadowlark;
 12.7 flock of 30 starling; 13.2
 now to S; 13.3 yellow shofsted
 flicker; 14.1 yellow shofsted

flicker; 14.2 Rock Creek bridge, mainly ice but water flowing
 over ice and in open areas; 4 juncos; 14.3 6 bluejay in one
 group; 14.5 base of hill; 14.9 top of hill, 4 crows flying E at about

250 feet high; 15.3 now to S; single crow flying east; 15.6 redtail in tree 1/10 mi to E; 16.2 now to E; 16.4 dropping off hill; 16.8 Lone Star road; 17.4 10 starling and 2 meadowlarks; 17.8 leaving main road; 18.0 30 tree sparrows, 4 cardinals; 18.4 3 bluebirds, 4 cardinals, 18 juncos at top of hill; 18.5 yellow-shafted flicker; 19.2 have returned from Gray farm and now going E. Mr Gray says that KO has purchased 1/4 section to west, and will use for recreation purposes. Mr Gray is in the farming business and if government is to make recreation park out of his area, he wants to sell out immediately. 19.4 5 juncos; 19.8 now to S; 19.9 20 juncos, 8 tree sparrows, 4 cardinals and 3 Harris' sparrows; 20.1 redtail, 8 meadowlarks; 21.0 yellow-shafted flicker flying 38 miles an hour for 1/2 mile; 21.1 end of census. Temp about 20°F during census.

Lawrence, Douglas Co., Kansas

Jan 27 1966

For the last week, I have noted robins on the campus of the Univ. of Kansas, generally 3 or 4 in number and these as isolated individuals. On Jan 25, one sat in top of tree and gave its loud call. Patters Lake still with original ice of initial freeze. This lake has been used every day for skating without interference of snow. Ordinarily the lake freezes and is then covered with snow the following day or so.

Wakarusa Valley, area of proposed Clinton Reservoir, Douglas Co., Kansas

Jan. 29, 1966

Mary Pauline and I made census of Clinton area (see notes of Jan 2, 15 and 23 for other censuses in same area), following precisely as of Jan 2. Left home at 9:30 A.M., mileage 79.5, sky clear, brisk wind from north, temp 10 below O.F. Will keep record of birds between outskirts of Lawrence and Sigel. 73.6 6 goldfinches; 74.1 20 juncos; 75.3 Yankee Creek, yellow-shafted woodpecker; 75.8 meadowlark; 75.9 Sigel at 9:47 A.M.; 76.0 meadowlark; 77.1 "Y" in road; 77.8 77 end of proposed dam, birds rare. all water completely frozen and no snow in any exposure, soils dry; 78.3 18 meadowlarks along side of road in one flock; 79.1 ^{Passing} road to Peterson; 79.6 Wakarusa bridge; ice complete and soils above ice dry and almost powdery; one red-bellied woodpecker

flew by followed by another one in ten seconds; 80.0 5 crows fly-
 ing along dike at base of hill to S; 80.7 1 redtail hawk in top
 of dead tree on ridge 2/10 mi. to S; 12 juncos along road; 81.0
 passing by bridge over Wakarusa river; 81.2 2 cardinals,
 1 blue jay; 81.3 now to S and 6 eastern bluebirds, 2 cardinals;
 81.5 yellow shafted flicker, 2 juncos, 4 starling, 1 yellow shafted
 flicker, 2 cardinals, all within area of 150 feet of roadside; 81.7
 yellow shafted woodpecker; 81.8 water at cascade in Wakarusa
 River open but solid above and below, water flowing in good
 quantity over rapids, snow^{1 inch} on ice in protected areas of ice on
 river; 81.9 small culvert; 82.1 main road; 82.2 2 cardinals,
 8 Harris sparrows, 12 juncos, 1 blue jay; 82.3 2 meadowlarks
 and yellow shafted flicker; 82.6 now to S; 83.2 horned lark;
 83.5 horned lark; horned lark; 83.7 base of hill; 12 juncos,
 cardinal, 83.9 top of hill; 84.3 turn around, 1 crow flew by
 to west; 84.5 3 male cardinals, 3 juncos; 8 juncos, 12
 juncos, 2 starling; 84.8 top of hill, several bush with
 brilliant red berries; 84.9 base of hill; 85.1 3 horned
 larks; 85.4 8 tree sparrows; 85.7 horned lark; 86.1 now
 to W; 86.4 Belvoir bridge over Wakarusa (constructed 1921);
 87.1 now to S, sun brilliant today; 87.9 5 crows left field
 to right; 88.1 now to W; 28 meadowlarks in one flock; they
 dispersed in 3 directions; 88.7 now to S and wind blowing
 across road to S; 88.9 2 horned larks; 89.0 2 horned larks;
 89.2 now to W; 89.3 bridge over Wakarusa, water open in
 rapid area above bridge; 89.5 horned lark; road extremely
 dry & dusty; 90.0 horned lark; 90.3 2 horned larks; 90.6
 horned lark; 90.6 road now along river; 90.7 chickadee;
 90.8 now to S; 2 cardinals, 8 tree sparrows, 18 juncos; 91.2
 now to W; 91.6 red-bellied woodpecker 1/10 mile from any tree;
 91.7 passing bridge over Wakarusa; 8 tree sparrows, 4 juncos;
 92.1 2 cardinals, 8 juncos; 92.4 4 corners now to right; 8 Eng
 sparrows and 8 starling; 92.6 Elk Creek bridge; water flow-
 ing under ice in creek; 92.8 top of hill. 92.9 hairy woodpecker;
 93.3 red-bellied woodpecker; 3 tree sparrows; 1 cardinal; 93.7 crow;
 94.0 4 Harris sparrows, 3 juncos; 94.1 2 blue jays, 4 cardinals,
 6 juncos; 94.2 dropping down off of hill; 95.6 Center of Richland
 96.2 bridge over Wakarusa, open water in rapids below bridge;
 97.0 3 meadowlarks. 97.1 now to E; 97.6 now to N; 98.4 4 tree sparrows;
 98.8 turned around, 1 blue jay; 99.8 back to main road & now to
 E, at 11:30 A.M.; 00.0 40 meadowlarks in one flock; 00.1 3 cardinals

5 tree sparrows, 15 juncos, 02.1 now to S at 4 corners on hill;
 2.7 23 tree sparrows, 8 juncos; 2.8 yellow shafted woodpecker;
 3.0 4 cardinals, 8 tree sparrow, 2 juncos; 3.2 at bridge over
 Wakarusa, open water in rapids above bridge; 3.4 2 eastern
 bluebirds; 4.3 now to E; 5.3 dropping down off of hill; 5.4
 80 tree sparrows, 20 juncos; 5.7 30 tree sparrow, ^{yellow} shafted wood-
 pecker; 5.9 crossing bridge from drainage of lake to north. 6.6
 Crossroads now to N; 6.7 cardinal, 7.0 2 horned larks; 7.8 now
 to E; 8 tree sparrows here; 8.2 2 meadowlarks; 8.4 now to N; 9.1 Dry
 Creek bridge, 8 starling and 2 robins at farm house; 10.1 now
 to E; 10.3 450 cowbirds in one compact flock, feeding in a
 plowed corn field, 10 chickadees and 3 titmouses, 5 meadow-
 larks; 10.6 4 tree sparrows, 2 blue jay, 2 cardinals; 11.0 Deer
 Creek bridge, 10 robins, 2 mourning doves; 11.4 8 tree
 sparrows; 11.6 18 tree sparrows; 12.2 Coon Creek bridge; 12.3
 3 crows feeding in field to N; 13.3 Bromelsick Lake, red-tail
 hawk left lake area; 13.7 stone house on top of hill, a fox
 squirrel ran across the roof, in the house the floors and
 stairs are in good repair, porch could be reconstructed; 13.9
 now to E; 12.35 A.M.; 14.4 2 meadowlarks; 14.8 Rattlesnake
 Point; 15.4 now to E; 16.4 22 meadowlarks, resting low in
 ditch along side of road, out of wind; 16.6 N. end proposed dam
 (old site), chickadee; 18.3 8 meadowlarks. 18.5 Sigel School at
 12:45 P.M., end of census. (Birds listed after mileage figure were
 associated together). 21.8 redtail hawk and 30 meadowlarks in
 one group; 22.3 end of road no. 4 at Iowa + 23rd St. at 12:56 P.M.

It was of interest to note that today with temp at 10 below 0
 and wind from N, the redtail hawks in census area were
 apparently low in trees and in protected places as we did not
 see these birds today. The loggerhead shrike were also ab-
 sent and, being a high perching bird were again secluded in
 low shrubs and out of sight. It seems that in cold weather,
 birds ^(meadowlarks, cowbirds, horned larks) congregate in large flocks. This flocking may be a re-
 sult of reaction to an unfavorable external stimulus, in this
 case, cold temperature, rather than predation. I have observed
 flocks of sandpiper form close formation and maintain this
 compact organization when pursued by pigeon hawk.

Lawrence, Douglas Co., Kansas
 Feb 6, 1966

Family visited annual boat show in Kansas City, Missouri

Enroute along turnpike from Lawrence to Kansas City noted 14 redtail hawks, consisting of 2 pairs and 10 singles. Six of these singles were associated with nests. Observations show that the turnpike offers protection to these hawks as guns cannot be used along this route. Observations between 1:30 and 2:30 P.M. The Kaw River at Lawrence from turnpike bridge and dam below is in solid ice but water in pools on top of ice. These isolated pools cover 90 per cent of the surface of the ice.

Lawrence, Douglas Co., Kansas
Feb. 7, 1966

This is the first morning in which birds were reacting to the change of temperature, being the first day that temperatures were high enough to start ice melting on Potters Lake and the first day that skating has been stopped in the last month or so. At 7:00 A.M. Cardinals were singing, starlings were calling and sparrow "talking". Cardinals have been in song before this date but not as emphatic as this morning.

Feb. 8, 1966

Cardinals singing again this morning just after daybreak. Potters Lake on the Univ. of Kansas Campus is now starting to loose its ice with melting starting at edge. About 3 feet of open water now surrounds the ice mass which has not moved by wind action. Approx 10 lobes (8 feet in diameter) had formed on the melting ice. This evening rain to at least 10:00 P.M. Temp 56°F.

Potters Lake, Univ Kansas, Lawrence, Kansas

Feb. 11, 1966

Potters Lake still with solid ice and about same as after original thaw of Feb. 7. Approx. 8 feet open water around edge and no movement of ice. Surface of slush ice saturated and reflecting a blue similar to water. Where snow had been piled during skating, is now in standing water on top of ice.

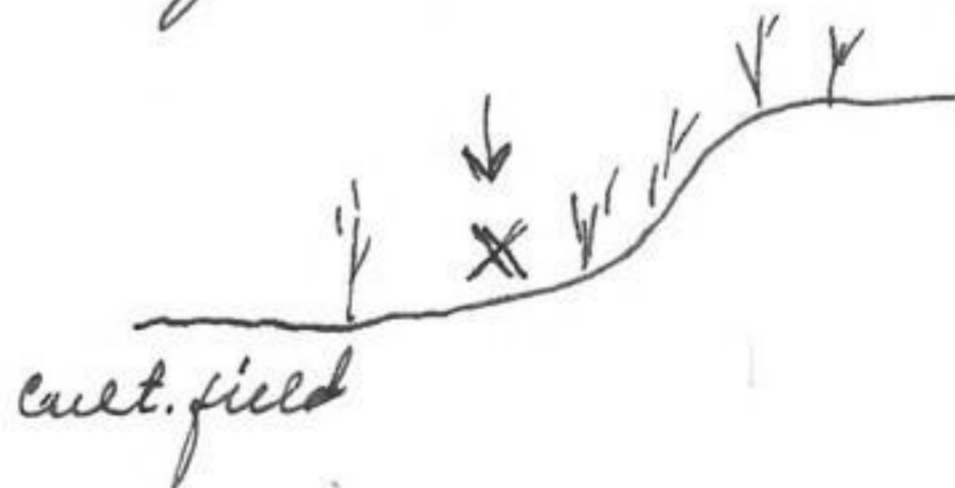
Wakarusa Valley (proposed Clinton Reservoir area), Douglas Co., Kansas

Feb. 12, 1966

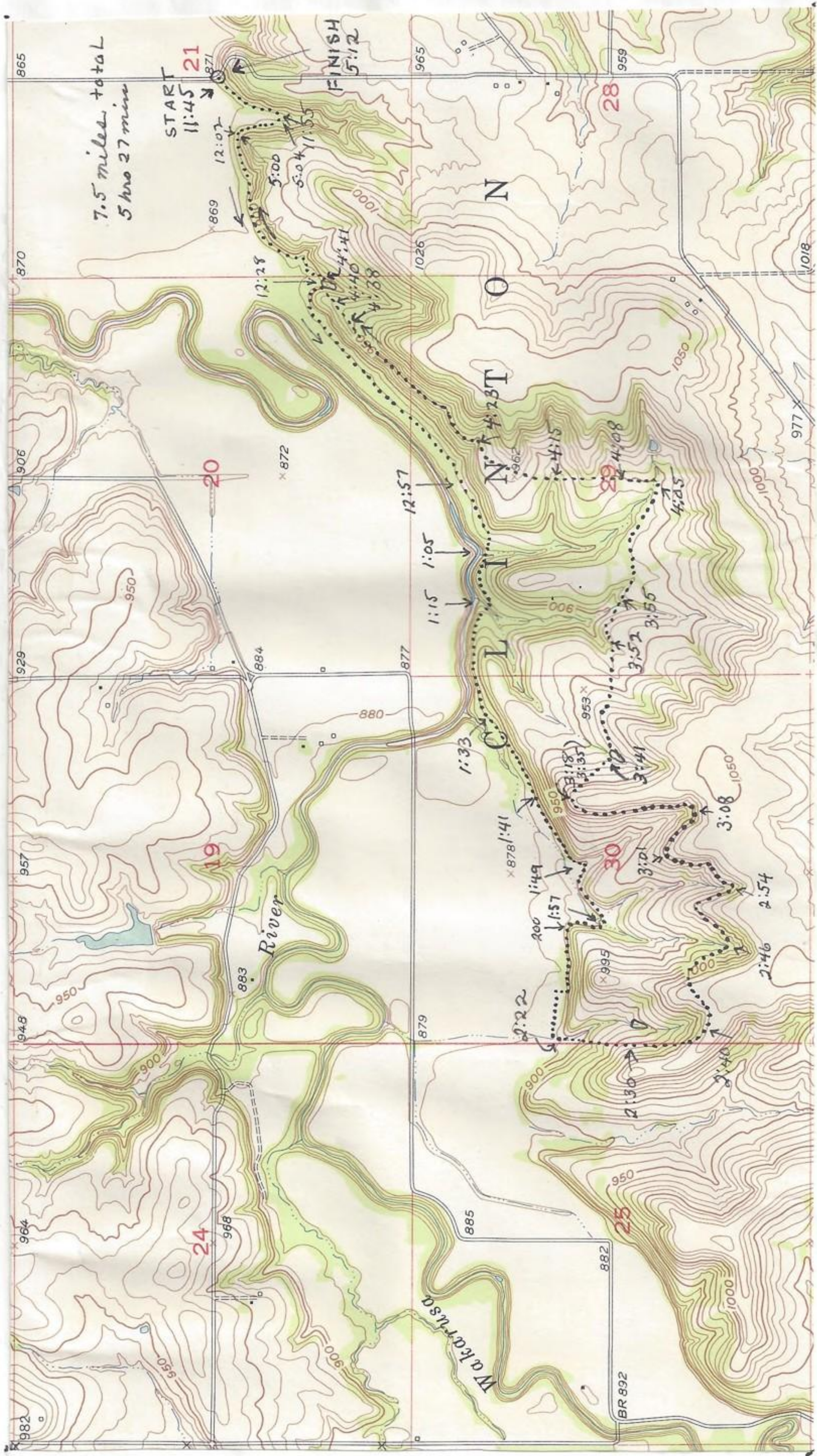
Mary Pauline + I made census of mammals in the Clinton area.

Left home at mileage 7.1 at 10:30 A.M. Temp 43°F, breeze from NW and sky clear. Will keep record of different kinds of birds between Lawrence and Sigel. meadowlark, Eng. sparrow, starling, 11.6 mileage a red-tail hawk on fence post 20' from road and remained until opposite it; 11.8 red-tail hawk; some ponds open, others with 50% ice and this ice on one side; 13.2 3 red tails circling knoll to N (juniper forest) and remained in this area for at least 10 minutes. One would occasionally drop with closed wings into toward trees and then glide up. one alighted on top of tree and then dove down among trees. 13.7 Sigel at 11:00 A.M. 14.8 "Y" in road, Eng. sparrows at farm house; 15.8 small bridge, red-tailed hawk to N. in tree, water running in creek, Wakarusa River with white ice along edge but main stream open and running water, no snow in area in any exposure; 15.4 red-tailed hawk approx. 2/10 mi to N in tree; 2 cardinals & 8 juncos; 15.5 head of proposed dam; 16.1 2 crows feeding in plowed field; 16.8 passing road to Petersons, lower part of field just east of turn with pond of water from last rain; horned lark; 17.2 10 juncos among trees to S; 17.3 Wakarusa bridge, water running but some ice jams at various points, mainly single sheets of ice, mud on slopes wet in contrast to those of a week or so ago when dry & powdery; 18.0 yellow shofled flicker in field 2/10 of a mile from trees; woodpeckers in general seem to range farther from trees in winter than in summer; 18.2 red-tail in trees to S; 18.7 Patton Bridge over Wakarusa, water slightly higher than winter level, now to N because W road too muddy from recent rains; Eng. sparrows and starling at farm house, Crow in field; 19.0 2 meadowlarks; 19.4 sparrow hawk; 19.7 now to W, Coon Creek open & flowing; 19.9 loggerheadshale, 2 crows, 5 meadowlarks; meadow lark singing; 20.3 4 Eastern bluebirds; can hear 2 meadowlarks calling. 1 crow; 20.5 meadowlark; 20.8 Deer Creek bridge, original winter ice in creek but some water on top; 21.6 4 crows; 21.7 now to S; 22.7 dry Creek, water running, some ice; 23.0 top of hill, 5 juncos; 23.3 8 meadowlarks; 23.5 main road now to E; 24.0 12 starling; 24.3 Belvoir bridge, 30% river in ice, 24.6 now to S; horned lark; one meadowlark; 24.8 horned lark; 24.9 horned lark; water in drainage ditch but some ice; 25.7 base of hill, road muddy. At 11:45 left car here and walked W and base of hill and returned by upper route. will keep complete record of birds and mammals observed along route.

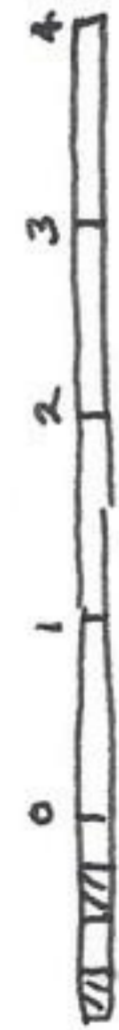
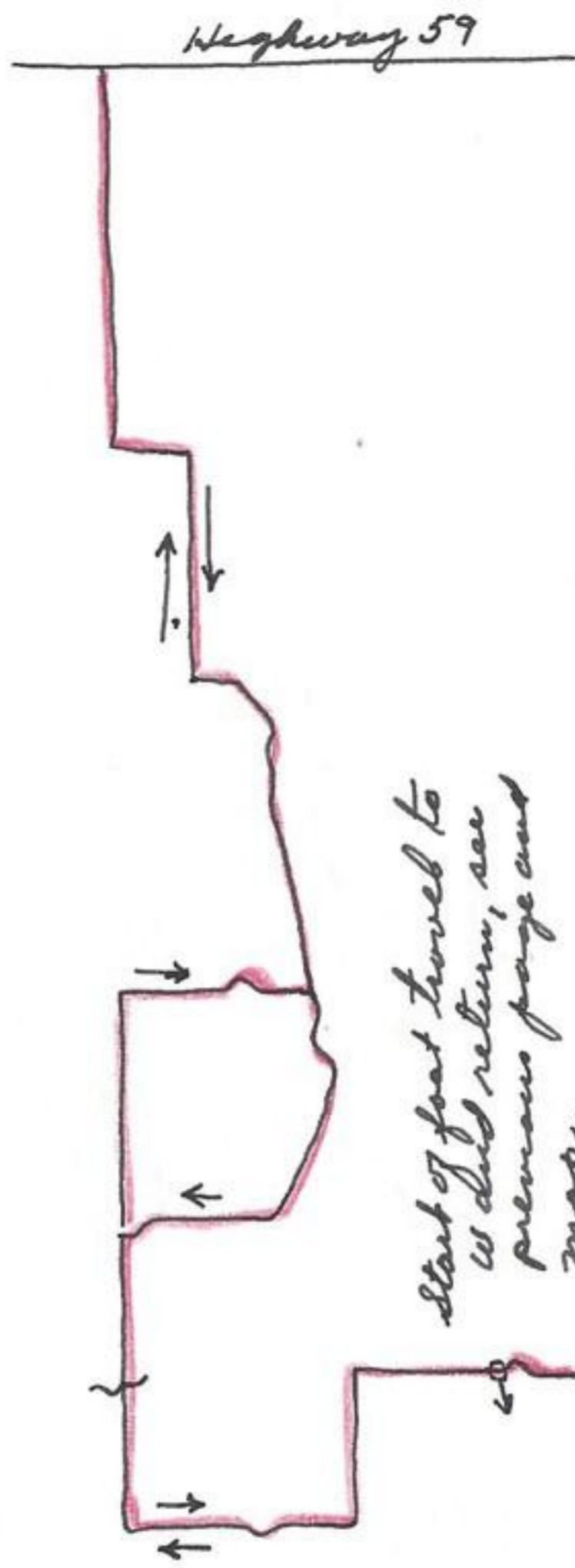
Red-tailed hawk over point at base of hill, 2 juncos, red-bellied woodpecker; 11:46 3 song sparrows associated with stream course and high grasses, 8 tree sparrows, 10 juncos; 11:48 song sparrow, 2 cardinals; 2 titmice, 2 eastern bluebirds, 6 eastern bluebirds, 1 goldfinch; 11:55 8 Harris sparrows, some of these birds singing; 14 juncos; 11:56 head of field and crossing over creek; 8 English sparrows; the birds in the last stretch from car could be considered a loose flock. 11:58 2 titmice, 1 winter wren, the titmice calling continuously; downy woodpecker, 3 chickadees (black capped); song sparrow, 2 cardinals, bluebird; 12:02 spring point and now to W; 2 eastern bluebirds; 12:03 five song sparrows associated with grasses of springs; 12:06 5 white-throated sparrows; 1 crow flew by; downy woodpecker; 12:07 swamp sparrow; 12:08 3 cardinals; 12:09 18 tree sparrows, these birds seem to be generally distributed along base of hill and fly hillward when we pass, some getting up as individuals or small groups in contrast to juncos that seem to get up all at once; 12:10 12 juncos; 12:12 14 tree sparrows; 12:13 red-bellied woodpecker and approx. 25 tree sparrows, these birds leave ground 40-50 feet beyond ahead of ~~see us~~ us. 12:15 4 song sparrows, 5 chickadees, approx 20 tree sparrows; 2 cardinals, 2 titmice; 12:16 approx 35-40 tree sparrows, mainly feeding on ground and leaving toward hill when approached; 12:17 3 cardinals, 12 tree sparrows, these tree sparrows are almost continuously distributed along route but in minor flocks as noted; area has been of old, mainly dead tree in partial open base of hill. This entire area has apparently been tree poisoned as most of trees now dead.



12:18 4 black capped chickadees
4 blue jays; 12:20 3 cardinals, no water in pond to right; 12:21 2 cardinals, 2 b.c. chickadees; there are definitely fewer birds thru wooded area; 12:23 2 cardinals; 12:28 pond at mouth of canyon, still in ice. at pond noted 2 cardinals, 4 blue jays, 2 white breasted nuthatches, 12 juncos, 3 goldfinches flew by; 12:32 8 juncos, 3 cardinals; crows calling in fields



ITINERARY FEB. 12, 1966



SCALE
MILES
1964

Kansas State
Road map.

Itinerary Feb. 12, 1966

to E; cardinal; at beginning of heavy timber between
 Wakarusa River and hill, examined marsh grass among
 trees; this area may support *Synaptomyza* or *Petymys*; main
 trail heavily used by raccoons; 12:37 cardinal singing;
 hairy woodpecker; 12:40 3 juncos (state colored); 3 titmice;
 2 cardinals; 5 tree sparrows & 2 golden crowned kinglets;
 12:43 2 cardinals; 8 juncos; 12:45 cardinal singing; flicker
 calling; 4 juncos; 12:47 cardinal calling; 12:48 red-bellied
 woodpecker; 12:50 3 blue jays, one of which called like
 a red-tailed hawk; 2 cardinals; 7 juncos; 12:54 2
 cardinals, 2 blue jay, 1 red bellied woodpecker; since
 entering the timber along base of hill (from last pond) have
 counted 12 runways of either or both the woodrat or
 more likely the cottontail rabbit crossing the trail
 at right angles or going from sidehill to Wakarusa River;
 2 jays, 1 yellowthroated flicker; Coyote tracks in trail
 unusually rare, predominantly raccoon; trails wet and
 muddy but on a base of frozen soil beneath; the dry
 leaves have come thru winter much in the same
 condition as in fall, having had no compacting snow
 to flatten them out. 12:57 beginning of old clearing
 nearing mouth of canyon; area growing into shrubs and
 small trees; 3 juncos; ~~12:00~~ 1:00 P.M. 2 song
 sparrows; 1:05 mouth of canyon and crossing meander-
 ing stream, water flowing and no ice. no snow in
 any exposure; 8 Harris sparrow and 12 juncos here; 2
 downy woodpeckers, 5 black capped chickadees; Wakarusa
 River 95% open with occasional ice mass across water;
 4 juncos, 3 chickadees; 1:12 20 tree sparrows; 10 tree
 sparrow; 4 juncos, 4 chickadees; 1 red-bellied wood-
 pecker, 3 titmice; 1:15 crossing mouth second creek;
 water flowing and some ice; 4 juncos, 2 titmice, 4
 chickadees; 1:20 3 chickadees; 1 downy woodpecker;
 1:23 25 juncos; 1:27 first spring area along trail; near
 beginning of ridge; 1:28 first rabbit; 8 juncos; second
 damp area along trail; 1:30 2 cardinals; 8 chickadees;
 1 cardinal; 1:31 four titmice; 3 chickadees; 1 cardinal;
 1:33 mouth of canyon & trail now to left; checked *Synaptomyza*
^{bog} ~~moat~~ here and found no good evidence of microtines as
 cattle had trampled grasses & sedges. very little overhead
 protection, considerable sphagnum moss in bog area of

spring, standing water below spring area in ice; some old trails present; weedy areas associated and beyond, where many *Synaptomys* were previously taken, are also trampled and made unsuitable for microtines; 1:38 2 cardinals, 2 blue jays, 3 juncos; 1:41 road from saddle and now open field to right; 1:42 8 juncos, 3 blue jays, 3 titmice; 1:44 5 cardinals, 4 titmice, 4 juncos, 4 blue jays; 1 titmouse left forested area, flew out into open field, alighted on ground and then returned; 1:45 2 yellow-shafted flickers; 1 white-breasted nuthatch, 2 cardinals; red-tailed hawk to S, 2 fox squirrels ran toward hill; 1:47 passing by an old nest that could have been used by a hawk or crow; area here in solid grass but grazed to base, more so than in previous years; no overhead protection; 25 tree sparrows, 8 juncos, 3 chickadees; 1:49 mouth of canyon, no water; Andropogon grasses in isolated islands and offering good protection for microtines of which there were many runways. Areas on both sides of fence grazed and trampled; 1:55 2 song sparrows, downy woodpecker 1:57 mouth of nest canyon to W. 3 cardinals; 2:00 W point of mouth of canyon, now to W; 2 meadowlarks in field to N; 4 starling flew by; 12 juncos, 2 blue jay, 2 hairy woodpeckers and 22 tree sparrows, 1 goldfinch, 5 Harris sparrows; 2:05 4 cardinals, 70 tree sparrows; 20 juncos, 4 titmice, 1 cowbird flew by, 13 Harris sparrows; most of these birds singing; deer tracks in trail and some Coyote (7 tracks in one square foot of trail); approx 40 tree sparrows leaving weed field and passing S into slopes of hill; the field to N of grasses and sedges in damp to standing water support a high population of rodents with well used trails completely covering the ground. This field, in previous years, has been burned or plowed but is always wet from spring and drainage water. 2:22 cattle pens at nest canyon. will go S to ridge, keeping on W slope where area is less grazed. 2:26 mockingbird; 4 juncos; field sparrow; 2:30 ungrazed andropogon, 1 downy & 2 bluebuds in old tree; 2 red-tailed hawks circling at head of draw to S; 2:35 2 chickadees; 40 tree sparrows at head of draw in sparse timber; 2:40 head of drainage on ridge, loggerhead shrike; 2:46 crossing draw to E; 2 blue jays ^{and} 8 tree sparrows, birds uncommon in higher regions of drainage systems;

3:50 3 tree sparrows, 2 bluejays; 2:54 head of nest
 draw; microtine trails cross main trail approx 1 per
 50 linear feet; water just barely flowing in drainage;
 some coyote tracks in trails, no raccoons; 2 juncos;
 good cover on E side of this drainage; some serious
 erosion ^{below} in gully where we just crossed; 3:01 on ridge
 into nest canyon; 3:02 2 tree sparrows; 3:04 3 tree
 sparrows; 3:08 head of nest valley; 2 yellow shofsted flickers;
 good grass cover on west slope of long N-S ridge; 3:10
 flicker; 3:18 at vantage point; Left point at 3:35, 2 meadow
 larks below, one of which was singing; day has been practically
 cloudless; 3:41 pond, duck left but species?; 10 juncos
 below dam; 3:46 old eroded wagon road & erosion grad-
 ually filling in; 1 meadowlark singing; many of the isolated
 small trees on slopes supporting nest, several of them with
 larger twig protection beyond nest (like a magpie but not over
 top; 3:49 meadowlark singing; 1 tree sparrow; 18 tree
 sparrows in draw associated with timber; 3:52 passing
 by major head-drainage, timber below cliff outcrops, one
 red-headed woodpecker; 3 bluejays; 1 meadowlark sing-
 ing from top of dead tree at edge of timber; 3:53 meadowlark;
 3:55 Crossing drainage at large juniper tree (53 inches in
 circumference). This drainage separates the andropogon
 grasses to W and other grasses to E; water flowing slowly in
 creek; 20 tree sparrows immediately E of juniper; 4:00
 meadowlark singing; red-tailed hawk; 4:03 red-bellied
 woodpecker; 4:05 crossing major drainage; 2 juncos here &
 no water in creek; angel worms under flat rocks; 2
 red-tails directly N and rolling; 4:08 old homestead site,
 cellar only but juncos still in landscape, one elm tree 10 inches
 in diameter in cellar; old well 8 feet N of NE end of building;
 heavy concentration of runway in grass in field N & E of home-
 site, 4:13 2 bluebirds, 1 red-bellied woodpecker; 4:15 at
 NE end field now crossing drainage; 3 yellow-shofsted
 flickers, 2 red bellied woodpeckers and 20 juncos, 32
 tree sparrows, 3 cardinals in group here, low hear 2 crows
 to north; 4 chickadees & 2 titmice; 4:20 1 bluebird
 in isolated tree in ^{open} field; 2 chickadees; 4:23 now entering
 wooded area on upper benchland; 1 red-bellied woodpecker.
 4:28 red breasted nuthatch; rabbit tracks dominate tracks
 in trail; occasional coyote track; the raccoon tracks are

dominate in trails along Wakarusa River below and robblets
 in trail on upper benchland; dry leave thru forest as if in
 fall; red-breasted nuthatch; birds uncommon; 4:36 white
 breasted nuthatch; 4:38 end of bench trail, 2 crows in
 open field to S; oak trees with considerable fruit debris at
 base; 4:40 top of hill at rock fence; 4:41 pond, 2 red bellied
 woodpeckers, 19 juncos, 8 tree sparrows, 2 cardinals; 4:45
 beginning of dike trail; 4:47 white breasted nuthatch; red-bellied
 woodpecker; 4:50 entering partial clearing at fence line; 80 cowbirds
 and 20 redwings passed NW overhead; 4:52 8 Harris sparrows;
 3 cardinals, 1 red-bellied woodpecker; 4:53 2 cardinals; 4:54
 2 cardinals, 1 yellow-shafted woodpecker; there is a noticeable
 lack of juncos and tree sparrows in areas where they were
 unusually common on our trip past here earlier; downy
 woodpecker; raccoon tracks dominate tracks in trail; 4:58
 spring area, 3 song sparrows and no other birds; 5:00 at point;
 8 tree sparrows in area of cattails and high grasses; yellow-
 shafted flicker flew by; 2 chickadees; 5 chickadees; west
 slope entirely in shadow, east slope in sun; 5:01 cardinal
 singing at top of hill to W; 5:03 2 blue jay, 2 cardinals; 5:04
 small 1 sq meter ice bank from spring on west slope 1/3 way up;
 5:04 crossing creek; 2 juncos; 5:06 2 meadow sparrows; 5:07
 2 cardinals, 2 flickers, 2 blue jays, 2 juncos; trails in old
 sedge patches where Synonymys have been previously taken;
 2 juncos; 5 Harris sparrows, 1 song sparrow; 5:10 3 song
 sparrows; 2 cardinals; downy woodpecker; 3 chickadees; 5:12
 arrived at car. Left 5:15 at mileage ~~25.9~~ 25.9. Sun approx
 45 minutes from sundown; 26.1 horned lark; 26.7 2 bluebirds;
 26.5 2 horned larks, these birds are more conspicuous when
 road is dark from being damp from last rains; 26.8 horned
 lark; 27.0 now to W; 27.4 Belvoir Bridge, ice and water
 about same as this A.M.; 27.7 crow in field to N; 27.9 2 blue
 jays; 28.1 now to N; 28.3 redtail from same position as has
 been previously seen, it flew N + then W; 32 meadowlarks
 in one group; 28.6 top of hill, 2 meadowlarks to W; 4 blue jays
 2 yellow-shafted flickers, 6 robin ^{at pond} probably to farm area as
 I have seen robins here on nearly every trip. The house has
 juniper wind barriers which may offer favorable roosting
 place for robins; 29.0 Dry Creek; 2 cardinals, 6 Eng. Sparrows,
 2 robins at farm house; 29.5 8 tree sparrows; 2 cardinals;
 29.8 now to E; 30.8 Deer Creek Bridge, ice as of this A.M.;

4 bluebirds here; light on the reddish side on slopes; sun within 10 minutes of setting; ^{31.1}~~32.1~~ cardinal; 3:16² meadowlark singing to S; 3:19 Cow Creek bridge; 3:26 3 juncos; 8 tree sparrows; 3 juncos; 8 tree sparrows; 23 tree sparrows; 3:30 Boy Scout drainage; 3:4 12 tree sparrows; 3:4 homestead house on hill; 3:7 now to S; 5:53 P.M. sun just starting to set; all light off of hills; 3:45 top Rattlesnake hill; 3:51 now to E; 3:6 7 end proposed dam; 3:3 top Sigel at 6:00 P.M.; end of census. Sky without clouds all day; breeze all day; 3:7² redtail hawks flying toward juniper hill to W.

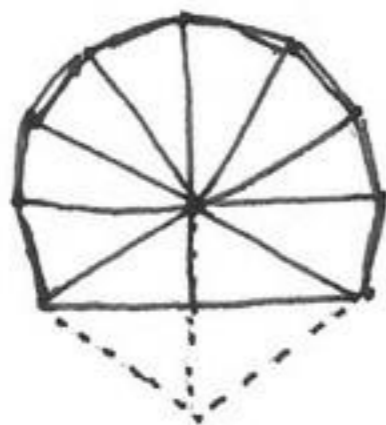
Potter's Lake, Univ. Kansas, Lawrence, Douglas Co., Kansas
Feb. 16, 1966

Snow of previous day now melted (yesterday afternoon) on ice of lake. Ice melting from W side and has exposed 1/4 of lake, 1/8 open on S side. The question has occurred that as to why loggerhead shrikes maintain high conspicuous perches on telephone wires, where they are most frequently seen, when there are no insects on the ground. It would be interesting to determine the diet of these birds when hunting on these high perches. Perhaps it is to attract rather than observe prey.



Lawrence, Douglas Co., Kansas
Feb. 18, 1966

Between Lawrence and Topeka via highway 10 noted 4 red-tail hawks, 2 of which were on utility pole at edge of road. On return, after dark (8:00 P.M.), noted 1 raccoon cross road 2/10 mi. W of point where Still Road leaves highway 10. Today received a letter from G. F. Crabtree, ^{dated Feb. 14} thanking me for identifying a face mask from the collection in the K. City Art museum. He is now at Ave. Dos #268, Cal. San Pedro de los Pinos, Mexico 18, D. F., Mexico.



Feb. 24, 1966

4 groups of robins (groups of 2-3-2-4) from home to Snow Hill at Hill,

Suggestion of 2 man tent patterned after 5 man tent. This tent would provide full front opening and overhead rain protection.

Clinton area, (Proposed Clinton Reservoir area), Douglas
Co., Kansas:

Feb. 19, 1966

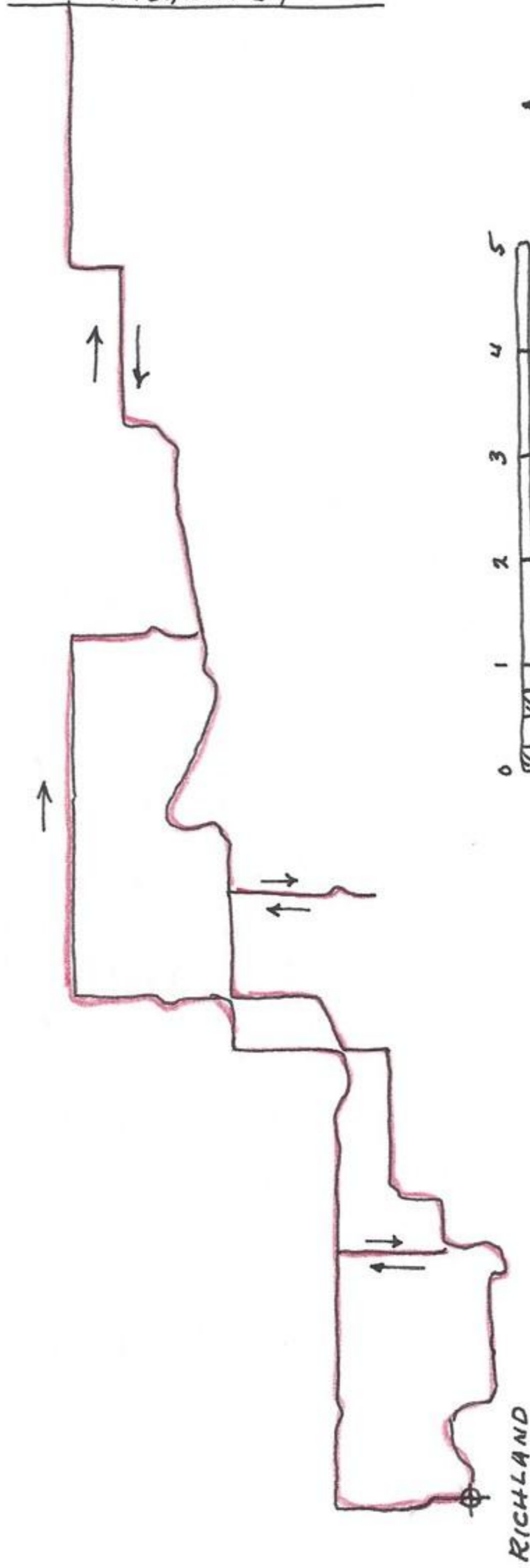
Mileage at Iowa and 23rd. street at beginning of road no
6; temp. 15° below freezing, now snowing slightly with
intermittent blue sky and periods of light snow in air;
thin layer of clouds, wind from N. Time 8:50. Will keep
list of kinds of birds to Sigel: 15.1 meadowlark; 15.4 meadow-
lark; 15.5 horned lark; 16.3 8 goldfinches; ice on ponds
and drainage ditch which on previous days has been water;
now just enough snow on ground to cover white probably
2 or 3 flakes thick; 18.3 Sigel School at 8:56, sun now
gone and slight snow again; 18.6 2 cardinals, 4 juncos;
18.7 ten starling; 19.1 2 cardinals, 15 tree sparrows; some
ponds are free of ice; 19.4 "Y" in road; 19.8 Wakarusa open
with ice covered with new snow on sides; small creek
frozen; 20.1 N end proposed dam; sun and snow on
and off again; 21.75 road side marker of old railroad;
21.95 Wakarusa bridge; open except on side, water clearer
than winter water which was greener; more snow here than
in Lawrence; 23.3 passing Patton bridge, now to W; water
above bridge at next turn completely frozen; 23.5 2
blue jay, 2 titmice, one red-bellied woodpecker; 23.7 now
to S; 23.8 2 cardinals, 5 tree sparrows, 2 juncos; 24.1
Wakarusa completely frozen and snow on ice; 24.4
main road, now to W; 24.9 now to S; 3 crows in field,
4 meadowlarks; 25.2 horned lark; 25.3 2 horned larks;
road viewed to S covered with 90% snow, road view to
N 20% covered which is a reflection of effect of wind;
26.0 base of hill; 8 juncos, 1 blue jay; 26.5 8 tree sparrow,
4 juncos, 1 crow; 28.5 cardinal; 26.6 turned around,
passed same group of birds; 27.2 base of hill; at 9:25;
28.3 now to W; 28.6 Belvoir bridge, mainly ice but above
open and bordered with ice; 29.1 meadowlark; 29.4 now to S
29.5 8 tree sparrow flew along car at 28 miles per hour;
29.7 12 tree sparrows; 30.0 2 juncos; creek frozen; 30.1
yellow-shafted flicker some distance from trees in open
plowed field; 30.4 now to W; 30.7 8 tree sparrows, 4 crows,
13 starling; 30.9 now to S, 4 horned larks; 31.1 yellow-shafted
flicker on top of pile of hay some distance from trees, these
flickers seem to occupy open country away from trees

more than other kinds of woodpeckers and frequent
 the ground more than other kinds; 31.4 now to W; 31.5 3
 yellow-shafted flickers in open winter wheat field some
 distance from trees; on flew to trees, the other two flew
 to other part of open field; 31.6 Wakarusa bridge; 85 per-
 cent open above & below bridge; ice completely covering in
 one or two places; 31.8 horned lark in road; 31.9 horned lark
 in road; 32.0 horned lark in road; 32.2 3 horned larks
 in road; 32.4 passing over small bridge; 32.6 horned
 lark in road; 32.8 now along river; 32.0 now to S; 33.1
 group of 5 cardinals, 35 tree sparrows, 1 yellow-shafted flicker,
 1 red-bellied woodpecker; 33.4 now to W; 33.9 passing
 Wakarusa bridge, now to S; 34.6 4 roads now to W; 7 card-
 inals, 8 starling and 6 Eng sparrow at farm; 34.8
 crossing Elk Creek; 34.9 6 cardinals, 8 tree sparrows;
 35.0 top of hill; 35.9 crow, blue jay; 36.4 top of hill and
 now down hill; 36.6 crow; 37.3 8 cardinals, 30 tree
 sparrows, 8 juncos; 37.4 tree sparrow; 37.6 1 crow; 37.8
 center of Lubland; 10:00 A.M.; 38.3 Wakarusa bridge, open
 water 3/4 of channel; 38.7 meadowlark; 39.3 now to E;
 still snowing off and on with small ^{fine} flakes hardly
 leaving deposit on ground; 39.7 now to N; 3 meadowlarks;
 40.7 3 meadowlarks; 40.9 return (turned around) 41.9
 now to E; 43.3 4 blue birds, 1 tree sparrow; 44.2
 4 way road on side of hill, now to S; 45.3 Wakarusa bridge,
 now returned to N; water open above & below, 95 per cent;
 because of fast moving water; 46.4 back to crossroads
 and now to E; 47.0 2 meadowlarks; 47.3 top of hill & down;
 47.4 yellow-shafted flicker; 47.5 creek partially open; 47.7
 2 tree sparrows; 2 yellow-shafted woodpeckers; 4 juncos;
 47.9 mouth of canyon supporting lake; 48.1 song sparrow;
 48.3 2 cardinals, 2 juncos; 48.6 crossroad, now to N; pond
 open; 49.0 4 cardinals, 40 tree sparrows, 18 juncos; 49.1
 horned lark; 49.4 2 juncos, 49.8 now to E; 50.3 now to N;
 50.8 lake to W completely frozen and snow on top; 50.9 top of
 hill, pond to left frozen; 51.2 Dry Creek; 50% ice and 50%
 open running water; 2 cardinals; 51.7 crow; 52.0 now to E;
 2 chickadees; 52.3 crow, 8 tree sparrows; 52.5 2 blue jay,
 8 tree sparrows, 12 juncos; 53.0 Deer Creek, completely frozen
 and covered with ice; 53.4 2 cardinals, 2 tree sparrows, 4 juncos;
 53.7 8 tree sparrows; 54.0 meadowlark, pond open, 54.1 Coon

HIGHWAY 59



SCALE
MILES
1964
Kansas State
Road map



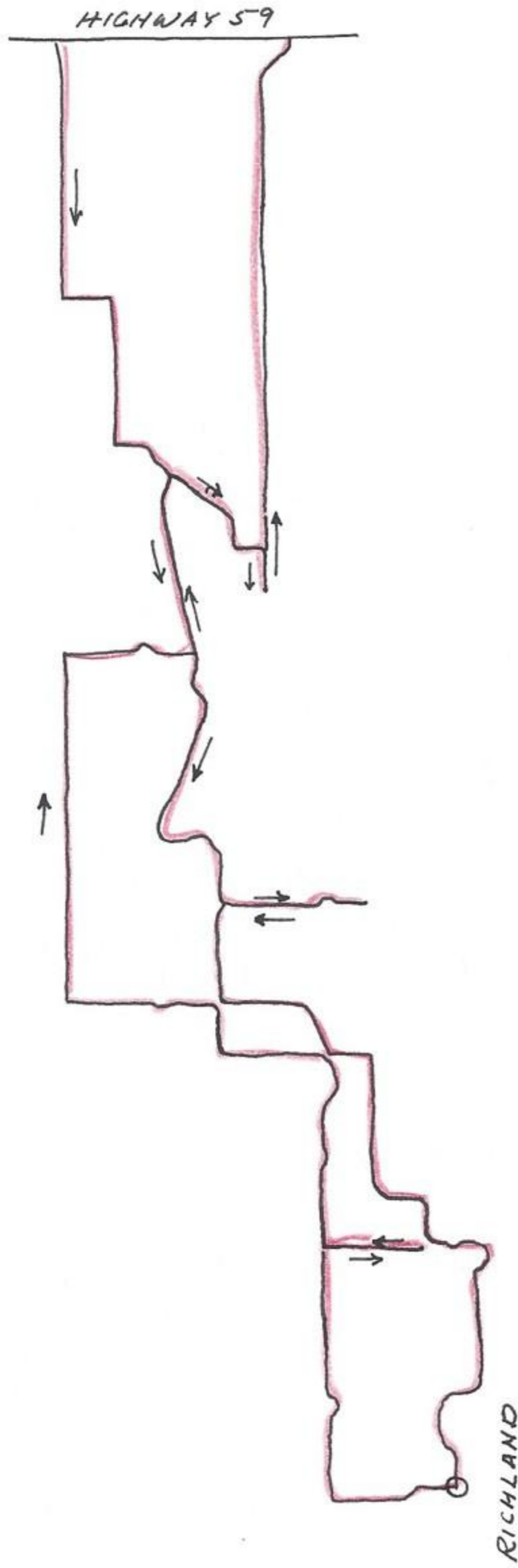
Itinerary Feb. 19, 1966

Creek; have not heard birds singing today; water 50% open; 8 Eng sparrow and 12 tree sparrows here; 55.2 Scout Camp drainage; 8 tree sparrows; 2 cardinals; 55.6 40 tree sparrows; 8 juncos; 55.9 now to E; 56.7 Rattlesnake Point; 56.9 swamp sparrow; 57.2 horned lark; 1 meadowlark; 57.3 now to E; 58.6 n end proposed dam; 60.0 4 meadowlarks; 60.5 Sigel School, 10:50 A.M. and end of official census; 60.8 10 crows; 60.9 loggerhead shrike; 61.9 red-tail hawk; this bird was on dead limb of tree and approx 6 feet from ground; mostly sunshine now and snow has passed but large fluffy clouds in sky; continued into Lawrence.

It is unusual that there were no red-tails or loggerhead shrikes in the census area, probably because of cold temperatures and ^{cold} wind, ^{birds} generally high perching birds. There were ~~other~~ fewer birds than on previous census in same route. (mileage can be corrected by subtracting $\frac{1}{10}$ of any mileage reading as mileage meter in car registers $\frac{1}{10}$ more per mile, example 1.1 miles on meter is actually 1 intrinsic mile)

Clinton Area, proposed Clinton reservoir, Douglas Co., Kansas
Feb. 26, 1966

Checked different kinds of birds between Lawrence and Sigel, census not complete. Sky nearly clear, wind from n and temperature 34°F. 40.5 mileage, red-tail hawk, low in tree, 41.5 red-tail flying 300 above ground; 4 meadowlarks; 41.9 Sigel School at 9:30 A.M. will keep complete record beyond Sigel; 42.7 small bridge, 2 cardinals; 1 crow; 42.9 4 meadowlarks in top of tree; pond frozen; 43.0 "Y" in road, 3 Eng. sparrows at farm house; 43.3 bridge, ice elevated in creek but no water flowing in creek; 43.7 bridge, 95% ice in creek, water flowing; 43.8 n end of proposed dam; 44.2 2 juncos; 45.8 Wakarusa bridge, free running ^{clear} water except along edge where ice crystals are developing, some 4 or 5 inches long; 18 juncos; 45.9 2 horned larks flew across road; 46.6 yellow-shafted flicker flew across open fields; 46.9 passing Patton bridge, now to W; 47.1 chickadee; can hear Eng. sparrows calling; 47.3 now to S; 47.4 inspected old log cabin on sidehill, logs too far gone for reconstruction, collected example of mortar used between logs, red-headed woodpecker here, there are approx 20 times more birds beyond road than along road.






SCALE
MILES
1964

Kansas State Road
Map

Itinerary Feb. 26, 1966

started again at 9:55; 47.7 Wakarusa 90% in ice, some parts open; 48.0 main road, now to W; 48.4 single mourning dove in road; 48.5 now to S, ice in drainage along road but 40 percent open and water just flowing; 49.6 base of road, 3 juncos; 49.8 2 blue jays; 1 junco; 50.0 1 song sparrow; 50.1 3 song sparrows; 50.2 turned around and could hear meadowlark, 2 crows; 50.5 blue jay; 50.7 red-bellied woodpecker. 50.8 base of hill, met 2 Coyote hunters here (from Eudora). They captured 25 last year, mainly S of Eudora and 9 so far this year, mainly in Inland area; 51.5 3 horned larks flew from road; 51.9 now to W; 52.2 Belvoir bridge, 40 per cent in ice and the ice covered with water; 52.7 4 meadowlarks, 1 yellow-shafted flicker; 52.8 meadowlark; 52.9 meadowlark; 53.0 now to S, 2 meadowlarks here; 53.1 can hear meadowlark; 53.6 pond frozen; 53.7 ice in creek and very little water flowing; 53.9 now to W; 54.4 marsh hawk working sidehill; 54.3 15 meadowlarks in one flock; 54.4 horned lark; 54.5 now to S; 54.9 15 horned larks in one group; 54.0 now to W; 55.2 bridge, 5 crows flying to N, 1/3 in ice, 55.4 2 horned larks left road; 55.6 2 horned larks feeding in road; 55.7 single horned lark; 55.9 horned lark; 56.0 small bridge; 3 chickadees; 2 crows to S along ridge; 56.1 2 gold finches; 56.2 horned lark, wind from N keeping dust on S side of car; 56.4 now along river, some snow on ice in protected places; 56.6 now to S; 56.7 crow to W; 57.0 now to W, can hear titmice calling on ridge to S; talked to farmer in house to right, continued W; 57.6, 10:56; 58.3 four way road now to W, 4 English sparrows; 58.5 Elk Creek bridge; 2 cardinals, 2 chickadees, water 80 percent open and flowing, clear; 58.7 top of hill; 59.3 fox squirrel; 60.0 top of hill and now down; 60.3 creek; 61.0 cardinal; 61.0 2 cardinals; 12 juncos; 61.5 center of Richland, now to N; 62.0 Wakarusa bridge, 95 open & ice along edge (11:10 A.M.); 62.9 now to E; Compost pile steaming; 63.5 now to N, 1 meadowlark; pond frozen; 64.5 turned around; 65.6 now to E; 8 meadowlarks; 67.9 4 way crossroads on hill, now to S; 68.3 bridge and 1 red-tail low in tree in same position as seen on previous trip; 69.0 Wakarusa bridge; open water except on very edge; 69.6 cardinal at bridge; 70.1 now to E; 70.3 meadowlark; 70.6 meadowlark; 70.7 meadowlark, starting; 71.0 top of hill; 71.7 small bridge, stream 90% open & flowing clear water; 71.4 great horned owl left sidehill of trees and flew ^{over open field} to trees along Wakarusa river to S; 71.6 drainage from lake

canyon; creek open and water flowing; 71.8 yellow-shafted flicker; 72.3 crossroads, now to N; farmer just beginning to burn field along valley road to E; ponds low and ice just beginning to thaw around edges; 2 juncos; 73.5 now to E; 73.5 loggerhead shrike dropped down from telephone line to among weeds below; 74.0 now to N; 74.2 sparrow hawk; 74.5 top of hill, now down into Dry Creek drainage; 74.7 pond low and ice just beginning to melt on NW corner of lake; 74.9 Dry Creek, free of ice and flowing clear; 75.1 lone starling; 75.7 now to E; 75.7 7 meadowlarks, considerable springtime thaw; 75.8 40 starling in one group; 16 Harris Sparrows along fence row; 8 goldfinches; 5 juncos; 76.3 cardinal; 76.5 blue jay; 76.7 Deer Creek with original winter ice but water on top; 2 cardinals; 77.3 8 goldfinches, 1 crow; 77.7 pond open and 3 feet lower than winter height; 77.8 Coon Creek, English sparrows at barnyard; 12 slate-colored juncos, 12 tree sparrows, 2 cardinals feeding and drinking at edge of Coon Creek; water 90 per cent open and clear; 2 crows to N; 78.3 12 starling; downy woodpecker; 78.5 2 tree sparrows; 78.9 Boy Scout Camp drainage; 2 blue jays, 1 bluebird, 3 juncos, 4 meadowlarks; 2 juncos; 79.1 ^{at 12:10 P.M.} 79.3 top of hill at house; 79.6 now to E past Petersons; 80.3 Rattlesnake Point; 4 juncos; 2 redtail circling point of ridge to E, they flew out into valley; crows calling in that general vicinity; 81.1 now to E; low places damp but no water; 81.9 2 crows in grazing field to N; 82.1 meadowlark; 2 juncos; 82.2 N end proposed dam; love noted 2 whirlwinds today; which do not occur during winter months; 83.0 "X" in road now to S; 83.1 bridge over Wabasha, river 99 percent open with ice on N exposure; 83.6 20 meadowlarks in one flock, some calling; 4 starling; 84.0 yellow-shafted flicker; 84.1 horned lark; 84.5 main road, now to W to Jesse Suttons, 2 meadowlarks; 1 meadowlark; 84.9 meadowlark; 85.0 Jesse Suttons residence; met his wife, their son and daughter and his daughter's husband. Mr Sutton is 76 years old and had lived his life in the Clinton area. He has an alert mind and is a good informant. He told us of his following experiences. (They own grazing land S and to the W of the Windmill in 2nd canyon E of Elk Creek. In early days he remembered an eagle at windmill area. nice fallow plowed furrows for 1/10 mile and are finally run over by tractor. Recalls capturing a striped skunk under a rock

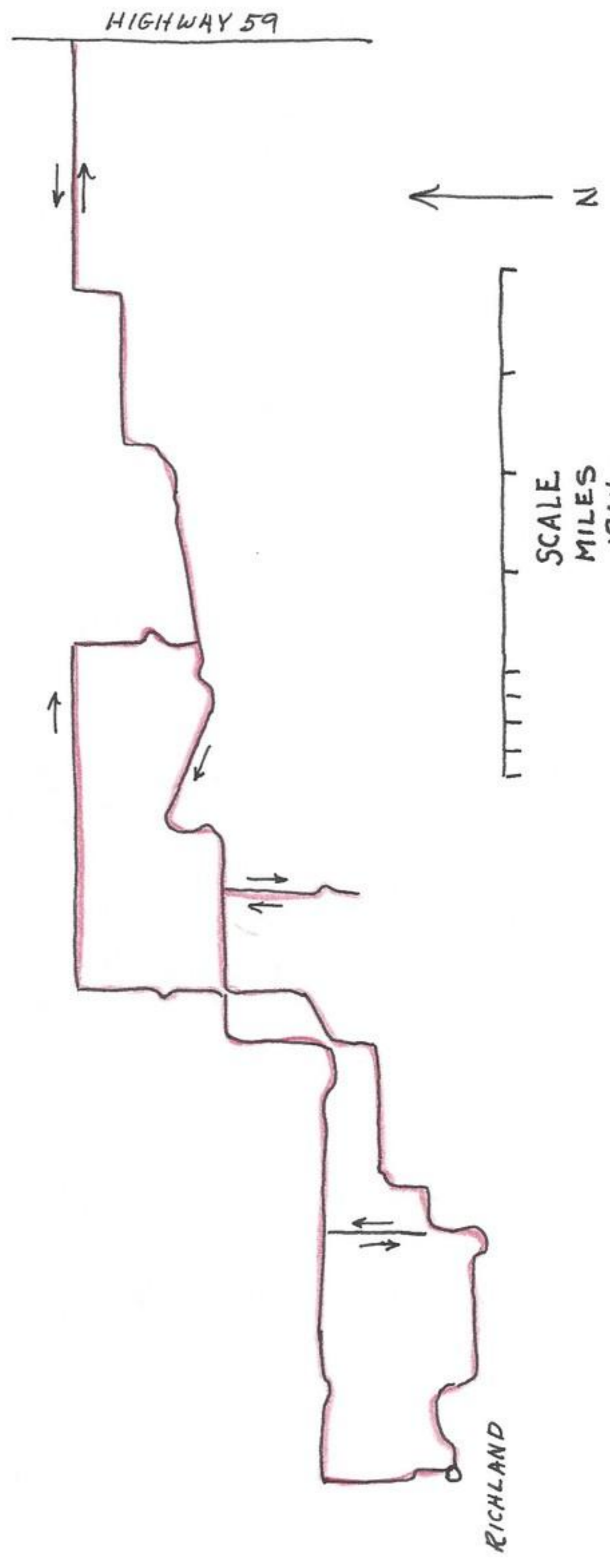
on fence line near windmill in early days. The slopes on S side of valley beyond windmill have never been plowed and were originally prairie, now partially grown to shrubs and small trees. East of windmill in low area were swamps and cattails. Creek water in Canyon used to flow to E. Tornado in 1917 followed along slopes on S side of valley to Clinton, cemetery and did considerable damage. Wakarusa River used to be lakes and rapids and not as deeply entrenched as today. At windmill area in early days he saw chipmunks that are now gone. Fewer 13 lined ground squirrels. A walnut log was found 13 feet below surface and not decayed. Beaver eat corn fields and dig tunnels into fields. Arrowpoint found in area are  natural size, and larger ones  . He found an Indian pipe of clay just N of his house at edge of Wakarusa River. When tornado of a few years ago passed by between Collins property and his, there was no wind at his home. Left Suttons and continued E at 85.2 ~~at 1:00 P.M.~~; 85.4 38 starling in one flock; 85.9 Rock Creek bridge, water 90 per cent free of ice; 87.0 12 starling on telephone lines in one group; 87.3 5 end proposed dam site, 2 crows, end of complete census. 88.6 red tail circling to S. time approx. 3:30 P.M. In Lawrence noted nuptial flight of mourning dove.

Lawrence, Douglas Co., Kansas
Feb. 27, 1966

Rained slightly last night

Wakarusa Valley, proposed Clinton Reservoir area,
Douglas Co., Kansas.
march 5, 1966

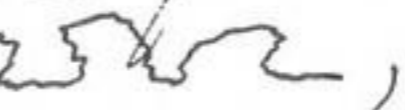

made complete census of area (some route covered in previous census). Day characterized by high cold wind. The wind high enough to blow down limbs of trees and cause birds to fumble in the air when forced to leave ground or short shrubs. Beginning at road 6 at 23rd street at 8:35 A.M. continued west, mileage here 0.1 A thin layer of clouds alternating with partial clear blue sky and dense clouds dropping snow. This on and off snow and clear weather characterizes the weather but snow accumulation almost nil. Temp. 22° F. 2 starling and 5 English sparrow on outskirts of town. The same Coyote inside his small house




Kansas State
Road map

Itinerary March 5, 1966

far first that I have noticed since passing by the
 winter and several trips. It always seems to be
 standing outside on every other occasion. 2.8
 ponds frozen, red bellied woodpecker, not much
 evidence of snow on ground in field although it
 seems to have been snowing on and off all night;
 old limbs of trees have fallen on road during
 last night's wind, roads dusty in spite of snow;
 which has completely disappeared; in protected
 places and on flat surfaces (like ice) the surface is
 white from snow accumulation; 4.1 starling; 4.6
 Sigel School ^{at 8:45 A.M.}; the previously named birds are
 the only ones between Lawrence and Sigel School;
 5.7 Y in road, pond at farm house partly open; 5.9 small bridge,
 ice remaining in creek but water evaporated or sunk into
 creek bed, yellow-shafted flicker flew from open field into
 trees along creek, Wakarusa River open; 6.4 bridge, water
 partly open; 6.5 N end proposed dam (original site); 6.6 one
 crow in top of tree, wind strong and cold in open exposed
 river valley; 6.7 meadowlark; 7.2 all weeds and grasses on
 Peterson property burned, including the Synopterus bog and
 sidehill grasslands to the east, burned between last trip and
 today; 8.2 Wakarusa bridge, river 100 per cent open, 2 inch new
 ice crystals at edge and around limbs in water; snowing -
 clear off and on; 9.2 4 horned larks; 9.5 passing W by Patton
 bridge; road dry; 9.6 2 titmice; 9.7 cardinal in road; 9.9
 now to S; checkadee at corner; larger trees being removed
 from this forest; 10.3 Wakarusa open in long lake-like segment;
 10.4 ♂ + ♀ cardinal, at small bridge; have noticed small and
 large limbs blown onto road from last night wind and wind
 of this morning; 10.7 main road, creek 70% ice, wind noticeably
 stronger across ^{open} valley; 11.2 now to S; road dry; 11.3 18 meadow-
 larks on both shoulders of road in a 100 foot linear distance;
 11.4 horned lark, water practically gone in drainage ditch
 bordering road on right side, raised ice remaining in some
 places; 12.3 base of hill; sun breaking thru clouds; near
 top of hill at 12.4 great horned owl left tree & flew to W, a
 red squirrel was in same tree, ^{at his tree next} and not over 20 feet from the
 owl, a bluejay and one crow here also; 12.8 checkadee; 12.9
 turned around and now back along same road; crow flying in

drainage to west; 19 tree sparrows left hedgerow and flew
 with difficulty, these birds were not seen on trip up lane;
 13.2 cardinal; 13.4 Cardinal; 13.5 base of hill; 13.9 horned
 owl left road; 14.5 meadowlarks noted at (13.1) back in same
 area; 14.6 main road, now to W; sunshine in some areas, thin
 clouds in all other areas; 14.9 Wakarusa bridge; water
 completely open and banks dry; no ice or snow; 15.7 now to S;
 15.8 meadowlark; 16.2 pond on right frozen; 16.3 90 percent
 water in creek frozen; mainly pools frozen and rapids open;
 16.4 horned lark; 16.6 now to W; all grasses on S side of road
 have been fired, normal growth on N side and should be
 tested to see if there is movement of mammals from burned
 field; 17.1 crossroads, now to S; 18 tree sparrows, 12 juncos and
 2 cardinals feeding on burned sidewalk at the 4 corners; now
 snowing with snow blowing almost horizontally from N.W.;
 17.7 3 horned larks; 17.8 Wakarusa bridge, crow on log in
 river, no ice or snow of any kind; water slightly greenish
 but mainly clear, (9:15 A.M.); ^{clouds of} plowed fields of fall are now smooth
 and flattened out (fall = , now );
 from frost action and wind. 2 horned larks left road; separated
 by 50 feet; 18.5 2 horned larks together; 18.6 small bridge;
 19.0 now along river, no snow on ground but it has been
 snowing on and off all morning; 19.3 now to S, 2 horned larks;
 20.1 Wakarusa bridge (passing by); 21.8 Crossroads now to W,
 20 Eng. sparrows at stock yards, 2 starling; at Elk bridge just
 to W counted 22 male ^(both ♀ and ♂ will yellowish eyes) and 30 female rusty blackbirds and 1
 male returning in one flock, they were feeding in ripples of open
 water between frozen pools of Elk Creek. They were turning the
 submerged leaves over. They then flew ^{up} to side of creek among
 bordering trees and worked over the dry leaves on the ground;
 21.2 2 cardinals flew across road on hill side; 24.4 small
 sparrow; 22.6 top of hill and now down into valley; small bridge
 with open water filled with leaves; 23.2 sail red in this area; 23.6
 marsh hawk sailing with difficulty because of strong winds;
 24.1 center of Richland at 9:40 A.M.; sun shining but snow in air;
 24.6 bridge, water open; 25.2 meadowlark, 25.5 now to E; 26.0 now to N;
 26.1 pond to right open; 26.7 6 goldfinches; 26.9 12 tree sparrows;
 27.1 turned around, 22 meadowlarks on lawn of farm, this
 same lawn has supported large flocks of meadowlarks on
 previous trips this winter; 28.0 horned lark; 28.2 now to E;
 28.3 7 meadowlarks; 34.4 ⁰ four corners now to S, at this turn

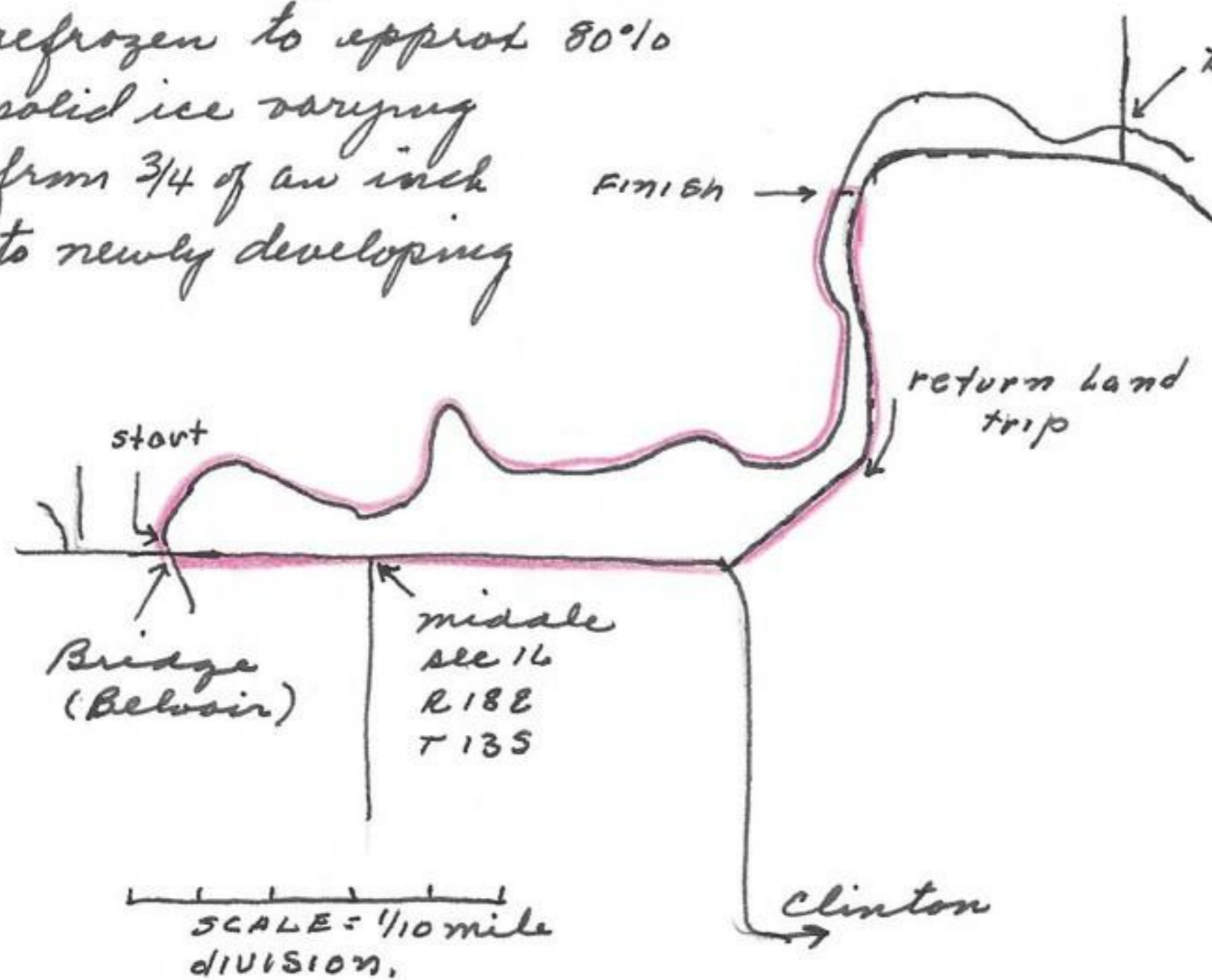
noted a loggerhead shrike in low shrub; 30.9 creek, mainly
 flowing but some ice; 31.5 Wakarusa bridge, ^{turned around} open water 100
 per cent; leaves in river from wind and at all points where I
 have observed the Wakarusa; 32.5 meadowlark; 32.6 crossroad
 now to E; 33.5 top of hill and now down, 1 small sparrow;
 33.8 small bridge, water 10% open; 33.9 3 bluejays, 1 hairy wood-
 pecker, 4 juncos, 8 tree sparrows, 1 field sparrow, yellow-shafted
 flicker in one group; 34.1 mouth lake canyon, drainage frozen
 solid; 34.6 ~~chickadee~~; 34.7 four corners; 34.8 killdeer at
 pond to ^{open} right; 35.0 18 mourning doves on lee side of cliffs
 facing stock yards , all with eyes closed and resting
 of rocks in sun, 15 Harris sparrows in same general area in
 small trees, 12 Eng Sparrows; 23 starling and 2 meadowlarks,
 all associated with yards; 35.9 now to E, pond at corners open
 but ice bordering; 36.5 now to N; 37.3 Sky Creek, ponds of
 creek ice, rapids open; 80 redwing blackbirds, ^{all males} in one flock
 here, they were feeding in open field; 38.2 crossroads now to
 E; 38.3 four Cows in field and remained within 50 feet while
 I passed which is unusual for these birds; 38.4 50 birds in
 one flock (approx 25 cowbirds, 25 starling); 8 meadowlarks;
 1 robin in same group (10:30 A.M.); 38.8 2 bluejays; sky
 overcast and snowing; 39.3 Deer Creek bridge, 150 feet of original
 winter ice below bridge, open above bridge and beyond ice
 below; 40.1 meadowlark; 40.4 Coon Creek, 95 per cent in ice,
 40.5 Cooper's hawk left open field and flew approx 2/10 miles
 SW to trees along Coon Creek, entering low; 41.2 drainage;
 41.4 2 cardinals, 2 titmice, 8 juncos; 41.5 scout camp
 drainage; 41.9 top of hill at old house (scouts have started to
 clear area, cut tree by old rock structure to E; 42.0 20 starling
 in one group; 22.1 now to E; striped skunk kill at corner;
 42.9 rattlesnake point; 43.7 2 bluejays base of hill; now
 snowing; 43.4 meadowlark; 43.5 now to E, horned lark; 44.8
 N end proposed dam (10:45 A.M.); 45.6 X in road now to right;
 45.7 Wakarusa bridge, water open, yellow-shafted flicker; seems
 like fewer flickers than on previous censuses; 46.5 cardinal;
 47.1 main road at Collins, now to W; 47.5 30 starlings at Suttons;
 47.7 meadowlark; 48.7 cardinal; 49.4 center of Clinton, now to W;
 49.5 8 goldfinch; 50.2 now road to SW; red soil in cut banks;
 50.5 meadowlark; 51.2 23 meadowlarks in one flock; 51.7
 pond on right frozen, pond on left open; 2 meadowlarks; most
 field on uplands either for grazing or for cutting; 53.4 8 starlings;

53.7 now to S; 53.9 2 cardinals, 8 tree sparrows; several small dead trees have blown over along this hedge row; 54.4 12 meadowlarks, 3 horned larks; wind high, snow on and off and occasional sunshine; 55.1 wooded drainage; water 50 per cent open and considerable green algae and moss, 3 cowbirds, 2 mourning doves; 55.9 crossing Rock Creek, old bridge gone; 8 slate-colored juncos feeding along edge of creek; no ice, water clearer than Wabarus; 56.1 passing old log cabin to right, considerable wood cutting in virgin stand to left beyond at turn; 56.6 drainage open + green algae & moss; 57.0 crossing drainage, 50% ice; 57.5 red-tail hawk soaring to right; surprisingly few birds on uplands, mostly grazed area, and heavily grazed at that; 58.6 pond open to right; 58.7 now to N; wind strong, more plowed field than to W; 59.3 striped skunk road hill; 60.4 top of hill and dropping down into Rock Creek drainage system; 61.4 drainage, water frozen; 61.7 red-bellied woodpecker; 61.8 18 robins feeding in open field along with 5 starling; 61.9 bridge over Rock Creek, 18 tree sparrows, 6 juncos along bank; water free of ice; 62.7 2 meadowlarks, 61.3 entering main road at diagonal takeoff; 63.5 horned lark, meadowlark; 63.9 meadowlark; 64.0 middle of Clinton; 64.5 meadowlark; 65.5 now to S; 66.5 yellow-shafted woodpecker; 66.5 bridge over Rock Creek, 85% open, clear but with recent leaves blown on surface; 66.8 now up hill; 67.2 top of plateau; 2 crow in field to right; 67.3 now to E; 67.6 now to S; 68.3 80 starling at farm house; 68.4 now to E; 69.1 main road; 1 sparrow hawk, 1 meadowlark. 69.5 now to N; 69.8 striped skunk road hill; 70.0 now leaving paved road and going N; 70.2 cardinal; 8 slate-colored juncos; drainage at 70.2 70% ice; 70.5 3 meadowlark; associated with cattle pens; 70.7 top of hill; 71.0 now to E; 71.1 horned lark; 71.3 now to S; 71.4 now to E; 71.5 meadowlark; 71.6 now to S; 71.8 now to E; down hill; good grasses on left side of road for microtines; 72.4 old school house; 72.9 now to N (11:50 A.M.); meadowlark; 73.4 meadowlark; 74.3 meadowlark. 74.6 Banners Corners now to W; ice in large drainage ditch to right; 75.0 5 end proposed dam; 75.3 2 meadowlarks; 75.4 horned lark; snowing and strong wind; 76.4 Rock Creek bridge. water 90% open. 76.6 18 starling 2 meadowlarks; 76.7 leaving main road at Collins and now to N; 78.2 Wabarus bridge; 78.7 2 cardinals in drainage; 79.5 Sigel School at 12:00

and end of complete census; beyond toward Lawrence noted that Yankee Tank Creek frozen except in rapid areas; snowing and hard wind but snow of today has left little impression on the ground; can see blue in some parts of the sky; 81.7 a Kreder red-tail feeding on weed slope and finding it difficult to fly when dropping to ground from small shrubs and trees while feeding; feeding by perch rather than soaring; coyote in house because of high wind, ordinarily is always outside of shelter at farm house. This day has been characterized by high cold winds and few birds, especially the high perching birds.

Wakarusa River, Clinton Area, Douglas Co., Kansas
March 6, 1966

Lon James and I made short trip down Wakarusa River from Belvoir bridge toward Patton bridge. yesterday the Wakarusa River was completely free of ice but since then (see notes above, the river had refrozen to approx 80% solid ice varying from 3/4 of an inch to newly developing



ice invading center of river from edges. Temp. 24°F. cloudless day, slight wind. Will keep census of birds to Belvoir bridge. Segel School at 10:45 A.M. at mileage 176.2. 78.6 meadowlark, 79.8 Wakarusa bridge. Ice 80% in river blocking sections

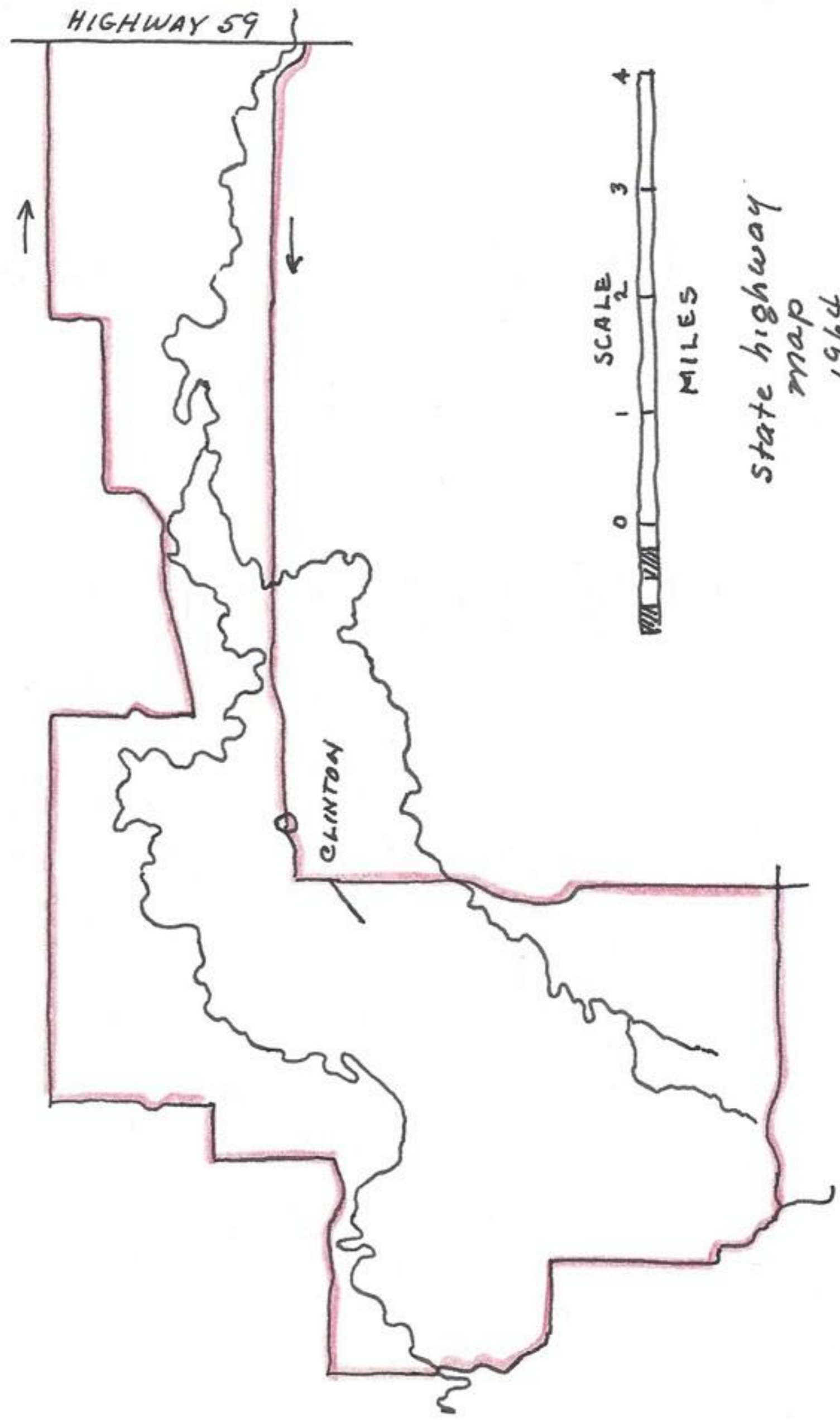
completely, other areas with ice from sides; 81.2 Patton bridge, 2 starling; 81.3 2 juncos, 1 chickadee; 81.4 cardinal; 81.5 at turn and now to 5; 1 junco, 1 cardinal; 82.0 titmouse at small bridge; 82.3 main road now to W; 83.0 Belvoir bridge, put corse in water at 11:00 A.M.; 11:02 3 juncos; 11:05 3 chickadees; 11:09 8 goldfinch; 11:12 12 tree sparrows, 8 juncos, 2 cardinals; 11:16 2 titmice, 3 chickadees, 4 juncos, 2 bluejays, 1 red-bellied woodpecker; 11:20 12 tree sparrows, 4 juncos, 1 downy woodpecker; 11:25 Kingfisher;

11:30 6 juncos, 2 chickadees; 11:40 downy woodpecker,
 2 white breasted juncos, nuthatches; 11:45 1 robin, ^{2 woodpeckers}, 1 great horned
 owl; 2 song sparrows; 11:50 left river because of ice barrier.
 The open areas were generally according to direct of wind, solid
 and thick ice in protected exposures and according to rate
 of flow of water, for example below rapids the water was free of
 ice for about 200 feet because of movement of the water, beyond
 solid ice. The most accessible route along n side of river
 where heat of bank of previous days had kept the river open
 for approx. 8-12 inches. Thickest ice $\frac{3}{4}$ inch, average $\frac{1}{4}$
 inch, some just forming in long crystal formation developing
 from edge of previously forming ice. In some areas when
 conae was moving slowly thru ice by breaking surface, the
 entire ice undulated down river. The conae seemed to
 break ice up to $\frac{3}{4}$ inch thick but movement of conae
 moved with great difficulty by wedging paddles in fractures
 and forcing the conae forward. Considerable noise as ice
 gone way and grated against side of conae. In still open water
 the conae seemed to glide noiselessly. The point where
 conae was taken from river was .15 miles S of bend
 in road that leads to E. Returned by foot to Belvoir
 bridge to pick up car. Enroute observed the following.
 11:56 2 white breasted nuthatches, 12:23 2 horned lark,
 12:24 cardinal, 20 meadowlarks in one group; 12:30
 car at Belvoir bridge, strong cold wind from NW; will
 return to conae arriving at 84.3 mileage; 84.45 now
 to E; 85.2 4 tree sparrow; 86.1 bridge over Wakarusa,
 ice same as first observed this A.M.; 86.8 horned lark;
 87.9 n end proposed dam; 89.0 3 cardinals at small
 bridge; 89.5 4 starling; 89.7 15 crows left field in one
 flock; 89.8 Sigel school house; end of complete census.
 Enroute to Lawrence noted one sparrow hawk about
 $\frac{1}{2}$ mile W of Ohio & 23rd St.

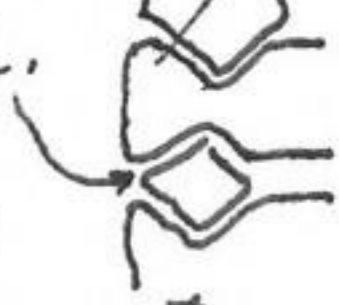
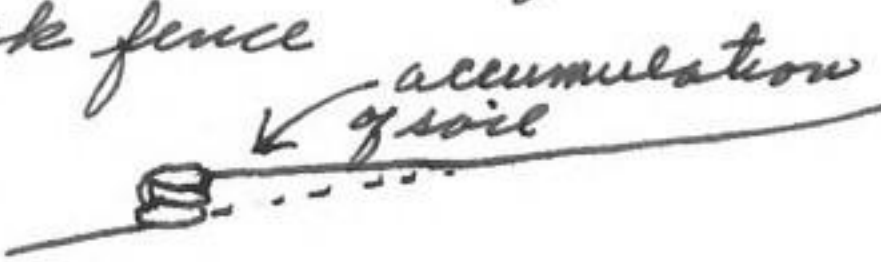
Area of proposed Clinton Reservoir area, Douglas Co., Kansas

March 12, 1966

Approached area via highway 29, thence W to Banners corner,
 Clinton etc: at bridge over Wakarusa on highway 59 noted
 red-tail hawk sailing SW from bridge area; meadowlarks
 singing, 1 sparrow hawk. Six domestic pigeons chasing
 the redtail hawk; 49.7 shrike; 50.1 Washington Creek;



Itinerary march 12, 1966

2 red-tails flying about 300 high 2/10 mi. to S; 51.9 now at S end
 proposed dam and starting complete census; at 2:42 P.M.; 52.1
 loggerhead shrike; 53.3 Rock Creek; 54.0 12 starling in one group;
 55.9 enter Clinton. 56.0 meadowlark; 56.8 leaving diagonal
 road & now continuing to S; 58.0 Rock Creek bridge; 16 robins
 in field where observed on a previous trip; 58.5 drainage,
 water increased & clear; 2 starling, red-tail hawk 1/10 mi to right;
 first butterflies this season; 57.6 top of plateau; 60.3 3
 cardinals; one singing; 60.4 cowbird; meadowlark; 60.6
 skunk road kill (recorded on previous census); 61.2 now to W;
 3 meadowlarks; 4 Eng. sparrows at farm; all ponds in
 country open, no ice or snow in evidence; 61.4 meadowlark;
 61.9 shrike; 62.2 cardinal; 62.4 cardinal; 62.9 redtail hawk;
 at drainage, water clear; 63.1 red-tail hawk; 63.3 2 blue-
 birds at drainage; 63.7 at old homestead ~~right~~ site to left.
 Timbers in excellent shape, perfectly cut and especially well
 fitted together at ends, not varying a 1/4 of an inch. 
 Inside floor & ceiling out of alignment, second
 story floor in better condition, considerable rodent
 damage to inside finishing by eating of stairway etc.
 about 40 per cent plaster remains on walls of first floor
 and more on second floor. woodrats active in area. Cellar
 same as observed on previous years. Left 3:20 P.M., cardinal
 here; 63.9 cardinal; 64.0 crossing Rock Creek, old bridge
 out, group of gnats along river and as far as 100 feet beyond;
 water greenish but visibility about 1 1/2 feet, 2 juncos along
 water, increased 3 or 4 inches since before rain; 64.5 cardinal
 singing; 64.5 now to S into valley ^{across creek}; 64.9 farm house; 65.2
 top of hill, 8 tree sparrow, 2 cardinals, turned around and
 returned on same road; at crossing of creek met a fisherman
 that had caught a 12 lb catfish; 65.8 now back to main road and
 to the W; 66.2 4 juncos; 66.4 cardinal; 66.6 old farm house
 and interest fence; 18 Eng sparrow here; yellow-shafted flicker;
 66.7 main road now to N; 3 meadowlarks, one singing; 66.8
 20 starling; 67.1 3 meadowlarks, one singing, 12 juncos,
 2 cardinals, 1 chickadee, 1 robin; 67.4 leaving main road but
 continuing N; 68.3 main road now to W; 68.7 effect of grazing
 to keep prairie open; 68.9 dropping off plateau; 69.2 old stone
 fence shows effect of erosion of sidehill, the fence having
 kept soils, now in grass behind rock fence
 69.6 crossroads now to N. 

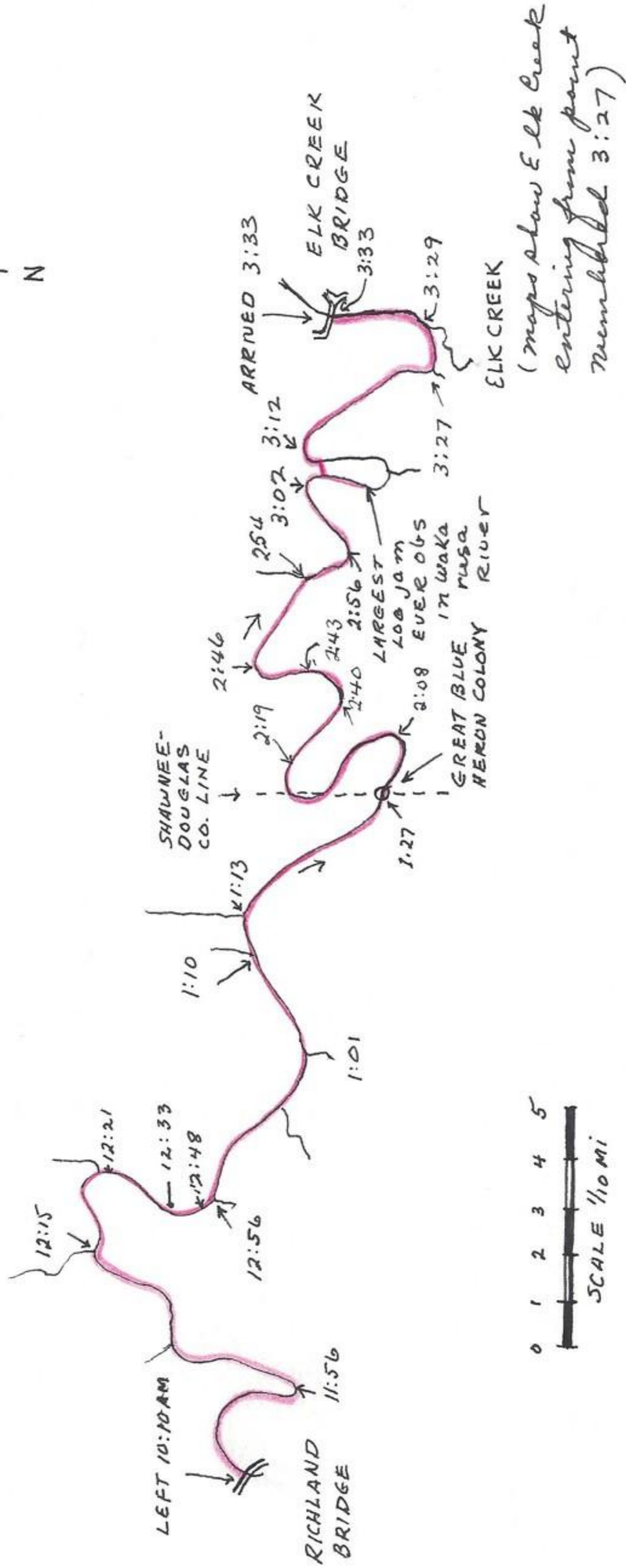
5 Eng. sparrows at farm house; 70.1 red-bellied woodpecker; 8 juncos; 70.3 Wabarus bridge, crossing and to N; 71.0 drainage, 2 cardinals; water flowing 1 gal per 3 seconds; 71.5 now to E; 1 red-tail hawk flying 150 feet above ground $1/10$ mi to S; 72.0 mockingbird and 2 tree sparrows; 72.1 can hear 2 meadow-larks; 72.2 meadowlark; pond has been dry all winter; 72.3 made sweep of 180 degrees from E to W to S with 20x binoculars, no red-tail hawks; 72.4 top of hill now down into valley; 2 blue-birds here; 72.6 drainage, creek clear & flowing more than in winter; 72.7 3 tree sparrows, 1 cardinal; 72.9 2 chickadees, 1 meadowlark, mourning clover butterflies; red-tail soaring above trees along Wabarus river to S; at 3:05 P.M. left car and walked up to reservoir to N; 2 meadowlarks singing; blue jay calling; red-bellied woodpecker flew E across canyon; 3:09 head of dam, 18 juncos, 3 cardinals; 4:13 top of dam, W end, no ducks or birds on reservoir; 4:16 leaving E end of dam & now along crest hill to S; 2 red-bellied woodpeckers flew across open field; raccoon & rabbit tracks in mud; edge of top ~~rock~~^{rocks} with erratics (red rocks) as if in original position since last glaciation; 4:20 killdeer flying to W; 4:25 back to road via road that drops down from uplands to ~~the~~ main road; 2 bluebirds here; mourning dove calling; red-bellied woodpecker flying to trees along Wabarus River; Pseudacris calling (1); 3 song sparrows at drainage from lake canyon; red-bellied woodpecker & 2 jays cross from W to E across canyon which seems to be the usual direction of movement; 4:30 back to car; continuing on at 72.9 2 tree sparrows; 73.0 drainage from lake canyon; 73.2 2 bluebirds; red-bellied woodpecker; 73.5 tree sparrow; chickadee; 73.7 crossroads now to N; 73.8 30 tree sparrows, 8 juncos, 2 cardinals, pond getting lower; 73.9 sparrow hawk; 74.0 hill at Kennedy; 8 Eng sparrows in stock yards; yellow-shafted flicker; 74.1 2 meadowlarks calling; 74.4 drainage, 18 tree sparrows; 2 chickadees; 6 juncos; 74.8 main road now to E; 2 meadowlarks singing; 75.3 3 meadowlarks; 75.4 now to N; 75.6 meadowlark; 75.7 3 meadowlarks; 75.8² meadowlark; red-bellied woodpecker; red-headed woodpecker; cardinal; 75.9 now down hill; red tail flying to W; 76.2 Dry Creek bridge; water flowing more than in winter. but ponds in some area losing water; 5 cardinals in jumpers at house;

76.4 2 meadowlarks; 76.5 2 meadowlarks; 76.6 2 meadowlarks;
 76.7 10 tree sparrows; 76.9 2 cardinals; 77.1 crossroads now to E;
 4 meadowlarks here; 77.5 2 meadowlarks singing; 77.6
 meadowlark singing; 77.6 cardinal singing from top of telephone
 pole; 77.7 red-headed woodpecker; blue jay; 77.9 cardinal;
 78.1 Deer Creek bridge, no ice in creek; 78.3 3 tree sparrow;
 78.7 2 cardinals; 79.0 meadowlark; 79.2 Coon Creek, more
 water than in winter; 1 starling 2 beef bluebirds; 79.5
 meadowlark; 79.8 tree sparrow; 80.0 drainage; 80.1 2
 Killdeers, 1 downy woodpecker; 3 chickadees, 2 bluebirds;
 80.3 Boy Scout drainage, 3 song sparrows; 2 cardinals;
 80.7 top of hill at house; 80.9 crossroad now to S; 2 crows
 left field; 1 meadowlark; 2 meadowlarks; 81.0 2
 meadowlarks, 2 meadowlarks; 81.2 loggerhead shrike;
 81.3 meadowlark singing; meadowlark singing; 81.4 3
 meadowlarks; 81.5 horned lark; 81.7 Rattlesnake Point;
 81.9 red wing blackbird ♂ on territory and singing. This
 bird was singing from tall weed stalk bordering the
 cattail spring vegetation that in last week had been
 burned to ground, inferring that the bird could anticipate
 the growth of these cattails where it nests. This was the
 only redwing noted this day; 82.0 2 meadowlarks; 82.4
 now to E; 82.9 yellowshafted flicker; 83.1 2 meadowlarks;
 83.2 3 meadowlarks; 83.3 meadowlarks; 83.5 3 juncos;
 83.6 north end proposed dam; 83.8 4 juncos; 84.0 downy
 woodpecker; 85.4 meadowlark singing; 85.5 Sigel School
 at 5:20 P.M. and end of complete census.

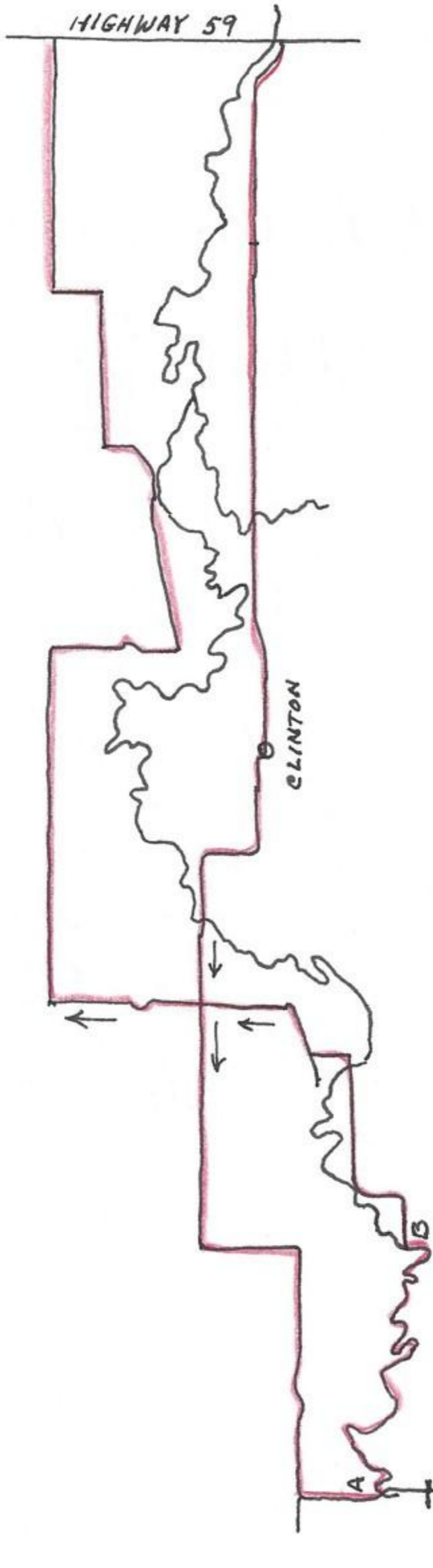
Clinton area of Wapakarusa River Valley, Douglas and Shawnee
Co., Kansas

March 13, 1966

Annette and I made canoe trip down Wapakarusa from Richland
 bridge n of Richland to bridge 2/10 miles beyond mouth Elk Creek.
 Enroute made census across area of proposed ~~dam~~ Clinton
 Reservoir area starting at S end of proposed dam site. Day
 clear, ^{hazy to W} only a gentle breeze and temperature around 56°F. Recorded
 birds from Lawrence to dam site via highway 59 including
 kinds only. meadowlark, red-tail, loggerhead shrike, red-
 wing blackbird, 2 crows. mileage at S end dam 8.5, time
 10:26 A.M. 8.9 horned lark; horned lark; 9.8 Rock Creek
 bridge; 10.3 meadowlark; 12.4 middle of Clinton, continuing



Canoe course approx 4.7 miles
 5 hrs + 23 mins in field



SCALE MILES
 Kansas State Highway
 map
 1964

Itinerary march 13, 1966

to W; 12 Eng sparrows in Clinton, 1 starling; 13.2 meadowlark
 singing; 13.8 loggerhead shrike, junco; 14.0 road kill rabbit
 14.4 2 bluebirds (eastern mall cases); 14.5 field sparrow;
 14.9 Belvoir bridge; 15.4 meadowlark; 15.6 meadowlark;
 16.0 2 meadowlarks; 16.3 crossroads with pond, drainage
 and small trees and one red-wing on territory, 8 other
 male redwings ^{in one flock} in tree 200 feet from other redwing;
 1 redtail and 1 meadowlark; 16.6 meadowlark; 16.7 meadowlark;
 16.7 meadowlark; 17.0 Titmouse; 17.1 red-wing blackbird on
 territory; 17.5 4 meadowlarks, 1 redwing blackbird; 17.7 2
 redwing black birds on territories; 17.9 meadowlark; 18.2
 3 meadowlarks; 18.3 mockingbird; 18.4 now to S; 19.2 2
 meadowlarks; 19.5 now to W; 2 mourning doves; 2 meadow-
 larks; 19.7 meadowlark; ~~20.5~~ ^{20.5} Shawnee Co., line; 21.4 2
 crows; 21.5 4 tree sparrows; 21.8 flock of male (8) red-
 wing blackbirds; 22.0 fox squirrel road kill; 22.2 approx.
 40 tree sparrows and now to S; 22.4 meadowlark; 23.1
 bridge over Wakarusa at 11:00 A.M. Put canoe in water
 and departed at 11:10 A.M. Eastern phoebe calling 50 feet
 S of bridge on tree over water, gave its typical call of 2 sets
 of notes with opposite inflection. Titmouse and red-
 bellied woodpecker here; water high enough to cover
 rapids, temp of water 49°F, temp 56°F. 11:22 one robin;
 2 juncos; 11:56 abrupt turn and now to left; 2 chickadees,
 1 cardinal singing; 8 tree sparrows, all in some general
 flock; 12:00 8 chickadees, 4 juncos, 2 bluejay, 1 titmouse,
 ruby kinglet (sp.?), 12:05 red-bellied woodpecker, 2 downy
 woodpeckers, ^{2 cardinals} 4 chickadees; 12:10 4 chickadees, 3 juncos;
 12:15 over rapids, 2 blue jays, 4 black capped chickadees; 12:18
 2 cardinals singing, 3 chickadees, 1 hairy woodpecker; have
 noted 5 frogs (^{Pseudacris} ~~Spizella~~) along edge of river, one 3 feet away from
 edge; 12:21 2nd rapids, 2 red-bellied woodpeckers, 3 chickadees;
 12:22 minor drainage from left, one mourning dove; now toward S^W
 12:25 4 chickadees, 2 cardinal, 2 titmouse; 12:28 60 snow
 geese and 15 blues in one high V shape flock passed NNW,
 calling, blues nearer end of V; 12:31 8 goldfinch; 12:32 2
 cardinals, 4 juncos; 12:33 minor bend to R, 2 chickadees,
 racks on W side river, mourning dove; 12:35 2 red-bellied
 woodpeckers, 2 jays; 12:41 crow flew by, can hear others to E;
 8 chickadees, 4 juncos, 2 cardinals, 1 fox squirrel running
 along bank; 12:44 bluejay calling, 2 cardinals singing, 2 chickadees

12:48 over rapids by 12:53, drainage in this case 100 feet below
 rapids instead of above, meaning that drainage has shifted;
 red-headed woodpecker, 8 crows chasing owl at bend to S, 15
 more crows come to area from N, 2 jays also concerned.
 12:56 now at bend and trending SE, a redtail dove at horned
 owl and while I did not see it contact it knocked the owl
 across the river where it alighted on the base of roots of a
 large tree, the red-tailed continued N, while on the ground
 the crows did not harass the owl which flew again across
 river and remained in same area, this in contrast to
 the winter flights of down stream; 1:00 5 chickadees,
 song sparrow singing; 1:01 major drainage from right
 now trending to N, flock of snow & blue geese passing to
 N, cardinal singing, rapids navigable, 2 wooducks ♂ & ♀
 below rapids, they left down stream, ♂ conspicuous but ♀
 left first and called; fresh beaver tracks for first time;
 few raccoon tracks in mud; 1:05 2 titmice calling, 3 chickadees,
 redbellied woodpecker calling, hum of bees at new exposed
 buds of elm trees above, is constantly along river, there is very
 little evidence of these buds scaled of floral elements being
 shed on ground or water, they have new color of reddish hue, some
 more advanced than others; paper nest wasp nests about 1 per
 50 feet all along river in trees overhanging water; 1:08
 chickadee; 1:10 minor drainage from N, 3 chickadees; 2
 wooducks (some as flushed before) left river and flew
 down river, the ♂ making itself conspicuous but the ♀
 flying first; 2 red-bellied woodpeckers; 2 downy woodpeckers
 fighting with a slate colored junco with tail upright watch-
 ing at 5 feet; 1:13 major drainage from left, rapids below;
 4 juncos, 2 chickadee, 1 red-bellied woodpecker; rapids not
 quite negotiable; 1:16 song sparrow singing; 4 chickadees;
 1:18 2 chickadees, 4 juncos; red-bellied woodpecker calling;
 not many tracks in mud and when there are raccoon; 1:20
 2 red-bellied woodpeckers calling, 8 small frogs noted since
 first of trip; 1:22 the two wooducks got up again from
 behind a log in water, as in previous cases ♂ made itself
 conspicuous & ♀ flew first; 1:24 9th small frog; 1:25 downy
 woodpecker; 1:26 red tail circling directly to S; 1:27 bend,
 rapids and great blue heron colony. The nesting tree, as far
 as I can determine on the Shawnee, Douglas Co. line. Pulled
 canoe on gravel bar on opposite side of large drainage on S side

river which in turn is approx 100 feet up stream from great blue
 heron nesting tree; a large earth slip of about 70 x 30 feet
 30 feet W of nesting tree; 12 nests in large sycamore tree and
 1 nest in sycamore tree to E and adjoining; no activity here,
 except a red-tail alighted on nest in top of tree and then left to N;
 temp water 50°F, air temp 56°F; 1:50 left great blue heron
 colony; below near first bend to N a large fallen tree jam
 that took us until 2:05 to get thru; there is considerable
 bank slipping and tree destruction in this area, probably
 because of sharp curve beyond; 2:08 hair turn, 4 chickadees, 2
 bluejays; 2:12 great blue heron nest in sycamore, 4 juncos; 2:15
 going into Shawnee Co curve, 12th frog; 2:18 major drainage
 from N, 2 downy woodpeckers, 2 red-bellied woodpeckers, 1 sapsucker,
 6 chickadees, phoebe in one group, the phoebe singing beyond
 and not associated with bridge; 2:19 log jam completely
 blocking river; 2:35 thru log jam and on way again; 2 cardinals,
 4 chickadees; 2:40 bend, now to NE, fox squirrel, 2 cardinals
 singing, 4 chickadees, first fish surface, another fox squirrel
 on bank; 2:43 ♂ + ♀ woodduck, male on left side of river in
 water, ♀ on bank on right side, male to center of river, then ♀
 which flew down river first and called, this could be the same
 pair as noted previously; fox squirrel crossed stream via limbs
 overhead; 2 red-bellied woodpeckers; 4 chickadees; 2:46 N bend +
 now trending SE, great horned owl left tree being chased by 2
 blue jays, 5 chickadees; 2 red-headed and 1 red-bellied in
 same area; titmouse singing, a red-tail hawk dove at
 horned owl; 2 white breasted nuthatch; 5 chickadees, ~~some~~
~~winter wren?~~; 2 cardinals all in above group associated
 with great horned owl, which again remained in some general
 area; 3:52 hairy woodpecker; 2:54 major drainage from left; 2:55
 flat turtle without colored markings but color in legs and neck
 on protruding log, the turtles neck was withdrawn at 10 feet
 away and remain until four feet away when it slowly slide
 into the water. It seemed that the withdrawal of head + neck,
 was gaining to be adequate for protection as if we were beaver^{or log},
 rather than a large canoe + humans, diameter of turtle approx
 5 inches; ♂ + ♀ woodduck left in same area and continued
 down stream; 2:56 bend, now to NE; drainage on right graded
 high to river; 2:58 2 bluejays, 2 chickadees; 3:00 fox squirrel
 crossed river over limbs of trees over river; hairy woodpecker
 calling; 3:02 west limb of hairpin curve, 2 chickadees;

solid

3:04 log jam in river and highest and most massive accumulated
 atin I have ever seen on the wakarusa being 8-10 feet high
 above water at lowest point. This log jam may have
 resulted from pirating of water across neck between bases
 of hairpin curve; returned to channel across bases of curve
 at 3:06 and pulled loose across to other side, fox squirrel
 here; 3:08 cross channel and loose in water again; 3:12 bend
 now to SE; 3:14 2 chickadees, 2 bluebirds, red-breasted
 nuthatch, 3 chickadees; 3:24 through log jam; 2 chickadee,
 2 titmice, another frog; 8 chickadees at log jam; 3:27 drawage
 on right, 2 chickadees, 2 Bewick wrens;
 substantial amount; 2 chickadees; 3:29 Elk Creek, water flowing in sub-
 sharp-shin hawk attacked
 downy woodpecker 5 times but without success although
 dislodging the woodpecker several times, causing it to
 move at least 30 feet; 3:33 bridge and end of river
 census, last 1/2 hour the sky has become clouded. Left
 bridge at 3:55 and continued east. 77.5 one red-headed
 woodpecker on fence post in open field, 3 cardinals and
 5 juncos; 77.6 along river + to E; 78.4 horned lark; 79.0
 bridge; 79.3 4 horned larks; 79.5 2 horned larks; 79.7 now
 to E; 80.0 yellow-shafted flicker flying in from field; 80.3
 now to N; 80.7 meadowlark; 81.2 meadowlark; and at crossroads;
 81.7 top of hill + now down, red-tailed hawk at base of hill;
 82.0 Dry Creek, loggerhead shrike, 2 cardinals, 4 juncos; 82.2
 loggerhead shrike; 83.7 3 juncos; 83.9 now to E, 2 meadow-
 larks; 83.1 3 bluebirds and 2 juncos (all bluebirds have
 been eastern bluebirds); 83.5 ♂ + ♀ cardinal; 83.8 5 juncos;
 83.9 Deer Creek bridge, mockingbird; 84.2 2 cardinals;
 84.4 2 starling, one flicker, song sparrows; 84.7 2 meadow-
 larks; 85.0 Coon Creek; 85.2 2 meadowlarks; 85.7 2 cardinals,
 1 song sparrow; 85.9 meadowlark; 86.1 Boy Scout drawage,
 2 cardinals, 2 song sparrows, 8 tree sparrows; 86.5 top of
 hill and old house; 86.7 corner + now to S, 4 tree sparrows;
 86.8 meadowlark; 86.9 meadowlark; 87.2 2 meadowlarks;
 87.5 Rattle Snake Point; 88.2 corner, now to E, 2 horned larks;
 89.4 N end proposed dam, 2 juncos; 90.2 Y in road, 2 crows to
 E. meadowlark singing; 91.2 meadowlark singing; 91.3 Sigel
 School, end of complete census. In summary, meadowlarks now
 dispersed and on territories, few more redwings on territories,
 phoebe first arrival, no blue herons at colony, more fox
 squirrels, 3 species of butterflies, bees active all along river.


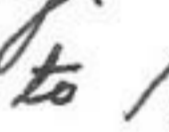
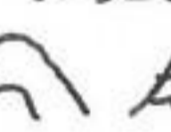
Lawrence, Douglas Co., Kansas

March 14, 1966

Marvin Braasch reports sparrowhawk entering a hole in the eaves of Sellards Hall on the University of Kansas. This bird, of a pair were observed in nuptial performance approx. 1 week before in same area. The question is whether the male selects a territory on the basis of available nesting site or is it actually the female that selects the nesting site on the territory, obviously impossible under these circumstances. This pair of sparrow hawks may be the ones that nested in Frazer Hall before it was raised and previous to that in Blake Hall before it was raised, all buildings within 1/10 mile of each other. He reports phoebe at Clinton near Wakarusa river.

Univ. Kansas, Lawrence, Douglas Co., Kansas

March 16, 1966

at 9:00 A.M. 120 geese flew N over campus ~~at the~~ directly over the Watson Library approx 600 high. 70 were snow and 50 blue. They were calling. The formation, in 1/2 a mile shifted from  to  to . One flock of 15 blues in consecutive line, others in group, others at random. Others heard passing N at all hours of the night."/>

Lawrence, Douglas Co., Kansas

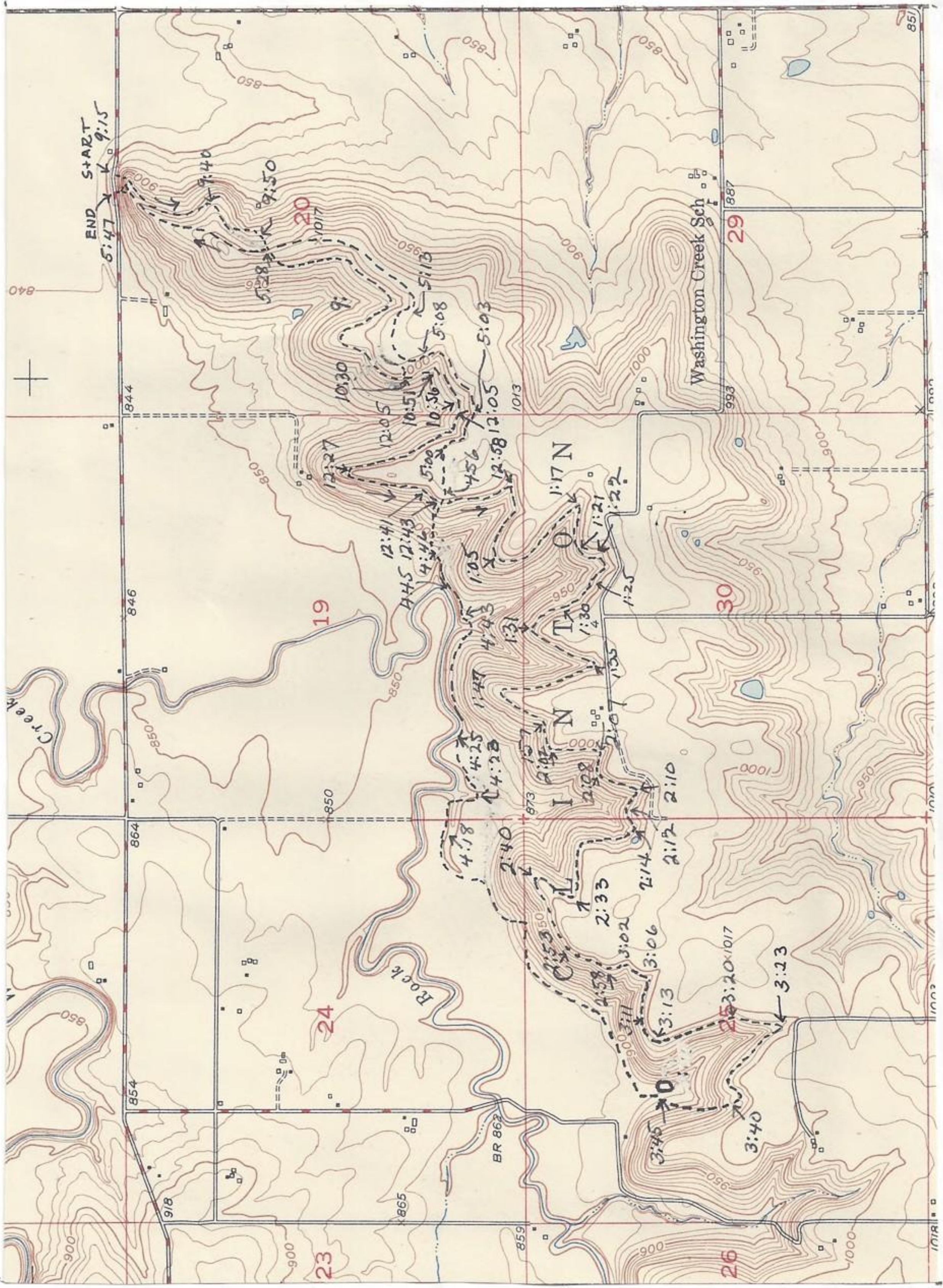
March 17, 1966

at approx. 6:00 P.M. a line of mixed grackles and smaller icterids (red-wing, cowbirds, starling?) passed SSW across Lawrence City at 9th and Massachusetts St. Another flying North W at 15th and Massachusetts and a third flock at 1620 Tennessee, flying directly W. Some grackles stopped in top of high pine trees on the Maupin residence, where several pairs nest in summer, but continued on W. mourning doves are setting up territories before grackles have arrived.

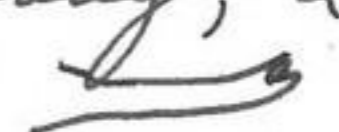
Clinton Area, Rock Creek, Douglas Co., Kansas

March 19, 1966

Census of birds and mammals on Rock Creek valley slopes, starting at the S end of proposed Clinton Reservoir Dam, thence following valley side SW to near middle sec 25, R18E, T13S.



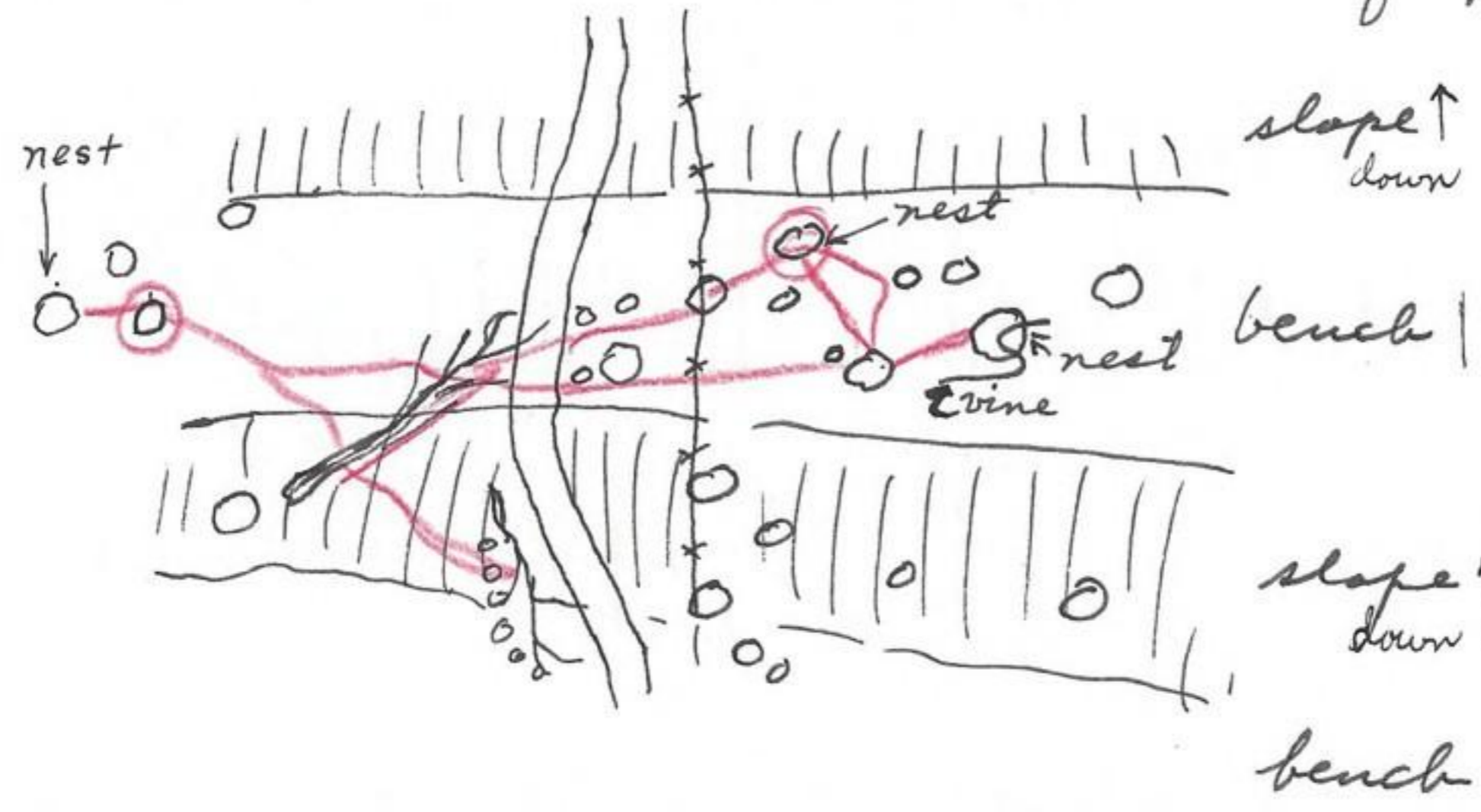
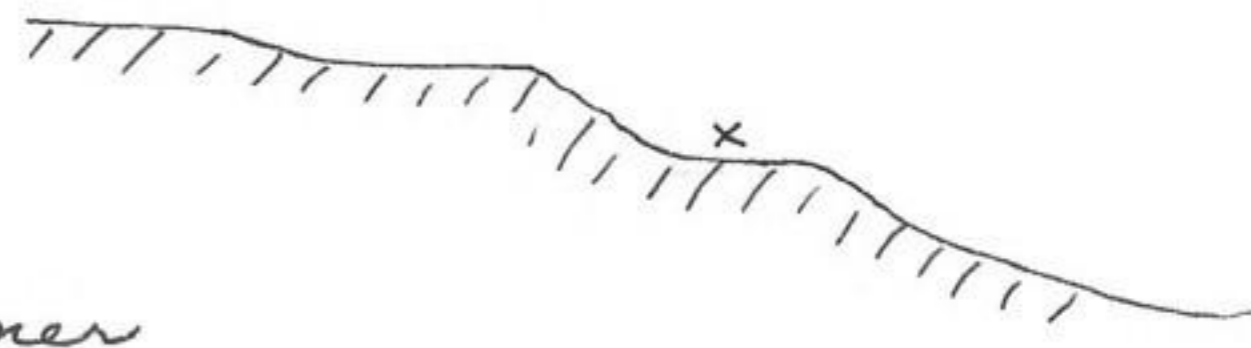
SCALE: 1/10 MILE

The objective was to follow along uppermost benchland for this distance to determine feasibility of establishing a course that could be used for comparison when Clinton Reservoir is in operation. A comparison then could be made to show variation in community composition before and after the body of water is created. A complete census was made. Day absolutely clear, temp 49°F and stiff cold west wind, at least in early part of morning. As ~~fast~~^{far} as possible, will follow along uppermost level or erosional benchland which is approx. on the 970 foot level. Started at S end of proposed dam on highway at 9:15 A.M. Sparrow hawk here; followed along east or lee side of ridge and being out of the wind was comfortable in contrast to exposed situation where wind is too cold for comfort. As a result birds concentrated on lee side; 4 meadowlarks singing in open valley to E, also can hear red-wings singing; 3 slate colored juncos singing; robin calling; 2 crows also to E. This western side of the Washington Valley is marked by wet grassy situations; red bellied woodpecker left open field and flew into timber; 9:17 cottontail left area of jumpers and ran into underbush beneath another jumper; considerable singing to E below; 9:18 3 bluejay, 2 cardinals, 1 red-bellied woodpecker, 8 robins left and flew west over ridge into wind; some other robins singing; 2 male cardinals; now walking thru timber 1/2 way up slope, 2 titmice calling from two directions; noted a slate-colored junco chasing a goldfinch, both feeding on the ground; downy woodpecker; 9:22 fox sparrow, 2 downy woodpeckers feeding together, 1 fox squirrel; 9:24 2 yellow shafted woodpeckers; 9:25 fox squirrel, leaves on slope approx. 8 inches thick and have been blown from ridge, some gullies with 2 feet of dry leaves, all in crisp + dry condition; wind crosses ridge and affects leeward side to different degrees, some places windy, other relatively windless; can hear wind howling on ridge to W; 9:26 red-bellied woodpecker at nesting hole in dead tree; 9:31 ♂ + ♀ eastern bluebird, male of pair singing, dropping wings to side and out as it sang, 2 titmice, the female of which had tail feathers bent  as if it had been roosting all night in close quarters; 2 chickadees (all chickadees listed are black-capped); 9:33 a downy woodpecker

feeding on ground and flying between feeding from base
 of one tree to another, 3 crows flew n e along top of ridge;
 9:35 fox squirrel near upper limits of slope between trees and
 open ridge; ground in forest mainly exposed, dry, black; trees
 near upper limits are dead; 4 more crows flew n e along
 ridge; 15 per cent of gooseberry bushes in green, others only
 faintly so or just beginning to show; 9:40 promontory, juncos
 singing; 9:42 rock fence and leaving forest to formerly
 cleared area but now in isolated small trees; looking
 back into trees can see some greenish ~~yellow~~ colored in
 new buds and leaves, 85 percent still of winter color; less
 wind here than in wooded area; 9:45 7 tree sparrow in
 tree (the tree 10 feet high) and they allowed me to pass
 within 8 feet of them, they seemed to make themselves smaller
 under these circumstances, no calls and slight wind
 buffeting their feathers; can hear downy woodpecker; 9:49
 mourning dove nest of 1 fresh egg, nest placed in a 15 foot
 high elm tree, nest 6 feet from ground and flimsy, female
 left nest with immation; and alighted 40 feet in another tree,
 not leaves or new buds on this tree; 9:50 head of draw
 and will pass over ridge to w side; 9:50 top ridge, rabbit legg-
 ing on ridge; 4 goldfinches, juncos singing to w; 9:52 west
 side of ridge on upper bench, pine siskin and 2 bluebirds;
 9:53 6 juncos, 2 bluebirds; 2 goldfinches; 9:57 red-tail flew ^(group)
 low across gully to w and may have nest; fox squirrel nests, 1 per
 ever 100 feet to 200 feet; 9:52 numerous tree tracks, 2 chickadees,
 2 cardinals; 9:57 2 cardinals, titmouse, red-headed woodpecker;
 9:59 red bellied woodpecker, 2 chickadees, 1 cardinal, 4
 juncos; 10:05 2 red bellied woodpecker, 2 chickadees, 2
 titmice, 2 cardinals; 10:08 cottontail rabbit; crossed upper
 draw by juniper tree, 3 bluejays, ^{10:12} redtail nest on second
 bench; 10:15 2 juncos, 1 downy, 1 red-bellied woodpecker;
 10:20 4 goldfinch, 2 cardinals and end of benchland because
 of rock slide push onto benchland from rock quarry, neotoma
 in slide area, deer tracks at base, 2 cardinals, 2 bluejays;
 10:30 road and base of quarry, checked area and found 1
 marsh of cattails 30 x 200 feet, Pseudacris calling, bluebird
 singing at edge in tree, other frogs calling in other ponds to
 E, no redwings here; 10:50 from upper benchland at
 road leading into rock quarry continued S, crossed old
 road grade to top with trees as wide as 6 inches in road;

at this point noted 2 bluejays, 2 cardinals, 4 juncos; slopes with dry leaves, black dry soils without vegetation; 10:51 crossing drainage now more to SW, red-tail circling to E and probably a pair with nest observed earlier; this gully filled with dry leaves 2 feet deep; benchlands have flattened out and trees more parkland; 10:53 point, 2 blue jay, 1 downy, 2 titmice, 4 juncos, 3 chickadees; 10:54 2 adult fox squirrels left small tree, ran across ground for 60 feet to nesting tree; 3 chickadees; 10:56 ^{east fork of} most southern drainage, no water but soils damp. From this drainage crossover on the

second benchland from top of observed the activity of 19 *Sciurus niger*, all young of the previous summer with considerable white in tail, buffy noses, buffy on hind front legs and along contact between grayish back and white venter. They suggested the gray squirrel in coloration. These 19 individuals were all in an area of approx. 50 x 100 ft. and were constantly moving by chasing one another, in one instance 9 squirrels chased a single squirrel, all in a single line, one back of another, as they ran across the ground and

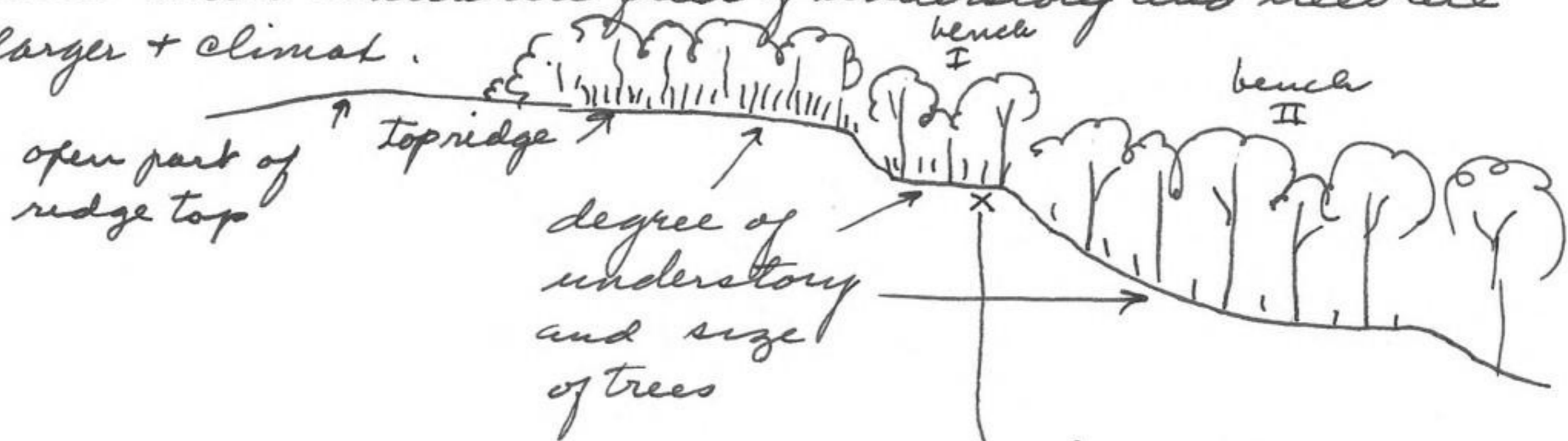


up and down tree trunks, limbs and vines. There was frequently three areas of activity, then all would join in one aggregation. One squirrel defended a hole, ^{12 feet high} in a tree by chasing all squirrels that come near the hole. It remained within a foot of the hole and when an intruder approached, which was intentional, the defending squirrel would chase it away, sometimes making contact. It would generally chase it down the trunk to ground and then continue the pursuit for 10-15 feet beyond before returning to the nest hole, by which time the squirrel being chased was already on its

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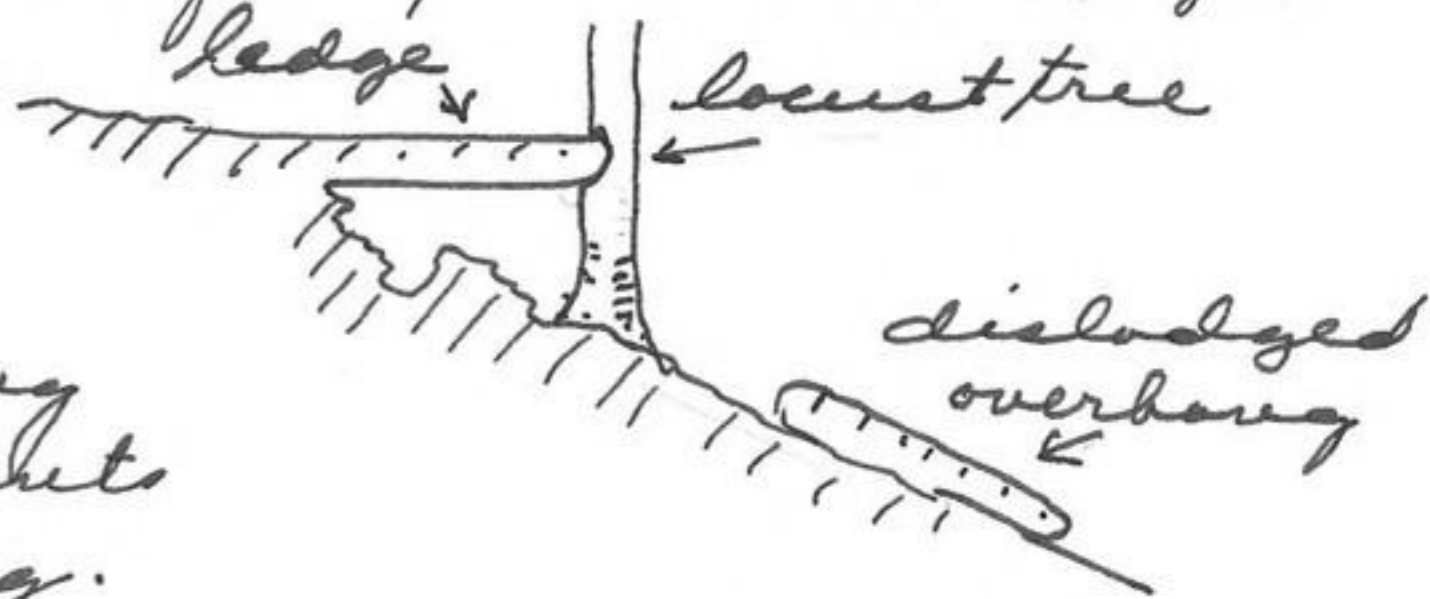
way back to the nesting hole where it would again be chased away. If it went up tree, the defending squirrel would chase it about 10 feet and then return. The squirrel being chased would generally go about 6 feet up tree and then turn around and go down the tree. At times the defending squirrel would leave tree and chase a squirrel on the ground. At one time it chased one approx 50 feet from nesting tree and then returned. When 2 or 3 squirrels were trying to invade territory of the immediate squirrel nest, the defending squirrel would make shorter chases and then return to hole, just in time to ward off another squirrel. During the entire time I observed these squirrels (80 feet away), this defending squirrel was continuously moving in its defense of the hole. The chasing of squirrels up & down the tree was accompanied by considerable noise from ^{tree} bark contact. This action is definitely an important ~~and~~ ^{coaction}. Base of trees completely trampled by squirrel activity. Although this action was initiated and maintained by squirrel activity I did not at any time see acts of copulation nor sustained bodily fighting except momentary contact. I would estimate that 30 per cent of the time was on the ground. It was unusual for these squirrels to maintain this activity in my presence. Usually fox squirrel retreat at twice the distance observed today. The accentuated activity of all squirrels madly chasing each other, or groups chasing one squirrel was cyclic and regulated on approx 6 minute intervals, between periods with a lessening of activity. Noted the defending squirrel with characteristic pose at base of tree with head down and extended out. While watching, one red-bellied woodpecker remain^{ing} in squirrel area, ^{3 groups of} 2 blue jays flew across area, ^{3 groups of} 2 black-capped chickadees passed thru & stopped to call at me with warning call, these calls attracting 2 titmice. When the warning call was given on back of my hand, the 2 chickadees & titmice stopped calling for 4 seconds and then started and increased the rate of their call by double. The call of these squirrels ^{when chasing one another} is a low, guttural note given at intervals of 5 or 6 seconds. At 11:51, left observation point and

walked into the center of activity. The squirrels slowly dispersed, some still ignoring me although only 30 feet away. At 11:54 crossed fence continued to watch squirrels until 12:02 at which time I left to W, leaving 50 per cent of original number of squirrels still in area, others had moved out in uphill direction. 4 tree nests of leaves in the area of observation. Left area and continued to W to main drainage arroyo there at 12:05. On E side of this drainage is a slope between 1st + 2nd bench that is almost completely covered with mosses. Gained first bench. Fresh and numerous deer tracks on benchlands, especially the uppermost one where deer tracks show localized activity of tromping with tracks every six to 12 inches apart; first bench has more understory growth of gooseberry and other small shrubs & trees and smaller trees of the scrub type than the 2nd benchland and those below which are free of understory and trees are larger + climatic.

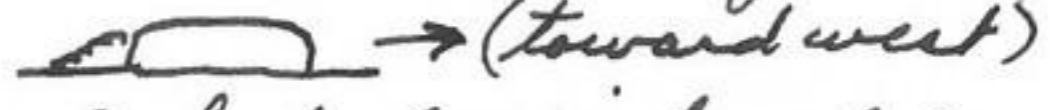


12:07 2 chickadees, 2 blue jays, 2 titmice, a white breasted nuthatch giving warning call from top of tree which was 10 feet from a hole in a dead tree where a red-bellied woodpecker was feeding. The nuthatch reacted to its own call by thrusting out its wings laterally each time it call. The entire body was turned from right to left on each call. When the woodpecker left the nuthatch flew to the hole in the tree. A pair of titmice and a cardinal ^{were} all concerned with the action of the nuthatch but left before the nuthatch finally flew to hole and then remained quiet. It would appear that the action was result of the woodpecker being in the territory of the nuthatch. A phoebe was heard calling as it moved up thru the drainage system.

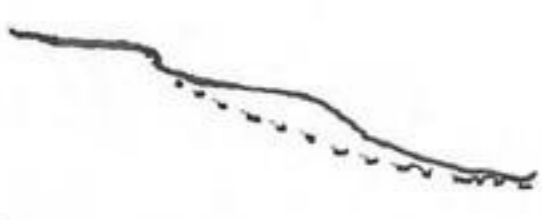
calling about every 5 seconds on its way up; 12:18 great horned owl on top of ridge; 12:20 passing old road grade up slope; yellow shafted woodpecker calling; wind has quieted down; 12:22 fox squirrel ran down tree into ground nest at base; titmouse calling; 12:23 yellow-shafted woodpecker; red-headed woodpecker, titmouse moving thru area and calling; 12:23 some grass now growing on benchland (1st); 2 chickadees, soil still dry, black, soft to walk on; 12:25 cottontail; 12:27 point overlooking Waparusa Valley below. This point is a narrow ridge and an excellent vantage point. On west side there are large slabs of limestone that have dropped from original position at top of ridge and have slipped down slope. These cliffs are well developed, with one overhang of approx. 7 feet, the outer edge stabilized by a tree which has grown on



scar tissue below and above the overhanging ledge. The support accounts for the extensive overhang.




The cliffs are well formed on west exposure but only moderately so on east side of ridge. This is the usual condition. Cliffs extensive and well formed and are probably good sites for copperheads. *Neotoma* in cliffs. This vantage point will be known as Cutch Point because of the support of the locust tree for the overhanging cliff. Will follow S along first bench below cliffs; some ledges on outer edge of first bench down hill; entire cliff area characterized by large slabs of limestone on slope below upper ledges; 12:34 2 chickadees, 3 jays; benchland would make excellent trail; 12:34 boat rock on bench, one cottontail, dry leaves piled up on lee side of boat rock  (toward west) to height of rock which is approx. 3 feet; considerable dark green moss on rocks; 12:36 large juniper tree, red-headed woodpecker left area, juniper at base 1 foot diameter, ♂ & ♀ cardinal; 12:38 8 slate-colored juncos feeding on steep slope below cliffs, 2 cardinals feeding with them, white-breasted nuthatch; this first benchland has many shrubs beneath trees and is more difficult to navigate than benches

below, 12:40 red-headed woodpecker in trees below, 2 chickadees,
 deer tracks common and mainly on first benchland as
 if this route was best for deer because of ready access to
 top of ridge and vantage trail to see into climax forest below
 and a bench that is more bushy than below and all around
 better protected. 12:41 drainage, cottontail, 2 chickadees,
 2 titmice, beyond this drainage cliffs less conspicuous;
 12:43 promontory, now to S; can hear crows to W in drainage
 valley; 12:50 red-bellied woodpecker, digging of either cotton-
 tail or squirrel, red-headed woodpecker, 3 jays at head of
 canyon; 12:51 2 chickadees, soil dry, black with dry leaves
 only; 12:58 head of drainage, now to W, crossing where erosional
 gully flattens out; red-bellied woodpecker, drainage below
 straight and rocky bottom, shall call this strike gulch;
 12:56 2 chickadees, shrubby on first bench, lack of shrubs
 on second bench; now on second bench where junipers are;
 one juniper 30 inches in circumference 1 foot above ground;
 3 red-headed woodpeckers, making considerable fuss, 2
 blue jays left junipers on NE side of gulch; 1:00 crossing
 fence line; 1:01 elm tree with water basin 5 inches in diameter,
 leaves completely covering benchland, now onto upper
 benchland; 1:05 promontory now to S; 2 titmice feeding on
 ground, 2 jays calling below; old trail up slope; 1:10
 fence line, partially cleared land beyond, more grass in
 open, good exposure of cliffs all along and used by neotoma,
 fox-tail grass dominant; 1:13 old rock fence and 1 red-
 bellied woodpecker, brownish yellow butterfly $1\frac{1}{2}$ inches across
 and about the 5th one noted so far; 1:15 rock fence, 2 red-
 headed woodpeckers, yellow throated flicker, 4 juncos, this
 fence is an old original fence, top rocks at a slant, will
 cross drainage at this rock fence; 1:17 drainage, now to W;
 small patches of ^{water in} drainage, rocks ^{wall} on S side to 5 feet above
 drainage has not been affected by flood water; 1:19 bench
 more open and true grasses in mat form, except on steeper
 slopes where it is bare soil and covered with exposed
 rocks, small trees and scrubs uncommon; 1:20 red-headed
 woodpecker, neotoma activity; 1:21 now at point, 3 blue jays,
 soil dry, ~~is~~ black, dry leaves ^{red-headed woodpecker} only; 1:22 crossing major drainage,
 2 small juniper trees between converging drainage systems \downarrow ,
 red-headed woodpecker left hole in tree, just a trickle of
 water in drainage, above without deep erosional gully

and controlled by upper set of cliffs, 


 2 blue jays calling; now along second benchland; many small trees to repopulate area if it is to be recovered; these benchlands are in grass; 1:25 2 jays, crossing erosional drainage where considerable trash is deposited; 1 field sparrow and 1 fox sparrow and 1 fox squirrel at drainage; 2 juncos, as one looks into forest below the young trees up to 8-10 feet are grayed which grade into dark above; 1 blue jay, 1 yellow shufted flicker flying together, red bellied woodpecker, a second flicker joined the first; the second benchland is largest in extent; altogether there are 5 yellow shufted flickers here including the above; 3 bluebirds, 5 juncos; 1:28 red-bellied woodpecker; 1:30 starting into native closed forest, 6 slate colored juncos; ♀ ♂ cardinal, 2 blue jays; 2 titmouse, 1 red-bellied woodpecker, these above at scature; 1:31 promontory, titmouse calling, 2 juncos 9 feet tall on point, mourning dove calling and first heard to day; 1:32 3 jays, 2 red bellied woodpeckers; 1:33 red headed woodpecker; 1:34 hole in ground in rock made by man, 100 feet beyond a fallen tree, old, with beautifully covered dark green moss, titmouse calling; 1:35 phoebe calling; 1:36 crossing drainage, now on second major bench; 2 cardinals, 8 juncos, 2 chickadees here; 1:37 cardinal, 2 mourning doves, very little water in drainage, 1 titmouse, 1:38 red-headed woodpecker; 1:39 large junco at 2 1/2 feet at base, 2 blue jay, 3 titmouse and 2 chickadees left this tree, red-bellied woodpecker nearby; 1:40 4 juncos, 2 red-headed woodpeckers; 1:42 fence line, 2 chickadees beyond fence line original forest, 2 blue jays, can hear crows calling in main valley to E; 1:43 blue jay, red-headed woodpecker; 1:45 red-tail flew into nest ^{40' high} in high hickory and immediately left when it saw me, normal in plumage, titmouse calling, considerable low, small trees but original forest otherwise, benchlands considerably flatter than here, that is overall slope; 1:47 promontory, red-bellied woodpecker, 2 titmouse feeding on ground, rocks of ledge exposed but poorly developed; 1:48 small trees 8 to 12 feet high on bench and mixed in among older trees, red bellied and red-headed woodpecker, gooseberry shrubs just beginning to leave and show greenish cast and


difficult to pass true, red-headed woodpecker, 2 cardinals;
 1:55 red-headed woodpecker, cannot believe there are so
 many in the area, they are associated mainly in ecotone
 situations between uplands & forests and especially where
 benchlands have been partly cleared; 1:56 red-bellied woodpecker
 fence line and considerable grazing now, removing shrubs
 from ^{of normal tree stand} understory, leaves on ungrazed size in normal
 accumulations while on other side in grazed area the
 ground is bare, dry and leaves absent, probably blown
 away from area because of lack of small shrubs to catch
 and hold leaves, 2 titmouse feeding on ground; 1:57 drain-
 age, 2 blue jays, 1 downy woodpecker, first rolling call
 of titmouse today others have been recognition calls; 2:00
 into clearing and most substantial so far; beautiful
 and well formed juniper with golden brown color to
 right on edge of bench, 1 large oak, ^{2:01} 85 inches in
 circumference at chest high standing out in open
 terrain, slopes in grass, more juniper trees associated
 with clearing, 3 juncos; 2:02 point now S; cardinal
 fussing around juniper tree, numerous juncos in area
 and mainly on east drainage slope, ³ red-headed
 woodpeckers; 2:04 4 eastern bluebird, 2 blue jays, red-
 tail passed by to N, largest juncos seem to have ^{had} ~~been~~
 tops damaged, blue jay in largest juniper; 2:07 drainage
 and no water, 1 red-bellied and 1 red-headed woodpecker;
 blue jay; passing trees that have been cut into 1 foot
 sections, 2 juncos, grass green in drainage ~~and~~ channels
 only, 2 juncos; 2:08 point now to S, red-headed woodpecker,
 1 juniper tree in perfect outline to right; 2:09 2 eastern
 bluebirds, 2 blue jays working over juniper trees, 2 juncos
 under same juniper tree, 1 red-headed woodpecker. 2:10
 drainage crossover, farm road to left, ^{going} down benchland;
 2 juncos, one of which is singing, grass on slopes except
 islands of new young trees where ground is bare, black & dry;
 2 juncos, junco singing; 2:12 point; 2:13 fence and grazed
 beyond; 1:14 major drainage consisting of 5 minor diverging
 drainages of about 30-40 separation, 2 yellow shafted flicker,
 4 juncos, rabbit & neotoma trails, benchland shallow &
 along a poorly developed service road; 2:16 last of minor
 drainages now NNE; 2:17 2 red-headed woodpecker, yellow-
 shafted flicker calling, cottontail left shrub and almost

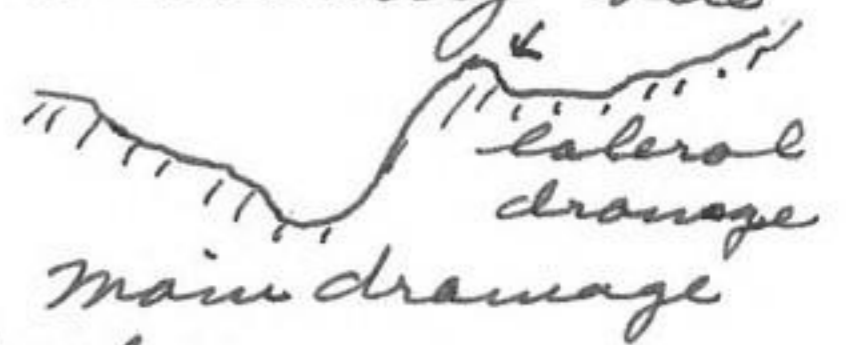
still following along steep slope with some rock outcrops, the general plan of today's trip was to use upper or 1st benchland  all the way and if deviation so indicated, the road now turns down slope and will gain upper slope; 2:19 now on upper benchland at point, red-headed woodpecker, fence turn here, deer tracks definitely more common on this bench where there is more brush and less parkland, where fence turns there is the beginning of a rock fence; 2:22 2 purple finch, one a male and the other a female, along rock wall at edge of bench, the male the most brilliant male I have ever seen, they were both in lower part ^{roosting left ground-below} of tree, the ♀ flew first 40 feet and alighted in small trees on bench followed by male, 2 chickadees (all chickadees today have been black-capped). The valley edge of the first bench is the best place for track but this edge would be slightly hotter in summer because of small tree and overhead protection. This trail, however, would interfere with deer trail corridor and affect more animals because of conspicuous placement of trail which is exposed to all of first and second benchland. As far as human advantage is concerned  this position would be all advantageous. If the trail were placed near base of slope of first bench there would be less interference with mammals & birds living on the second benchland as they would not be able to see action on trail. Periodic vantage points on edge of first bench might be a better arrangement; 2:25 watched a white breasted nuthatch carrying small piece of bark of this size  from a tree where it pulled the bark from the living tree and carried the fragment to a hole ^{4" in diam} in a tree 30 feet away ^{just over crest of bench toward cypress forest, nest 20 feet high}. This bird made 6 trips in 3 minutes, each trip from same tree to nest. At the 7th trip it collected bark from another tree in the opposite direction and approx 30 feet away. At this rate it would certainly fill a hole ^{cavity} in a tree in short order! It called as it performed its nest building. This ^{nesting} tree is approx 60 feet west of a reclining tree that has a nestoma nest in the fractured side of the tree;

one turkey vulture flying w just 100 feet n of here;
 2nd turkey vulture flew by, red-headed woodpecker here;
 2 jays calling, 2 chickadees in area, leaving nuthatch
 nesting site at 2:28, the nuthatch on occasions come to
 entrance of hole from inside and remained for several
 seconds^(35 secs), usually straight in and out, one bird only in area;
 2:33 red-bellied woodpecker; 2:33 crossing major drainage;
 this drainage is deep thru 1st benchland and flattens
 out just beyond cliffs above first bench, great horned
 owl flew from upper part of this drainage beyond first
 bench, 2 chickadees; 2:36 red-headed woodpecker;
 2:37 ^{1st} bench narrow and sloping, 2nd bench well developed;
 ridge to w narrow and only 50 feet wide between drainages,
 trail along this ridge; 2:40 point on 1st bench, fence
 N-E and trail separates, ⁵ red-headed woodpeckers,
 one chased a red-bellied woodpecker, 2 chickadees,
 1 white breasted nuthatch; upper 1st benchland poorly
 developed, 2nd bench well developed beyond point, short
 of large trees with base trampled; 2:46 first bench
 difficult to navigate ^{because of dense shrubs}, & dropping down to 2nd bench, old
 logs with considerable mass and look old; 2:48 young
 tree 1 foot in diameter with buttress 2 1/2 feet long ^{3" dia};
 2:49 old fence line, benches variable, upper one with
 considerable shrub; 2:51 2 titmice; trails should not
 be too wide or they will develop successional vegetation
 on each side; 2:53 point, good rock outcrop here; second
 bench almost flat and beyond and upper ledge of rock
 with plates on slope; vertical cliff above first bench which
 is still small, most old trees have fallen down slope;
 2:56 2 blue jay calling, fewer birds along here, many
 rabbit, squirrel or neotoma trails, 2 juncos; 2:58 point
 and now to S; 2 cardinals singing, red-headed woodpecker,
 these west ^{and n} exposure slopes seem to have fewer birds than
 other exposures, rock fence built into rock cliffs on upper
 bench; 3:02 crossing drainage, rock wall across drainage,
 red-headed woodpecker, titmouse calling; 3:03 3 red-headed
 woodpeckers; 3:06 ^{major} minor gully, trail down this gully & turn to
 left, red tail left trees 100' to west, 2 red-headed woodpeckers,
 3:09 2 red-headed woodpeckers; 3:11 point, fence; 3:12 red
 headed woodpecker; fewer small birds because of climatic
 condition of vegetation or time of day, first Eumeces on trail;

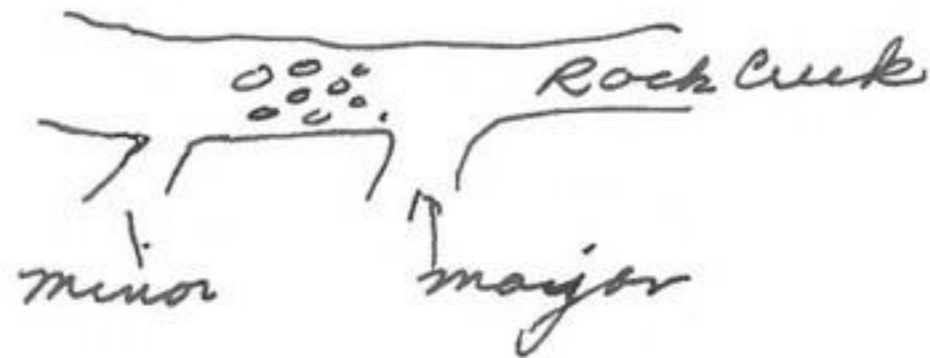
3:13 point, cliffs just before point well formed and 3-4 feet high, broken down tree at point, 2 red-headed woodpecker, 1 red-bellied woodpecker, beautiful parkland on sloping benchland below, upper 1st bench would be considerably warmer than below, 2 bluejays, cliffs smooth out along this bench, 3 eastern bluebirds; 3:16 red headed woodpecker, open woodland below into large trees 30-50 feet high, rock ledges picking up here & there; 3:17 red-headed woodpecker, red-bellied woodpecker; 3:18 rock fence to right at edge of cliff; 3:20 minor drainage, no water, soil damp, rock still along ridge to left; 2 chickadees & 4 juncos; 3:22 intercepting trail that leads up gully, red headed woodpecker, 2 jays, there has apparently been an old road down thru here at one time, exposure of moss to right unusual in extent & color, red-bellied woodpecker; 3:23 Crossing ^{deep} head major drainage just at point on 1st bench where ^{erosional} gully starts to develop, no water, deep erosional gully has exposed cliffs in erosional zone, one large ^{hill} elm with irregular surfaces just up & down slope from these cliffs, one dead tree 40' beyond, trail goes down drainage but will continue on upper 1st bench; 2 bluejays. Between upper drainage at 3:23 to pond at 3:45 noted 3 groups of red-headed woodpeckers (5-4-2), 3 groups chickadees (2-2-2), 2 juncos, 2 groups titmouse (2-2), 1 crow, 5 cardinals in (1-1-3), 2 red-bellied woodpeckers. At pond at 3:45 found pond down 8-9 feet, no frogs, 6 red-headed woodpeckers, 3 bluejays, 2 cardinals. None noticed that where trees have been downed the shrubs grow more dense. Left pond and will continue N to mouth of canyon, thence NE at base of hill to car. Left pond at 3:50, cow hear junco singing and 2 chickadee, 2 cardinals calling, cottontail rabbit; 3:55 mouth of canyon now to E, 2 downy woodpeckers, 8 cardinals in one group, 4 Harris sparrows, 2 red bellied woodpeckers, 2 red-headed woodpeckers, 5 juncos, all these at mouth of canyon as a loose aggregate and considerably more than on upper benchlands. Continued E along edge of open field; 4:03 2 titmice calling, 2 juncos, 4 cardinals, song sparrow calling, 2 male cardinals chasing each other, another nearby. 4:05 at



old pump, cardinal here, song sparrow, 2 juncos, 4:07
 2 chickadees, 4 cardinals, 2 red-headed woodpeckers,
 fox sparrow, red-headed woodpecker, white breasted
 nuthatch. 4:08 cardinal singing, red-headed woodpecker,
 4:08 red-headed woodpecker, 6 goldfinches, 4:10 2
 red-headed woodpeckers, 2 cardinals, song sparrow,
 red-headed woodpecker, red-bellied woodpecker; 4:12
 3 crows; 4:14 2 red-headed woodpeckers; 5 Harris
 sparrows, cardinal, 4:15 red-headed woodpecker, 2
 mourning doves, yellow shafted flicker, 2 eastern
 blue jays, Harris sparrow singing, deer tracks along
 edge of field, song sparrow singing; 4:16 downy wood-
 pecker, 4 juncos; 4:17 5 Harris sparrows, 6 juncos,
 2 chickadees, 1 downy woodpecker, 1 hairy woodpecker;
 4:17 2 yellow shafted flickers in ^{open} field; 4:18 6 Virginia
 deer in wooded river drainage bordering open field,
 one doe remained motionless while others left, one
 started into open field then ran back into wooded area,
 2 red-bellied woodpeckers reacting to deer, ^{4:20} yellow shafted
 flicker flew in from open field, 2 juncos, 3 Harris
 sparrows, winter wren; 4 juncos, 2 red-bellied wood-
 peckers. 4:20 ² bottom of open field and crossing ^{lateral} ~~main~~
^{of front w.} drainage; 2 blue jays, crows calling; 4:23 main erosion
 channel, drainage damp, muddy but no standing water;
 4:25 Rock Creek, water clear but algae giving greenish color;
 beautiful section of river, 3 blue jays calling, 2 juncos,
 red-bellied woodpecker; 4:30 drainage from S and a
 wounded red-tail hawk which was capable of walking
 but could not fly. when inspected remained on
 back and head gradually lowered and bill chattered
 slowly (tail white with black and reddish mottling
 on end of tail  like a Kreider Red-tail; trail
 meets river here, ^{4:35} as a crossing for horses from Colmans
 place, the trail trends W from crossing but deer have
 developed a trail to E. up steep bank, continuing E;
⁷ 4:37 on main trail thru timber, fox squirrel crossed
 trail; 4:39 great horned owl and short cut trail to chimney;
 4:40 crossing major drainage, creek deep & meandering here,
 2 red-headed woodpeckers. Lateral
 drainage within 2 feet of breaking
 thru, a good case of inefficient piracy.
 water in ponds & trickle between ponds in creek.



This canyon has beautiful white barbed sycamore trees; 2 red-headed woodpeckers. Ripples above major drainage but below minor drainage; red-headed woodpecker; 4:43 Chimney; sycamores seem to be arranged in the main lateral drainage and then down main Rock Creek.



Some old disk fragments around site of chimney; leaves in some parts of trail 2 feet deep, deer trail thru here; 4:45 Rock Creek angles to N. beautiful sycamores at bend of river, this river with too many ^{shallow} rapids for boating; 4:46 crossing erosional gully just before drops of into deep gulch, 3 juncos; on other side drainage climbed up slope; 4:48 ♂ & ♀ cardinal, lower part of slope rocky; cardinal, red-headed woodpecker; 4:50 yellow shafted flicker, 3 crows flying head of gulch; 4:51 2 red-headed woodpeckers, 4 juncos, 2 chickadees; 4:53 blue racer measuring 32 inches body + 7 inches tail, kept coiling its body over its head for protection, side of heel with rock cliffs (on 2nd bench from top); 4:55 crossing first bench which I passed along at 12:43 this morning; 4:56 large elm tree at W edge of field, titmouse calling; flicker flying across open field; winter wheat averaging 4 inches high, red-headed woodpecker; 5:00 east side field along shoulder of ridge, many deer tracks here and average 1 per sq foot; 5:03 road leading down hill and toward old rock quarry, eastern bluebird singing; 5:04 4 blue jays, red-bellied woodpecker, downy, 5 goldfinches, 2 bluebirds; 5:06 fox sparrow, 7 bluebirds, 2 goldfinches, fox squirrel top of ^{tally} tree, 3 chickadees; 5:07 song sparrow, 2 cardinals; 5:08 beginning of gravel pit, 2 red-wing blackbirds on territory not over 10 x 10 feet, 3 others can be heard to W. (these were not here this morning); 2 bluebirds singing; 5:10 upper NE end of pits, 3 bluebirds 5 cardinals, fox sparrows, no frogs calling, 4 juncos; considerable fish? activity in upper pond; 4:12 leaving gravel pit area, 5 juncos; 5:13 fence line, forests NE partly cleared for grazing; 5:14 can now see into Washingtons Creek Valley, an old shed that has collapsed on this ridge, Harris sparrow singing; 5:15 2 bluebirds, ridge mostly open, juncos common, red-headed woodpecker;

5:16 flicker calling, juncos singing, Harris sparrow singing,
 4 juncos, woodrats & nests common, 5:17 mockingbird;
 5:18 field sparrow singing; some cacti on top of ridge,
 robin; Harris sparrow & juncos singing; 5:20 8 juncos,
 1 red-bellied woodpecker at nesting hole; 18 juncos, many
 old dead trees down slope to E, downy woodpecker and
 8 Harris sparrows, 2 chickadees, the previous in one
 group; 2 blue jay, flicker calling; 5:23 fence line E-W
 separating partly cleared to all clear ridge land; 5 Harris
 sparrows, 3 cardinals; bail of fence wire on ridge
 shows higher grass & weeds where ungrazed; 5:25 6
 bob-whites 20 feet from timber at crest of ridge, good
 view of K.U. campus + wakarusa valley, field sparrow
 singing, sky become hazy in last 2 hours, sun about
 1 hour from setting; flicker calling, cardinal singing;
 5:28 head of drainage above red barn; mourning dove in
 same area as this A.M. at 9:50; can see considerable swamp
 or wet marsh land below in valley; 5:30 rock fence
 that comes ^{20'} into ridge from edge of ridge; red-bellied
 woodpecker; following fence line to N, 6 grouches
 flew from E to W; red-bellied woodpecker calling;
 5:32 titmouse calling. 5:33 red-bellied woodpecker
 calling; 5:35 cardinal, titmouse calling, cardinal,
 4 juncos, cardinal, 5:36 8 juncos, 2 chickadees, 2
 cardinals, 2 cardinals, titmouse; 10 juncos; in
 on brush pile on ridge noted 1 white crown sparrow,
 1 field sparrow, 2 juncos. The field sparrow has a
 light-delicate flight. It seems as if birds have
 congregated toward end of this ridge which ends
 abruptly. The end of ridge has two knolls, each covered
 with juniper trees. white crown sparrow here, 2 chickadees,
 8 bobwhites making considerable noise as they ran
 across dry leaves. These points may have been
 good observation points for Indians but no evidence
 found in way of artifacts. 5:40 mast NE point, cotton-
 rabbit here; red-bellied woodpecker; 5:45 descend-
 ing to car directly below, considerable green moss on
 this exposure, red-bellied woodpecker called; arrived
 car 5:47 P.M. Sun about 30 minutes from setting. a
 sparrow hawk & loggerhead shrike 100 feet E of the
 S end of proposed dam; end of complete census.

Today there was an unusual number of red-headed woodpeckers and probably represents a migration, ^{mainly in western part of area (prettiesome) wooded} there being 86 ^{(22 of which were on return trip from pond (3:45 PM))} individuals observed on this trip. There was a noticeable lack of reptile activity, especially lizards; those observed were recorded. Only 1 snake. Route covered would make an excellent ^{horizontal} trail system of horizontal trail which could be extended the full circumference of the lake with camp sites or lodging every 10-15 miles. Land owners adjacent to lake could participate in this overnight accommodation with place to sleep and eat. In this way the lake could be hiked with minimum of equipment to carry. These trails would be for enjoyment and study of plant and animal communities and not for physical endurance records or motorized routes. Area from edge of lake to beyond crest of ridge would have to be controlled by government or state agencies or by private control with agreement with government agency for maintenance. Roads in area will be brought to vantage points only, all others beyond immediate lake and not noticeable from lake. Trails rerouted around areas of ^(wildlife sanctuary) inviolate trespass, and around areas of private homes in the restricted area where they are allowed to be built. All foot or vehicle traffic confined to established trails and roads. An experimental pavement trail system (2 feet wide) should be investigated.

Clinton area, Rock Creek, Douglas Co., Kansas

March 20, 1966

Returned to area visited yesterday (10:56 A.M. on map) to check on the fox squirrel aggregation noted there. Mileage at S end proposed Clinton dam at 64.3 at 9:50. Will keep complete census. 64.5 meadowlark singing; 64.6 meadowlark singing; 64.9 now to S; 65.1 meadowlark; 65.4 turnoff to house, cardinal singing, 3 goldfinches; 65.5 crossing drainage, meadowlark, cardinal singing; 65.6 eastern bluebird, cardinal, 4 juncos; 65.7 2 bluejays, cardinal; 65.8 ^{9:55 A.M.} top of hill at rock quarry, 2 red-tails in tall trees N of quarry, 4 cardinals singing, no red-wing blackbirds, Pseudacris singing. Starting on upper benchland at old road grade just to S of regular road at 9:56; 9:57 crossing drainage, 2 bluejays, 1 red-bellied woodpecker; 10:01 point, 2 titmice, 3 jays calling, 3 bluejay calling, red-bellied woodpecker

10:02 2 chickadees, downy woodpecker; 10:04 drainage which is equal to time of 10:56 of yesterday (see map of that date) where observation were made of the squirrels approx 80 feet to W. From drainage continued to center of the previous days squirrel activity. Took observation site on old road grade $\frac{1}{2}$ way up slope between first and second benches. An arrival 2 blue-jay and 2 downy woodpeckers in area of squirrel trees. no squirrels in area at arrival but compact trails and activity around bases of trees show evidence of considerable use by squirrels. at 10:11 turkey vulture sailed up canyon and over area then returned. Small birds in evidence, very seldom silent more than 10 seconds. The bluejay called most frequently and moved in circles or irregularly passed thru area from upper benchlands to lower canyon drainage as if a local group on territory. The bluebirds, of which there were 2 to E, 1 200 N and 1 NW. all beyond area. The red-bellied woodpecker on territory 100 to E call less regularly and at longer intervals. One red-bellied entered area and then left. ^{2 groups of 2 ea} Chickadees & titmice passed thru area. at one time could hear 3 titmice calling from different areas. at one time at 11:36 a sharp shinned called on first bench above; 10:40 first warning call of a fox squirrel (normal red) 200 to N down slope and about same time a fox squirrel entered nest hole in tree on W end of squirrel area (see map). at 10:50 left and crested area to see if squirrels had localized elsewhere in periphery. but no sign although good nesting sites 200' from main squirrel activity. Returned to observation point and continued observation. Slink left mouth of hole in base of old stump surrounded by ^{dry} leaves. Robin passed thru area. 11:17 red-bellied woodpecker inspected hole where squirrel was lodged. The squirrels occupies the area above the hole; 11:30 first crow flew by from W to E; 11:45 squirrel put head out of hole for first time, occasionally placing both front feet & head out of hole; 11:53 Coyote passed from E to W at 250' below, walking slowly and with mouth open as if it had been travelling. There were no birds or mammals reacting to the presence of the passing coyote; 12:00 squirrel with head still out of hole; hairy woodpecker passed thru area, stopping 15 seconds to feed; 12:01 fox squirrel (normal red) fed among leaves 200' to N and then climbed tree to feed. It then left and travelled 200 to W

out of sight, having covered approx. 300 linear feet from E to W; 12:02 fox squirrel fed on edge of bench 10' above me, collected, ♂ 460 mm total length. The 4 adult (red) fox squirrels (*Sciurus niger*) are residents in area and did not investigate the area of the young squirrel activity. Left 12:30. Cottontail in brush pile SE at head of drainage. Did not keep record of bird beyond this point. Arrived car 12:50 and returned to Lawrence. At S end of proposed Clinton Reservoir dam noted (200' to E) 1 loggerhead shrike and one sparrow hawk.

State
Douglas Co., Lake, Douglas Co., Kansas
March 21, 1966

Lawrence + Hazel Bee and Annette + I visited the lake at 5:30 P.M. 2 large flocks of snow and blue geese passed N over lake. This lake is an example of extremely poorly planned management. If the only purpose is for fishing it serves the purpose but the associated background has been destroyed. The large road cut thru the area on W side of lake, scaring the hillsides and today sending a cloud of dust over the fishermen and lake like a fog bank. Approx 40 cars were parked as near the edge of the lake as they could get, destroying all the grasses & sedges and presenting a body of water lined with varied colored cars and campers. The 10-15 boats moving about the lake destroyed the final remnant of natural beauty of this unusually situated lake. Recommendations would be: road only on outer limit of area beyond sight of lake with one or two vantage points only for cars; trails only, leading to lake; 50% of lake kept inviolate to trails or fishermen in areas where background of lake should be kept in unspoiled beauty; dam made irregular and grown to trees; picnic sites made inconspicuous and placed beyond sight of observation points; reduce parklike condition of isolated trees & cut grass to an original deciduous or open exposure.

Lawrence, Douglas Co., Kansas
March 21, 1966

2 flocks snow & blue geese flew N at 7:30 after dark flying N over what would be considered Louisiana street.

Potter's Lake, Univ Kansas, Lawrence, Douglas Co., Kansas

March 23, 1966

First American Coot on Potter's Lake.

March 27, 1966

Snowed last night but did not remain on ground more than 2 hours.

Rock Creek Valley, Douglas Co., Kansas

March 27, 1966

Annette P. and I made trip on ridge SW of the south end of proposed Clinton Reservoir dam. Mileage 79.7 at S end proposed dam and going W at 5:10; 80.1 loggerhead shrike; 80.3 meadowlark and turning to S; 80.4 horned lark; 80.8 road to house to W; 81.0 15 slate colored juncos in one group; 81.1 2 black-capped chickadees; 81.2 top of hill at gravel quarry; left car 5:17; 4 red wing blackbirds ♂♂ on territories and singing; 5:20 upper lake, cardinal, 3 juncos, red-tail hawk circling to N; 5:22 field sparrow; 5:23 fence and head of drainage, red-headed woodpecker; 2 cardinals singing N in distance; 5:26 old shed overlooking Washington Cr. drainage, cow hear 3 cardinals singing to SE down slope; 5:28 cardinal flew across ridge, 2 juncos, 2 chickadees; 5:30 2 field sparrows travelling together, keeping within 3 feet of each other; they prefer the open area of ridge but finally fly to better shrubs and timber to E down slope; 5:31 6 white-crown sparrows, 5 Harris sparrows in brush pile in center of ridge, they continued down ridge to N; these birds joined 12 other Harris sparrows and 5 white crowned sparrows which finally left partially open ridge and flew to border trees to E where they started to sing (5 Harris sparrows and 2 white crowned sparrows) as we passed by, other Harris sparrows joined in making 8 Harris sparrows singing at one time; 5:35 4 crows left ridge 300 to N; all told there must be 25 Harris sparrows; 5:37 cottontail left brushpile, neotoma house in most usual spots at base of trees and among brush piles averaging 1 per every 100 feet; robin flew W across divide; 2 chickadees, yellow-shafted woodpecker, 2 chickadees, yellow-shafted flicker calling to E; 5:40 robin; 5:43 photo 660327-1 of Wakarusa Valley with dead trees in foreground; fence

line at 5:44, now W, 2 field sparrow beyond fence in open ridge (no shrubs or trees beyond); 5:45 single Harris sparrow, 2 red-headed woodpeckers at pond, bob-white calling, 9 left at corner of fence line, now to S; 5:52 2 red-headed woodpeckers, one of which chased and contacted the other in flight, 1 bluejay; 5:51 single titmouse giving warning call at 30 feet; 5:52 passing by nest that could have been used by horned owl or old red-tail nest; 5:54 crossing drainage on 2nd level; 1 fox squirrel, 2 jays + 2 chickadees near, 1 red-bellied woodpecker calling; 6:04 2 red-bellied woodpeckers; 6:05 point, bluejay chasing a red-headed woodpecker near base of tree, no birds since 5:54; red-tail calling in valley to W; 6:10 passing likely red-tail nest, 2 jays calling; 6:14 drainage, now back to 1st level; 6:15 red-bellied woodpecker calling; 6:16 elm tree 88 inches in circumference chest high, another large aspen orange and a large dead downed tree, this is where the upper bench is eliminated by rocks piled from rock quarry; 6:19 base rock slide on 2nd bench, cotton-tail here; 6:24 road and rock quarry, bluejay, red-bellied woodpecker; 6:25 left in car; 81.7 mileage. cardinal, 2 starling flying to farm house to E; 82.6 south end proposed Clinton Reservoir dam. A great redtail circled the point above. at about 1/10 mi. E of the S end of proposed dam noted a large great blue heron in drainage ditch that leaves N side of road and turns to NNW.

Campus, Univ. Kansas, Lawrence, Douglas Co., Kansas
April 1, 1966

Last two days approx 20 goldfinch fed all day in one elm tree which was just budding and showing inflorescence. The next day (April 1) they were in some tree in some numbers. This was a concentrated group of goldfinch as I did not hear or see others on the campus.

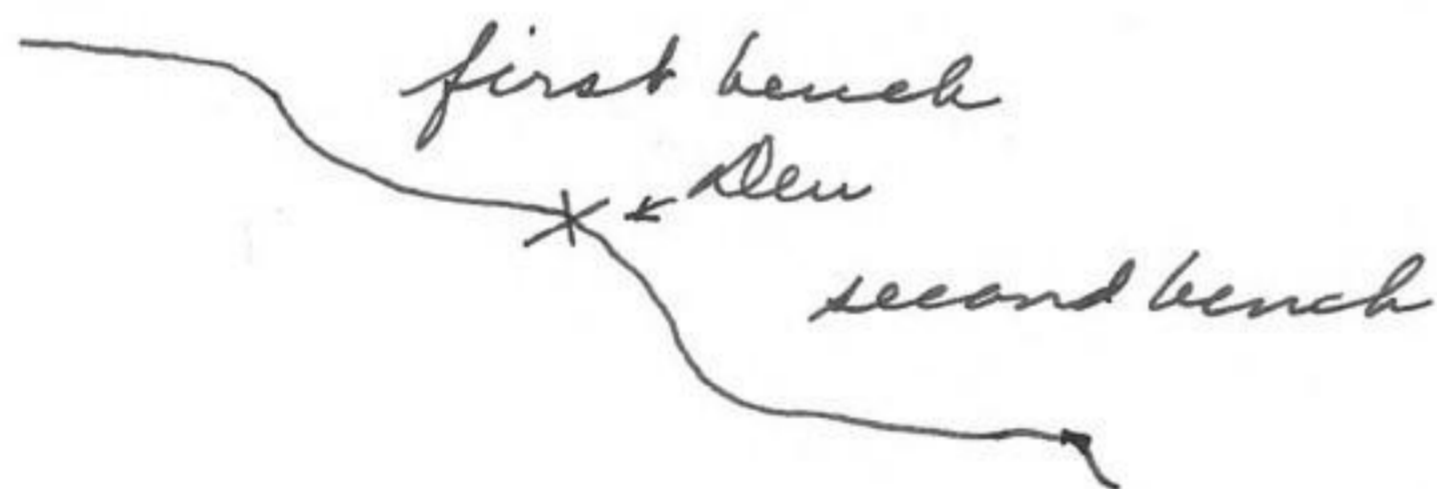
Rock Creek, Clinton Area, Douglas Co., Kansas
April 2, 1966

Census of S hillslope of Rock Creek drainage. Complete census started at Siegel School at 9:10 A.M. Temp. 56°F entire sky overcast but some character to clouds bases. mileage 78.7 at Siegel. 78.9 meadowlark, 2 starling; 79.0

meadowlark; 59.1 robin; loggerhead shrike; 59.2 now to S;
 meadowlark; 59.8 pond low; 60.0 Wakarusa bridge, water
 1/2 foot lower than highwater mark of season, 2 Eng sparrow
 at farm; 60.1 red-headed woodpecker, Cardinal, 3 juncos,
 wind from S; 60.9 8 yellow-shafted flicker left center of
 plowed field with trees 2/10 miles away, 1 red wing
 blackbird in flock of 15 ♀♀; 61.5 main road at Collins;
 Continuing S; 61.7 now to W; 62.5 now to S; 63.2 Rock
 Creek bridge, red-bellied woodpecker, water about 1 foot
 lower than main water mark of season; 63.3 2 eastern
 bluebirds; 63.6 base of hill at 9:25 A.M. Old home
 site with area burned and exposing many runways, of ^{old nests}
Microtus ochrogaster and other small mammal trails.
 Started at upper bench at top of hill at 9:40 A.M. will follow
 this bench which is the first one below the plateau;
 9:42 robin, chickadee, coyote tracks on this bench, soil
 block, dry, soft; leaves of last fall in original condition.
 9:43 2 juncos; 9:45 2 turkey vulture overhead & flying to
 W. 9:45 3 pieces of roofing metal wrapped around trees
 by tornado, direction of impact from SSW, field sparrows
 singing in top tree below (2nd bench); 9:47 point,
 red-headed woodpecker, red-bellied woodpecker flew
 from here to 2nd bench. One rock lodged against a tree,
 bench about 30° slope which is condition of many n or
 valley sloping hillsides; 9:50 large plates of cliffs have
 slipped down this slope, considerable digging of large
 mammals, most large trees have been blown down
 slope to n, some trees of 2nd bench have been blown to W;
 chickadee calling, considerable brush and difficult to
 navigate, badger size holes 10 feet below upper
 ledges, arrived at point to W (Separation Point), most trees
 have been blown to ~~the~~ n but one 80 ft to n is blown
 to E, so wind has been in at least 3 directions here (n,
 E, and W); Chickadees here, 2 bluejays; 9:59 Carolina
 wren carrying butterfly in bill (this area is beginning of
 noticeable tornado effect and is at a point where a
 large tree with white fungus grows on 2nd bench), consid-
 erable down timber and makes good protective cover for
 the wren, trees ^{blown} down toward the n and NW, maximum
 damage between upper ridge & 200 feet down slope, turkey
 vulture left here from among trees. From this observat-

ion to to 11:40 at Pilot black snake point the recorder failed to function. In the distances covered have approximated the number of birds of observed but not recorded because of this malfunction: 2 song sparrows, 1 fox sparrow, 8 cardinals, 25 red-headed woodpeckers, 13 blue jays, 2 turkey vultures, 6 red bellied woodpeckers, 8 black-capped chickadees, 15 Harris sparrows, 2 field sparrows, 13 juncos, 2 robins, 2 white-breasted nuthatches, 5 fox squirrels, 6 titmice, 11 bobwhites, 2 bluebirds, 6 goldfinches, 3 flickers, 2 Eng sparrows, 4 starling, 1 cowbird, 1 hairy woodpecker, at this point at 11:40 observed a pilot black snake half way out of den, which was covered with about 6 inches of leaves. Forcefully pulled this snake out of its den. Lower part (1/2) of body unusually cold to touch and was about same temp. as underground soils.

It measured 250 mm tail, 1400 body length. Den on N exposure. Hole 50 feet NW of large oak tree at point and among trees and sparse shrubs at brink of first bench



It is possible this snake was just emerging from winter hibernation although this ^{kind of} snake has been observed to have been observed active a week and

a half earlier. 2 red headed woodpeckers at this point but no other birds, 2 fox squirrels chasing each other 150 feet to west on first bench, wind constant and howls in upper parts of trees, especially on edge of plateau, I am wondering if this might be a factor in animal distribution, On second bench NW of this point is a small tree trunk with white fungus. Leaving point at 12:00 o'clock and will continue W. Bench on N exposure a 20-30 degree slope, beyond this point there is very little evidence of wind action from the tornado; small blue butterfly out; 12:07 excavation of burrow system by either a coyote or, more likely a badger, old marmot skull measured in 68 mm in width and 97 mm from front of incisor to back surface of condyle, estimated total length 102 mm (nasals

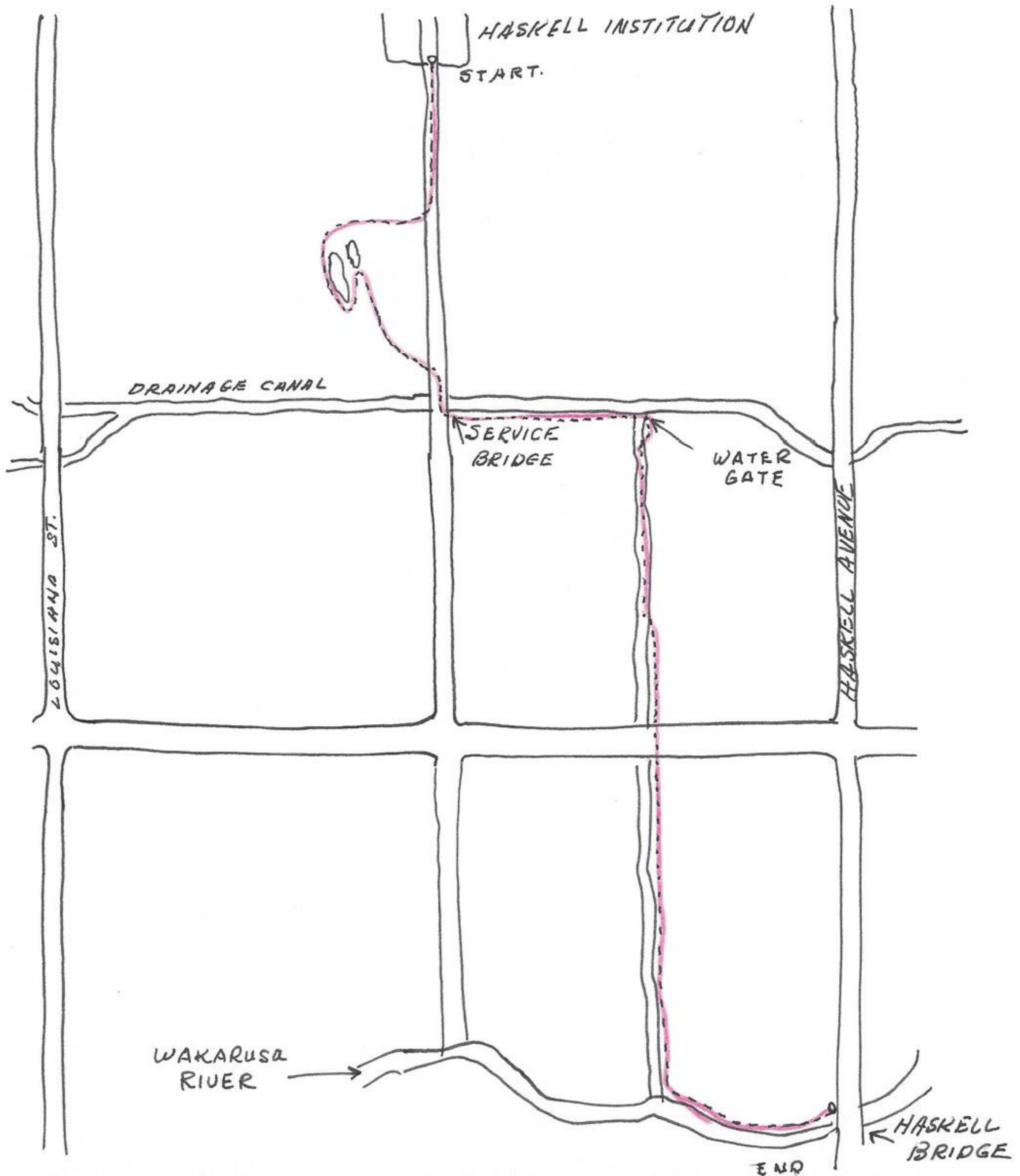
missing), 9 separate holes with some elevations, ^{tailings} 10 feet or
 so beyond hole; 2 red-headed woodpeckers here, deer trails
 along this bench, major small mammal trail along bench;
^{left these diggings at 12:10}
 12:14 fence (wire); 12:16 drainage, fox squirrel, 2 red-headed
 woodpeckers, 1 red-bellied woodpecker, hickory leaves
 out to 1 to 1 1/2 inches and are out farther than anywhere along
 route so far; 12:20 well organized trail at brink of bench,
 burned trees at points from either lightning or induced
 burning; 12:22 second point, this is a double point, old
 hickory at very point, 3 large junipers associated with point;
 12:24 drainage, two red-headed woodpeckers, 12:26 minor
 drainage without much deviation of bench; 12:28 drainage
 but could have been induced by old wagon road; 12:30 near
 point with wall-like ledge; 12:31 ^{first} point and good ledge out-
 crop, large displaced cliff ^{all} along, titmouse and 2
 chickadees; 12:34 now at main point, 2 red-headed wood-
 peckers, titmouse, crow flew around corner, leaving point
 at 12:47 and followed straight down ridge to valley below;
 12:52 on high bench directly above Rock Creek on trail, now
 to E, considerable amount of dry leaves; 12:55 downy
 woodpecker; 12:52 2 chickadees, titmouse, 1 cardinal;
 12:58 a major drainage, the vegetation of the channel proper
 of the Rock Creek is different than the vegetation beyond
 the channel; 1:01 red-headed woodpecker, 2 crows. 1:03 the
 larger of the two associated drainages, well developed small
 mammal trails on each side of drainage slopes; 1:04 large
 cut elm across trail, diameter 3 feet, titmouse singing,
 other trails crossing main trail at right angles, one out-
 standing sycamore along side of river below, 2 cardinals;
 1:05 cut elm with diameter 2.6 mm; 1:06 ♂ & ♀ cardinal call-
 ing vigorously but could not determine cause, hairy
 woodpecker near creek below; 1:09 first of two minor ~~small~~
 drainages, small mammal trails associated with drainage;
 1:10 second drainage system, red-bellied woodpecker, 2 chickadees;
 1:11 downy woodpecker; 1:12 minor drainage from diagonal
 road grade eroded 4 feet deep, the small blue butterfly
 only kind of butterfly observed today and have seen approx.
 12 observed today; 1:14 mammal trail crossing main trail
 at right angles to trail, 3 blue jays, red-headed woodpecker;
 1:14 river directly below, one sycamore tree felled into
 river backing up ^{on water for 20'} leave beds from trees, old tree about

40 feet to E that has a large hole that could support a turkey
 structure or woodduck nest; 1:16 5 blue jays chasing one
 red-headed woodpecker; 1:17 edge of open field, good trail
 from hillside about 20 feet before open field; weed
 field supporting more *Microtus ochrogaster* where high
 weeds give overhead protection; 1:21 drainage, water with
 considerably algae and water skaters on surface, water
 clear; 1:23 brow on road at point; 2 chickadees, 2 crow fly-
 ing from E to W; 1:25 4 juncos, field sparrow and in same
 general area as heard this morning, water at side of road
 and probably from a spring, titmouse calling, red-bellied
 calling in tree near old homesite; arrived car 1:28. Left
 at 63.6 mileage; 6:38 2 crows left from field along Rock
 Creek; 64.0 bridge over Rock Creek; 64.3 32 starling in one
 flock, 1 meadowlark; 64.6 meadowlark singing; 64.7
 now to E; 65.7 main road now to E; 67.4 S end of proposed
 dam, end of complete census, sparrow hawk near high-
 way 59.

Haskell Bottoms, S Lawrence, Douglas Co., Kansas
 April 2, 1966

made short trip this afternoon from Haskell Institution
 S to drainage ditch, thence E to water gate, thence S to
 Wakarusa River, thence down stream to bridge. Left 4:40,
 no clouds, wind from W, cool. Between Haskell and
 drainage bridge noted 2 robins, groups of 1-1-1-5-1 red
 wing blackbirds, group of 2-2-2 cardinals, Wilson snipe,
 meadowlark, song sparrow, swamp sparrow. There are several
 small ponds from surface soil excavations which are
 developing into good wet vegetation communities.
 At bridge noted 2 eastern phoebe, barrow pits on S side
 of dike dry. From bridge to gate noted 1 meadowlark,
 1 shrike, 2 cardinals, 1 red-wing blackbird. At water gate
 turned over 18 piece of tin & parts of doors without mammals
 or snakes where previously there were many, area heavily
 grazed. From gate to road to S observed 1-3 mourning doves;
 2-1-2-red wing blackbirds, 1-1 meadowlarks; 1 bobwhite;
 2 crows, redwing blackbirds of 28 ♂♂ + 3 ♀♀; one flock
 of 300 grackles, 24 redwing, 8 cowbirds, 6 ♂ redwings, these
 birds drinking water from drainage ditch which is supporting
 water 1/2 way up drainage, some trees of junipers 4 feet high;

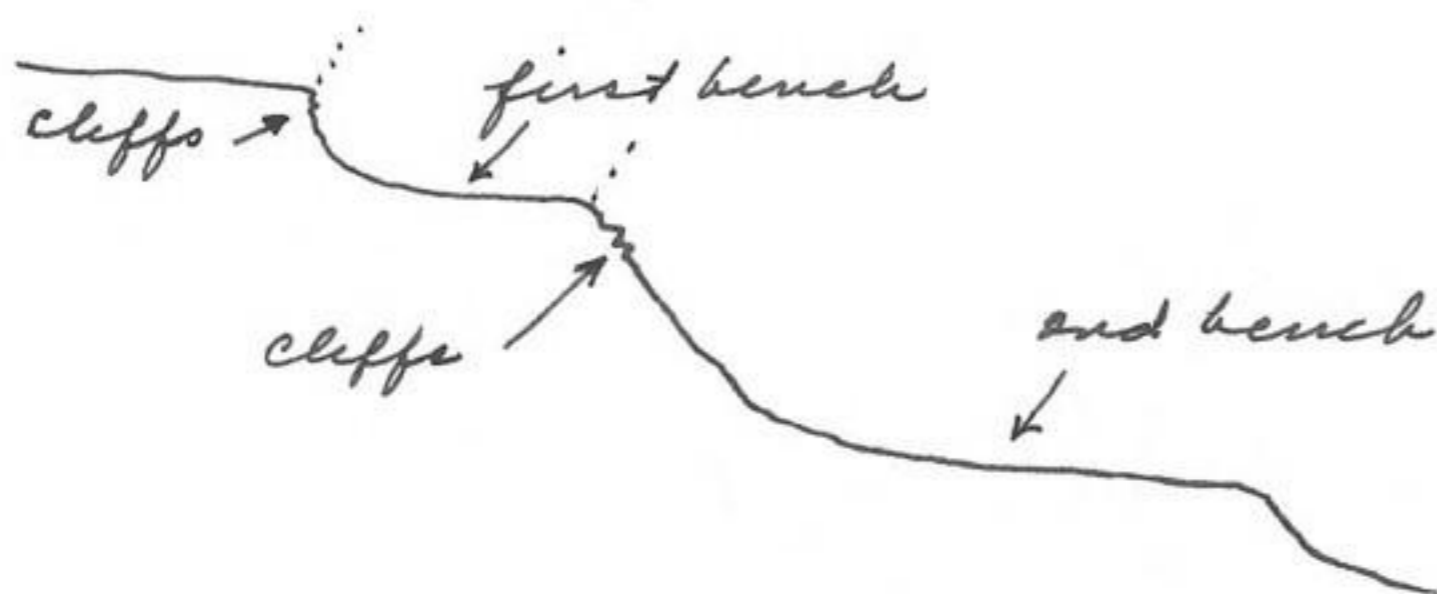
arrived road at 5:45 P.M. Birds between road and river were 2 red-wing blackbirds, ♂ grackle, 1 chickadee, 2 meadowlarks, groups 1-1-1-2-4 grackles, groups 3-2-5-2 ♀ redwings, 1-1-1-1 ♂ redwings, 1 cardinal, cottontail, flicker. From Wakarusa River to bridge noted 1 red-tail hawk, 1 fox squirrel, cottontail, downy woodpecker, red-bellied woodpecker, 5 juncos, 2 bluejays, 1 cardinal, 2 robins, stinging nettle approx 1 foot high. Arrived at bridge on Hasbell Avenue at 6:15 P.M.



Rock Creek, Clinton area, Douglas Co., Kansas

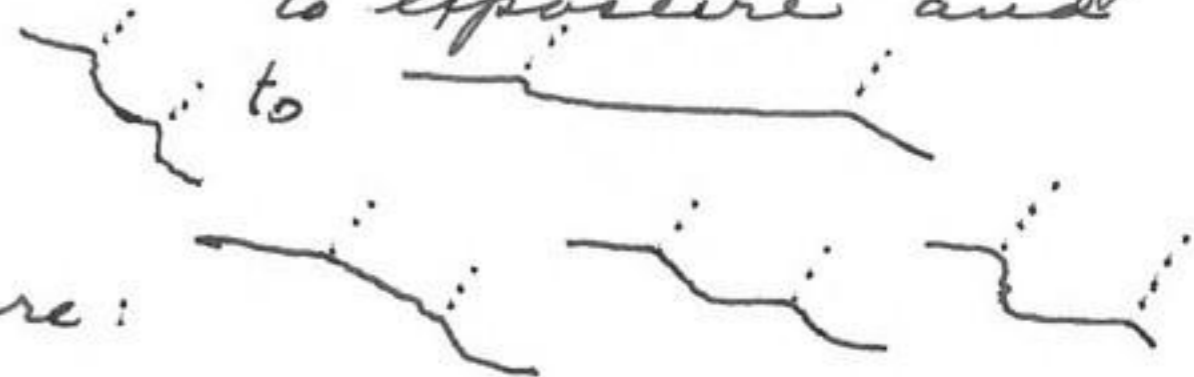
April, 3, 1966

Made complete census of upper slope of S side Rock Creek from 1300 ft ^E of the middle of ^{edge of} section 25, R18E, T13S to in Douglas Co., to 2,700 ft E of the SW corner of sec 27, R18E, T13S. Followed precisely the upper bench or erosional level which is the first level below the top or plateau. The



first bench maintains its identity the entire course by the crests and is typically as indicated in profile but varies according to exposure and

previous history and ranges from according to width and degree of erosion. Some other examples are:




This level or bench was selected

because the water level of Clinton Reservoir will not affect it and because the route can be duplicated at any other time for relative comparison before and after the construction of the large body of water. This route was also selected for most unaffected portion of sidehill and least disturbed by man. This bench would make the most ideal level for trail development. By proper placement of trail, one can be the most inconspicuous part of the animal-plant community (nearer inner part of bench) or the most conspicuous element of the hillside community (edge of bench where one can see both up & down the full breadth of exposure). Started census

in car at S end of proposed dam at mileage 96.9, 8:47 A.M.

day overcast and irregular clouds, some blue showing, cold wind from N, temp 48°F (expected to freeze tonight). 97.2

meadowlark; 97.6 meadowlark; 98.2 Rock Creek bridge >

profile of river  wet + water marks. Wet part about

1 foot above water; 99.1 3 female redwing blackbirds; 99.4

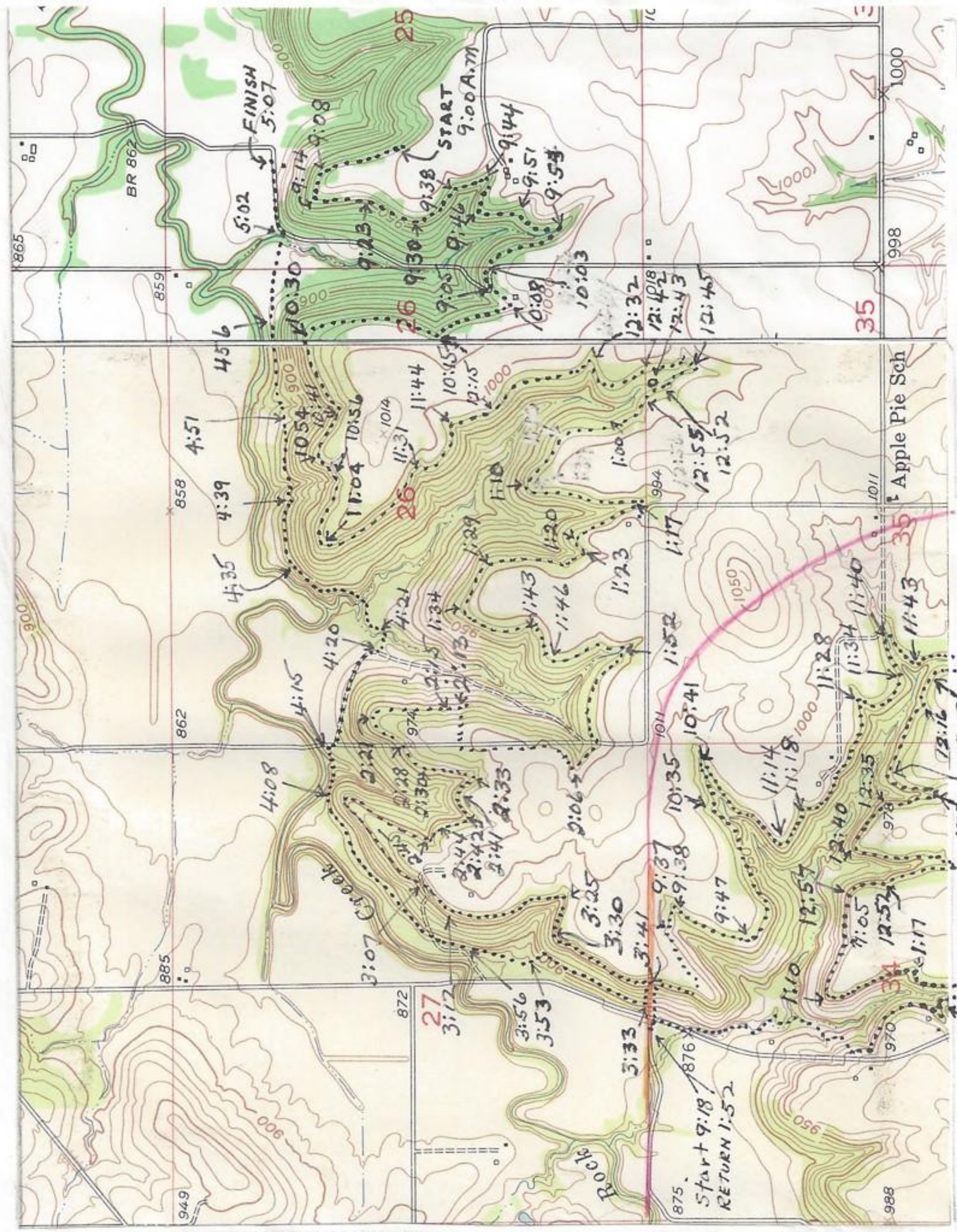
to 5 at Collins, ♂ ♀ cardinal, Eng Sparrow; sun now shining

through clouds producing corpuscular rays, the sky is gradually breaking up since early morning overcast; 00.0

meadowlark; 0.4 bridge over Rock Creek, 5 ♂ redwing black-

birds, one red-bellied woodpecker; 0.7 base of hill and will

park car here and walk up road (road not shown on map but



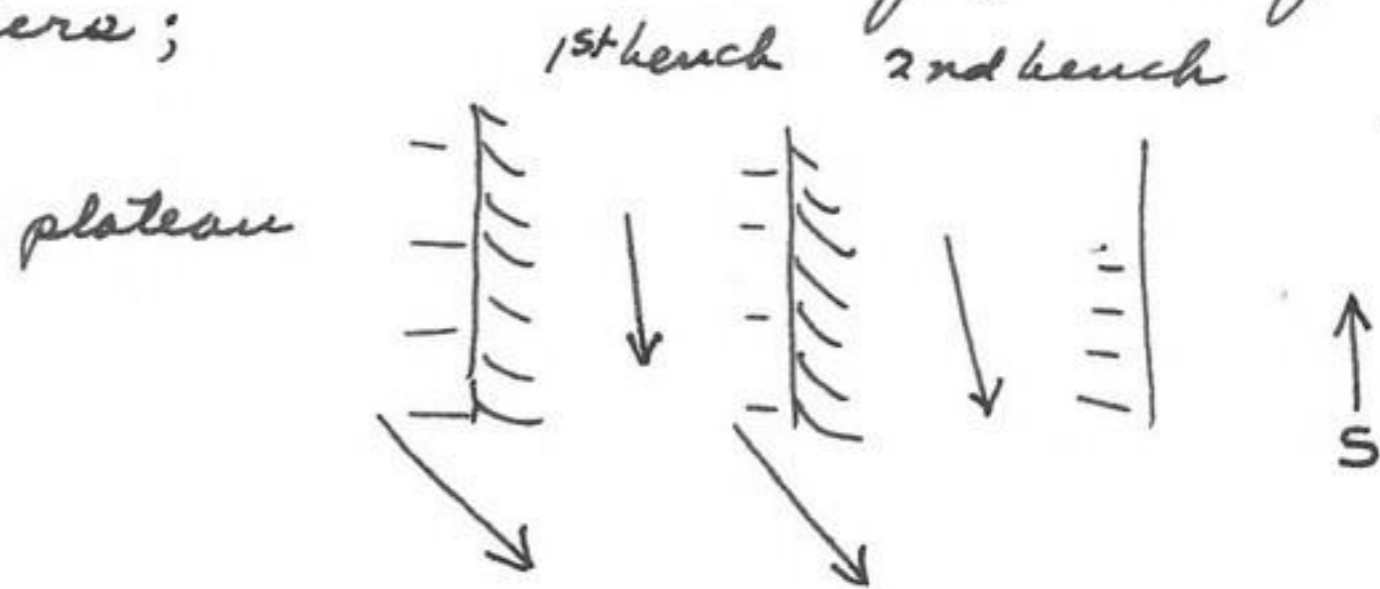
Itinerary April 3, 1966 (7²/₁₀ miles benchland. 2¹/₂ miles return or 9³/₁₀ total)
 and
 Itinerary April 8, 1966
 .1 mi to bench from car
 4.4 mi bench route
 .5 return from bench to car or 5 miles total

SCALE 1/10 MI



Continues S up slope). Starting on upper bench at 9:00 A.M. Field sparrow calling in top of tree, red-bellied woodpecker; 3 blue jays; 4 juncos; first tree blown over ^{pointing} to NE by tornado, many leaves on this east exposure on ground. 9:05 4 Harris sparrows, not singing, 2 cardinals, ^{3 fox squirrel nests} piece of roofing tin placed here by tornado, this must be about the eastern edge of tornado of April 12, 1964 (see notes of that date); 9:06 roofing metal wrapped around upper branches of tree on edge of plateau; field sparrow calling, 2 cardinals, large tree over and facing NNW; there are relatively few trees blown over on this bench; 9:08 2 cardinals singing, and at point. The bench to W now loses flatness and at about a 30° angle and considerably more brushy with *Ribes missouriense* dominant understory. Crow flew E; 9:10 beginning of downed tree from tornado, most of them NN E in general trend of tornado, trees below bench pointing NNW to W; 9:11 large holes used by animal the size of Koyote, badger, marmot and are currently being used, cliffs from 3 to 5 feet tall, benchland still narrow & steep; 9:14 point, will call Separation Ledge because of the block of rock separating from the main intact ledge, downed trees just W and below point pointing NN E to NE and probably influenced by point proper, bluebird singing, the ledge at point is 48 inches high, a symmetrical tree ∇ approx. 50 feet below ledge on outer brink of bench, 2 blackcapped chickadees, now leaving point to S; 9:16 beginning of long stretch of downed trees, making navigation difficult, starting at point where tree on second bench is covered with a flat platelike fungus, many tracks and animal activity, probably rabbits, 2 red-headed woodpeckers;

tree on edge of plateau uproot and facing NW, trees on first bench uprooted and facing N or NNW, tree on brink of first ~~to~~ bench uprooted and facing or pointing NW to NNW, trees on second bench pointing mainly NNW and mainly broken rather than uprooted, indicating that the soils are shallow on edge of plateau, on 1st bench and of brink and upper slope of 2nd bench. These shallow soils may control kinds of and sizes of trees on the slope of the



Rock Creek valley. The edge of the plateau shows the most serious effect of wind because of the increased velocity gained across the open fields of the plateau. The most tangled mass of trees is on the first bench. One wonders about the direction of force producing downed timber on the second bench which is relatively protected by the higher ridge and other climax trees. There must be a general direction of wind following the direction of the tornado and cross winds according to whether the circular movement is active at the front or rear of the tornado.



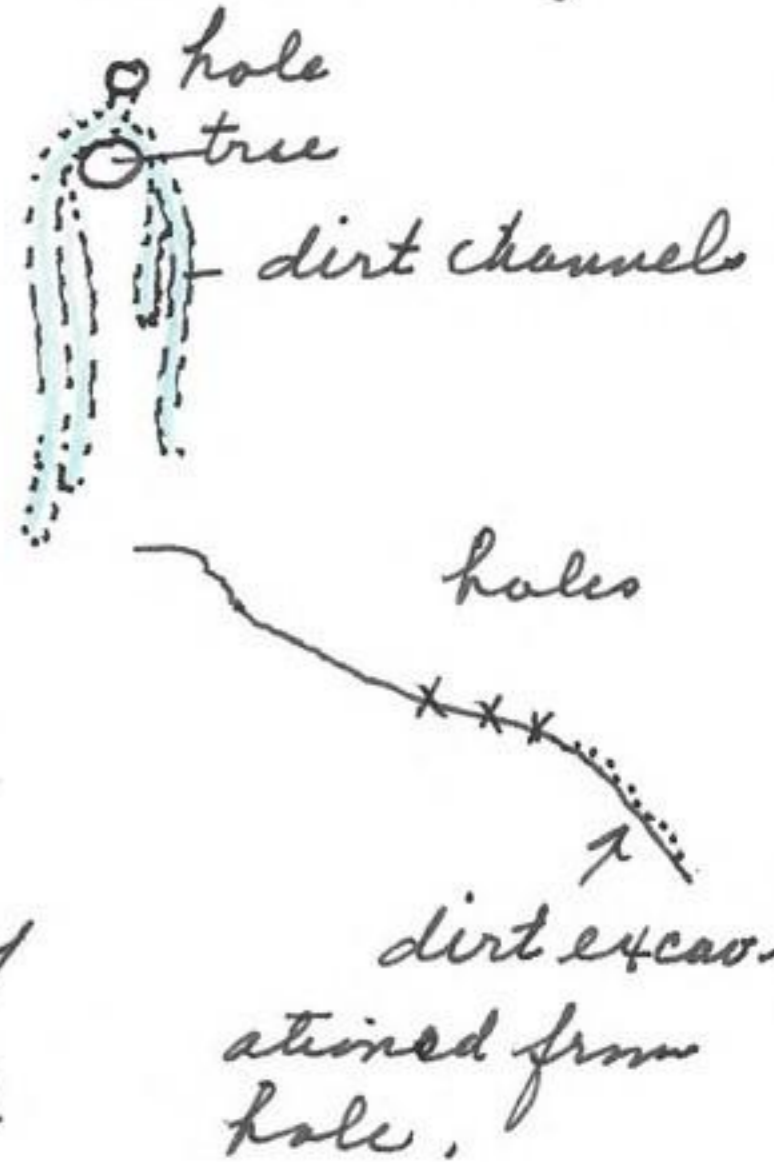
The eye of the tornado would be a partial vacuum and the movement would at first be upward and forward or sideward according to the site of rotation of the vortex. Most debris from buildings seem to follow general direction of the tornado, however the farm where car was parked was blown mainly to the W; many small mammal trails under downed timber, 3 blue jays, as one moves S there is more downed timber on second bench; 9:20 recently cut elm, 105 years old, the blue jays are moving about the drainage system below; 2 red headed woodpeckers, first bench broad & gently sloping; 9:23 minor drainage, bench angles slightly, bluebird singing, blue jays calling continuously on bluelands below, 8 robins, downed trees in same direction tending NNW; 9:25 fox squirrel tree nest, red-bellied woodpecker; 9:25 horizontal tree with beautiful fungus, 2 fox squirrel tree nests, soils dry, black with leaves; 9:28 rock fence, 2 red-headed woodpeckers, 1 red bellied woodpecker; splintered tree from tornado on second bench 30 feet from rock bench, 3 juncoas, some boards and metal roofing, most trees NNW, titmouse, 9:29 3 juncoas and took like females of slate-colored, titmouse calling, 2 chickadees; 3 red-headed woodpeckers at point at 9:30, several very old trees on ground and pointing same direction as recently blown trees, the reaction of trees being uprooted has a profound effect upon the surface of the ground and the associated plant-animal community, especially in exposing broad expanses of new soil and rocks at different exposures and slopes; from this point can see trees down to as far as middle of valley to W and a few beyond, all pointing mainly NNW. to N, as the bench trends more to SW, the trees now point nearer N and instead of being blown down slope are falling onto first

bench from the lower ledge. or ^{before point}
 bank of first bench; 9:32 2 ^{now}
 tree nests of fox squirrels, 2 cardinals, 2 fox sparrows, 2
 song sparrows, 1 fox squirrel (fox squirrel as such refers to
Sciurus niger); 9:34 starting into benchland that at one time
 had been burned and most understory gone and ^{orange to well dia.} trees, smaller
 and successional, old timber on ground less, ♀ cardinal ^{shagbark hickory}
 carry material for nest, ♂ cardinal 30 feet away, the female
 flew into vine mass surrounding a large tree, no leaves on
 vines or tree; flicker calling; 9:35 red headed woodpecker, 2
 fox squirrel tree nests, 2 dominant kinds of nests, the hickory
 being dominant and ^{almost completely} covering ground, fox squirrel; 9:38 minor
 lateral drainage, 4 red-headed woodpeckers, 8 robins, 12 Harris
 sparrows and in some area as yesterday, these birds are
 probably influenced by farm house beyond, this lateral
 drainage is graded to main drainage; 9:44 head of drainage, 8
 Eng sparrows and 4 starling at farm, no water in creek but
 some near very head of drainage, 9:46 point, 4 robins, fresh deer
 tracks, at this point there is relatively few downed trees
 from tornado but many to E and W of here, this point
 is a broad one, all downed timber pointing N or slightly
 E of N and following main trend of valley, red headed
 woodpecker, blue jay still calling in valley below, con-
 siderable down timber on 2nd & 3rd bench below, cardinal,
 2 chickadees, 9:48 downy, 2 chickadees, flicker left ground,
 trees downed now pointing more to NW, 3 flickers left ground to-
 gether; 9:50 under utility pole line, 2 cardinals, 1 fox squirrel,
 flicker calling, 9:51 drainage, rock fence crosses drainage E-W,
 more open beyond to S and less understory, more juncos, 8 juncos,
 2 cardinals 9:53 crossing head of main drainage, no water, metal
 roofing, bluebird singing, field sparrow, some natural dampness
 in soil just N beyond crossing, trees this side blowing more
 NE and wondering if flat plateau and drainage channeling
 may have some influence of direction of trees and if so
 would mean a positive pressure of wind; 9:55 red-bellied,
 2 chickadees. 9:56 rock fence again (same one as on east
 side), titmouse calling, more brushy understory N of fence,
 9:56 fox squirrel tree nest; 9:57 2 red-headed woodpeckers, 4
 jay, 9:58 3 fox squirrel tree nests, 2 red-headed woodpeckers
 9:58 an old N-S road & rock fence on E side, at this point a
 decidedly increase in downed trees and aligned NE and

about 90° to trees which are down on east side of valley, some trees overlap and as far as I can tell the ones pointing NE are superimposed on the trees pointing NW, fox squirrel, trees from edge of plateau mainly NE, those on first bench mainly NW, bluebird calling, 2 red-headed woodpeckers, Carolina wren, considerable amount of boards & metal roof material along here; 10:03 point, most metal roofing ^{seen so far} just W beyond point, trees pointing NE and even some near E, old box of rusty nails here, field sparrow calling to S; 9:05 road at turn, as I continue can see across gully to NW and 95% of surface of sidehill is covered with dry leaves; Ribes missouriense ^{current} out to 3/4 inches, 10:07 definitely ^{house or barn} more debris from tornado, mainly metal roofing, boards, personal house effects, old rock fence, 10:08 crossing head of drainage, water flowing ^{green}, algae & moss and damp areas, floor & walls of shed and must have been building directly to S, now going NW, cottontail, 10:10 pair door knobs; 3 fox squirrel tree nests, red-headed woodpecker, red-bellied woodpecker, considerable debris from S, most trees fallen and pointing to E or NE; crows calling down valley; 10:11 red-bellied woodpecker, sun most of time but occasionally shaded by cloud and then cool; titmouse & 2 chickadees calling; 10:13 ² blue jay; 10:14 at large old tree where old battery is placed; 10:15 minor drainage 2 fox squirrels, 3 of their tree nests, goldfinch calling, titmouse calling, 3 red-headed woodpeckers, 1 yellow shafted flicker, some standing water in drainage, white breasted nuthatch, approx 70' beyond drainage is a spring at brink of ^{1st} bench with water seeping down for 4 feet or so, by double tree; some red-head just out, hairy woodpecker flew by, 10:16 ² red-headed woodpecker, cowbird singing in tree above red-heads, 2 blue jays; 10:18 rock fence and beginning of large group of downed trees all falling in same direction as fence which is probably E-W, trees mainly on edge of plateau on upper edge of 1st bench and on brink or lower edge of first bench and are 90° to direction of trees on second bench and those across canyon, at this point almost all trees down and must have been a concentrated tornado impact, metal roofing still in a line NNE from building at head of drainage previously crossed, a ^{large} ^{sporation} den on slope of 2nd bench, used trails leading off both sides, fox squirrel 20' beyond; 10:20 two turkey vulture directly overhead, ^{downed} trees difficult to navigate thru, many old downed trees in same direction as tornado trees,

9:22 fewer downed trees from tornado, red-bellied woodpecker, understory of small trees generally bare of leaves, some with leaves just showing green but for all tense and purpose foliage is lacking and trees look like winter condition; 10:23 crossing old road bed going down slope, 2 red-headed woodpeckers; 10:23 2 fox squirrel tree nests; 3 turkey now overhead and the same individuals as noted earlier plus the 3rd one, now a fourth one has joined the third one; 2 fox squirrel nests; 10:25 a rock fence from plateau but stops at upper edge of first bench; 2 red-headed woodpeckers; 10:27 2 minor and shallow drainages and probably relatively new, bench hardly turns to react to these drainages, 2 chickadees, red-headed feather on ground, have seen several fox squirrel nests on 2nd benchland but have ~~not~~ been counting ~~there~~ only those on first bench, this count is not too significant as it is difficult to pay so much attention to searching for these nests and survey other things at the same time so number may only be approximation; 10:28 2 red-heads; 10:30 point, 2 red-headed woodpeckers, a large elm measured 71 1/2 inches chest high, bare at base from small mammal activity, on burned tree at point about 15' west, at 50 feet NNW of elm tree is the den of the pilot black snake. It was 2 feet from den and sunning on dry leaves. Yesterday it was measured and removed 30 feet from den (tail 250 mm). Leaving point 10:35, as with most N exposed ^{main} valley slopes, the first bench is narrow and slopes approx. 30 degrees; 10:38 red-headed woodpecker, well developed small animal trails, one large tree in which a bushel or two of decayed red wood has been excavated from base of north side of tree and ^{redwood} extends 10 feet down slope, 30'-40' feet beyond is a set of holes (9) in an area of 20' in diameter, one hole had been excavated by a badger? with ⁴ dirt trails leading down slope for 15 feet in channels where the excavator had progressively moved dirt down slope from hole. 2 other of the 9 holes had been excavated but not as extensive. marmot skull from these diggings (see measurements of yesterday's notes)

10:41 drainage, 2 red-headed woodpeckers, titmouse calling; 10:42 to 10:51 changed reels of recorder. 10:52 two titmouse calling, one above and one below; 10:54 point, the last rock ledge poorly developed

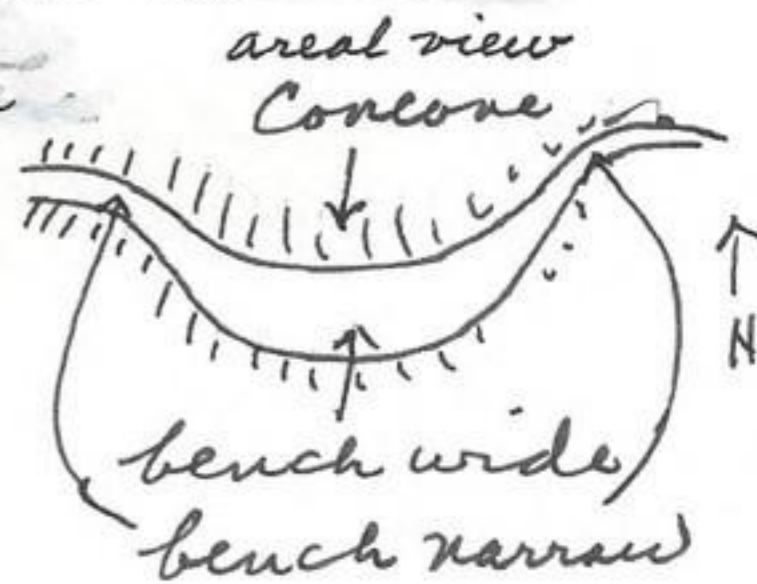


drainage systems on the north exposure is broad and with concave curvature as if produced by a meandering river channel of the Rock Creek drainage when at that height.

most drainages have angular outlines.

at this point will discontinue census of fox tree squirrel nests

as I believe I am missing some because of attention being diverted elsewhere; 10:55 major point of double point and now to SE; 10:56 minor drainage, now going SW; titmouse calling, 2 chickadees; 10:57 2 red headed woodpeckers; 10:58 ^{small} blue butterfly but uncommon; 10:59 old road bed now more ^{small} nearly NW, this road bed may have been a shallow drainage as bench angles slightly, this drainage system is like previous one and is broad and gently curving, upper or first bench narrow & almost disappears to NW. 11:00 cliffs developing like a rock wall, more Ribes; 11:03 point and well developed cliffs and displaced slabs of limestone, this is a broad point, well developed cliff all along with slab formation; 11:04 main point and now to SE, 2 fox squirrel nests here; 2 red headed woodpeckers; from point can see large sycamores on Rock Creek below to N, some elm trees with greenish color but 98 percent of country without leaves, 2 titmouse calling below, 2 chickadees. This point will be known as angle point because of 90° angle of ledges, one stump at very point, also two bases of trees that look like elephant feet; 11:11 now leaving point, wire fence about 100 to SE from point; 11:12 extensive digging by large mammal on slope beyond first bench, there is considerable digging on this slope all along between 1st & 2nd benches, trees averaging 6 inches in thickness along 1st bench, titmouse calling below, 11:16 2 red-headed woodpeckers, one titmouse calling, the ^{mainly} titmice have been calling above and below the 1st bench; 11:17 rock plates measuring 240 mm across, on hickory tree is growing up thru cliffs and is adjusting to fissure, these cliffs would make an excellent place to make small animal study to be compared with other cliffs in different exposures, some very old and ^{some} dead anchored in cliffs, these cliffs form a gulle are and are best ones seen so far, extensive ^{wire} well developed, bench some profile all the way; 11:23 fence, 2 chickadees; 11:24 large elm



areal view

tree, 104 inches in circumference two feet above ground, this tree is growing on top of ledge and so anchored, another old tree similarly anchored about 90 feet beyond has unusual character for photographing, it is dead, *Neotoma*^{nest} in the unusually large base of this tree; 11:27 cliff take a slight angle to right, 2 chickadees, 2 bluebirds, cardinal singing below; 11:30 2 red-headed woodpeckers, cliffs dropping off in height; 11:31 minor drainage, wire fence crosses, a stone marker (natural, on right side looking down, have noticed considerable large mammal activity (sidehill excavations) below first bench on slope between this bench and second bench, this slope is generally steep, rocky and exposed soils, 2 titmouse calling; great horned owl left base of cliffs; 11:33 2 cardinals, downy, redbellied woodpecker, 2 blue jays, 2 exceptionally large elms on cliffs, titmouse calling; 11:35 more under-story trees, cliff holding up in bold relief; 11:38 great horned owl noted at 11:31 left cliff area again and flew E across plateau, 7 jays, 4 titmouse, 2 chickadees surrounded owl before it left; 11:42 2 red headed woodpeckers; 11:43 2 titmouse; 2 chickadees; 11:44 crossing drainage, osage orange tree 40 inches in circumference in middle of drainage, *Neotoma* active; 40 feet beyond to SW damp area and water leaving spring (recorder tape jumped track and stopped to fit, left again at 12:09; 2 cardinals, 2 chickadees, 2 titmouse; 12:10 very old wagon road, 1 tree 3 inches in diameter in road; 12:12 osage orange tree 80 inches in circumference at 3 feet high, smaller one 20' down slope, considerable eating of old osage orange fruit; 12:14 old fireplace (circular) of rocks, osage orange tree dominating, most large ones; 12:15 cliffs make slight bend to E, more osage than I have seen beyond S end of proposed Clinton dam; 12:15 osage orange tree 85 inches circumference at 1 foot above base, gets larger up trunk and supports grass in crotch of 5 limbs or minor trunks that diverge about 4 feet high; cottontail, osage on bench overaging 1 per every 30-40 feet in all directions, considerable eating of osage orange fruit by *Neotoma* and rabbits?; 12:19 old road bed, trees definitely osage and evenly spaced, spring and greenish moss for 50 feet across bench just beyond old wagon road, rock fence about 150 further to the S, piece of metal roof as if placed by tornado, large osage 40 down grade to W;

this benchland would be an interesting place to study
 neotoma populations, some trees tipped over on upper ledge
 by tornado, 2nd bench partly cleared, Titmouse calling,
 2 chickadees, chickadee calling; 12:27 white-tailed deer
 in bottom of drainage to right in partially cleared area; it
 worked up drainage out of sight, tail like a flag but at
 other times low in totally inconspicuous, difference between
 sunlight and area shaded by cloud is outstandingly
 different as far as ability to see deer, chickadee reacting,
 can hear 4 titmice calling in canyon below; 12:30
 tornado damage becoming evident, trees blown to W, one
 osage orange tree down and pointing to E; 12:31 cottontail,
 considerable down timber here and many osage orange
 uprooted, another cottontail 12:32 crossing drainage, wet
 some pools, crossing at rock fence, raccoon tracks in
 damp mud, most downed trees are NNW some are
 down to E, 2 bluejays, 2 titmice, red-bellied woodpecker,
 1 red-headed woodpecker and fewer in this drainage than
 in other drainages; 12:35 fence & grassland beyond, consider-
 able tornado damage, this is a point, one large tree pointing
 NE, no metal roofing present, area more open and parklike
 with grass, several pieces of roofing thruout valley; 12:42
 rock fence crosses drainage, cottontail; 12:43 at pond,
 crow, 3 bluejays, pond directly in path of tornado,
 dandelions around dam of pond, 2 chickadees, trees
 dominant & many have blown over rather than other
 kinds of trees which is surprising, running water in
 creek above pond, 3 juncos, 2 chickadees, 5 crows calling
 at head of drainage, most water in creek seen so far, osage
 orange consistently blown over, 2 chickadees, 2 red-bellied
 woodpeckers, 12:45 forks of drainage, more from right, crossing
 over and going down drainage; 12:46 2 tree sparrows at
 edge of water along creek, they flew into side of brush pile
 where they remained on upper branches until approached. This
 is unusual because the tree sparrow has left weeks ago. Cottontail
 left brush pile, song sparrow associated; tornado severe
 with great numbers of osage orange down; 12:52 minor drainage
 W of pond, some metal roof material, tree vary in direction in
 which they fall; 12:55 chickadee, 2 cardinals; back to fence
 but on W side at 12:55; a short distance approx 200 feet beyond main
 erosion caused channel 10' deep exposing cliffs in middle of valley;


valley all in short grazed grass and open parkland with few trees;
 12:58 Eng sparrow calling, 3 red-head woodpeckers, 2 cardinals,
 3 blue jays, the first benchland here is broad and gently
 sloping; 1:00 14 Harris sparrows, 2 cardinals & 4 juncos, the
 juncos seem to be more ♀ slate colored than normal flock
 constitution, minor drainage, red bellied woodpecker, 2 blue jays
 1:01 male & ♀ bluebird, 2 chickadees, titmouse, 2 downy
 woodpeckers in contact activity at base of tree, ♀ bluebird left
 hole in tree; 1:02 chickadee calling, more pomper trees in
 area than in other part of drainage, one approx. 35' high, 1
 red-headed woodpecker; 1:03 2 cardinals, blue jay, 2 goldfinches,
 5 Harris sparrows, 1:05 real old flattened rock fence, one large
 elm about 40 feet before fence; 1:06 titmouse, 2 red-headed
 woodpeckers, 2 juncos, bench still broad and gently
 sloping, trees placed far apart and parkland with short grass;
 bench long & straight and uniform in construction; 1:07
 titmouse calling, leaves 90 per ^{cent} coverage; 1:08 7 bedding
 sites on this bench where deer had flattened out leaves,
 this area like that used by mule deer and considerably
 more open (Complete overhead canopy) than what white tail
 deer prefer; 1:10 point, now to ^{the} south, at exact point soil bare,
 black and free of vegetation or leaves, many nuts of the hickory,
 red headed woodpecker and blue jay here; point could be called
 Bare Point; 1:12 2 red-headed woodpeckers, many osage orange and
 evenly spaced, chickadee, 2 goldfinches feeding on leaves or buds
 of elm (all goldfinches seen today are common american goldfinches)
 Titmouse calling, lichen mainly green with leaves about 1/2 inch
 to 3/4 inches, 1 red headed woodpecker; 1:14 2 field sparrows
 singing on plateau; large elm on crest of plateau; 1:16 red headed
 woodpecker, 1 yellow-shofter pecker; 1:17 crossing just as ledge
 makes turn more to E, farm house at head of draw on plateau,
 2 juncos, chickadee, red-headed woodpecker (bench continued
 200 feet beyond but this area is influenced by farm yard); no
 water except some standing pools, soil damp; 1:18 first lizard
 (Eumeces?); 1:20 point and old road, stumps of elm have distarted
 growth 5 or 6 inches high; titmouse calling, gopher activity, 2
 blue jays; 1:22 second lizard; 1:23 crossing drainage, song
 sparrow, water in pools and green moss, dry beyond, 2 red headed
 woodpecker, several small hrossonal gullies beyond, 2 juncos; 1:24
 18 Harris sparrows, red-bellied, blue jay, titmouse calling the
 3-5 single note call, bench open, grass, current patches, some trees;

red-bellied woodpecker, bluebird; 1:26³ red-headed woodpecker;
 1:27 3rd lizard, 2 cardinals; 1:29 head, flicker calling, bench
 same character all along; 1:30 2 red-headed woodpeckers, 4th
 lizard; 1:30 end of grass and open bench and crossing fence
 into normal deciduous forest, 2 cardinals; 1:32 fence and out
 of deciduous forests (just a small tract) into open field of weeds &
 grass clear of trees except some on plateau and a few on first
 bench, 2 cardinals, beautiful sycamores in bottom drainage to
 NE; 1:33 2 cardinals; 1:34 point, all area to N & W has been
 heavily overgrazed & eroded at one time but now in grass & weeds,
 only jumped in area about 40' to right of point; 1:36 leaving
 point; 1:38 2 red-headed woodpeckers; 1:39 fence line, wire, and
 deciduous forests beyond, 2 field sparrows at edge, downy wood-
 pecker, blue jay; trees up to 8 inches thick on this bench,
 steep slope beyond brink of first bench and considerable
 digging by large mammals; 1:43 minor drainage, considerable
 Rhus beyond, no water, deer tracks, 2 red-headed woodpeckers,
 Cottontail, tracks common in dry soil; 1:46 point, considerable
 small tree understory, very brushy; 1:49, mourning dove left
 from among dense understory; 1:50 cardinal singing; 1:52 head
 of drainage where 2 drainages converge, no water but rocks
 covered with green moss (normal crossover would be about 100'
 up drainage), cardinal; 1:58 2 chickadees; 2:00 road, new
 buildings below; 2:04 red-tail alighted in tree above a burning
 log at edge of recently burned field, complete system of
Microtus ochrogaster trails in field exposed after burning,
 most of them leading to isolated mounds of dirt with 2-4 holes,
 2:06 head drainage, large large orange orange at head of
 drainage, chickadee, 2 cardinals, 2 bluebirds, 3 ♀ slate-
 colored juncos; 2:08 out of burned field, trailer houses
 directly below, sparrow hawk flew by; continued down
 fence row W of road to end of field, then E to first
 bench arriving 2:13, this is the fence line that restricts old cleared
 area on S side, red-headed woodpecker, downy, 5 juncos;
 2:14 old wagon wheels, red-bellied woodpecker, field sparrow; 2:15
 house directly below & to the east, 2 chickadees, 1 red-bellied
 woodpecker, all slopes in grass & benchland open with only a
 few trees; 2:17 2 field sparrows, old road grade, eastern shrike;
 2:18 fence line, native deciduous forests beyond, 2 lizards;
 2:20 red-headed woodpecker; 2:21 point, bench broad here;
 first bench almost free of lices, slope between first & second bench

in thick lices, 2nd bench relatively free of lices which is not the usual arrangement which is current of first bench, less on slope &, as usual for fewer on second bench; 2:28 road, beyond road the area is again grazed and partly cleared, tit-mouse calling; 2:30 point, an osage tree in middle of point and about a foot and a half in diameter; bench broad and cliffs poorly developed, slope have at one time been cleared and now replaced by osage orange & grass and hickory and others; 2:33 crossing double drainage, stopped to change reels leaving at 2:38; 2:39 hairy woodpecker; 2:40 red-bellied woodpecker; 2:41 point, red-bellied woodpecker, 2 red-headed woodpeckers, good patch of green ground moss 100 feet beyond point; 2:42 head of drainage, standing water in creek but intermittent, soil damp; 2 goldfinches flew by, red-bellied woodpecker, bench and general area partly open, grass; 2:44 point, 2 bluejays; 2:45 drainage, old pretentious looking house to W, 2 juncos; 2:46 2 bluejays; 2:47 wire fence line E-W, this east exposure is warm and comfortable, N & W exposures cold & windy, soil here dry, black and ground 95 covered with leaves, second benchland with remarkably few down logs on ground; 2:49 2 red-headed woodpeckers; 2:50 end of rock ledges consisting of 5 ledge masses dispersed at the very end of ledge. The bench continues N for 310 feet, terminating gradually to a point. The ledges as superstructure and the flat bench to a gradual point looks like a battle ship and point will be so named "Battle Ship Point". From end of ledges is a nest of a red-tail or owl 100 feet to W, 3 red-heads here, 2:56 continued to point and then returned to rock terminal and leaving at 2:58. It would be interesting to study these cliffs in relation to mammals to different types of cliffs and especially according to exposure. There is considerable green mosses on north exposure rocks. 2nd bench with steep slope between brink of first bench and floor of second bench. Several *Nestoma* nests in upper cliffs and considerable mammal activity in cliffs between 1st & 2nd bench; 3:00 secondary cliff outcrops on bench or they could be masses of ledges displaced from upper ledge. Navigation is ~~impossible~~ in many places up & down. This stretch is definitely the most interesting cliff exposure; 3:02 bench and slope almost all solid rock; 3:03 large slabs almost all across bench, one large den under upper

slab; 3:04 cliffs below outer brink of 1st cliffs now larger than upper cliffs of 1st bench, considerable animal activity in rocks on slope below first bench; 3:05 one slab on bench and dipping almost 40° to E; 3:06 wire fence line, red-bellied woodpecker, 2 blue jays, cliff slabs just beyond fence have slid half way down bench; 3:07 old road, 4 goldfinches; 1 red-bellied, 3 juncos; 3:12 point, forests below the 1st bench are successional and mainly osage orange, clearings with grass, first bench most primitive and unaffected with considerable understory shrubs & Ribes, beyond point more large slabs displaced from upper cliffs onto 1st bench; cottontail, Neotoma nests generally distributed; 3:13 secondary point, red-headed woodpecker, now more to S; one large double slab just beyond, strata tilted, best cliffs now on lower edge of 1st bench; 3:15 2 red-headed woodpeckers, cliffs stabilized and not many new rock surfaces, first large butterfly (a small swallow-tail), dry leaves piled high on lee side of rocks on bench; 3:16 one slab dipping about 35° to E, downy woodpecker, cliffs are making a broad gentle curve along here; 3:17 chickadee, 3 red-headed woodpeckers; 3:17 recent collapse of cliff, one mass 1x2 yards 15 feet from source & another similar mass between, both sliding down slope below cliffs; 3:18 small deviation in cliffs, red-headed woodpecker; 3:20 titmouse calling, 2 chickadees, lizard; 3:21 lateral drainage, large $4\frac{1}{2}$ feet diameter oak at top of cliffs in drainage, 8 or 9 erratic boulders of quartz or granite have been piled to right of this tree, no water, ledge displaced on right side, 100 feet beyond another stump still in position on cliffs, Neotoma nest in cavity, 4 blue jays; 3:23 red-tail ^{calling and}, cottontail, cardinal; 3:25 crossing major drainage, 4 goldfinch, 1 red-bellied, 5 juncos, 2 cardinals, 2 titmice, an old cement reservoir now filled in with soil that supports an old osage orange 5 ^{diameter} inches at base, soil eroded away on sides & lower edge, upper edge even with floor of gully, an old erratic boulder 6 feet down creek, 2 red-headed woodpeckers here; old road leads down S side of gully, approx 200 feet down gully. from crossover is a nest of a redtail, one bird left ^{without calling} nest, upper bench almost disappears near nest, nest when viewed from plateau is some level as top of plateau on other side of Waparusa valley; estimate the height ^{of the nest} as 38 feet; 3:30 point, an elm tree hold up a ledge about 40 feet east of point, at point 2 red-headed woodpeckers; 3:31

large slab shaped like end (point of) of arrow head; bench
 beyond fairly straight; 3:35 very brushy here; 3:37 wire fence
 line; 3:38 slight bend, some plants (rosette head) just beginning
 to push up thru soil, some 4-5 inches high; 3:41 fence line of
 gravel pit. Will follow down fence line about half way
 and then back along slope to mouth of redtail drainage. Most
 of day with sun and cold wind on certain exposure and when
 out of wind the area warm; 3:33 now half way down slope
 and starting n, robin, red-bellied woodpecker; 3:35 white
 breasted nuthatch; 3:35 red-bellied woodpecker; 3:39 chickadee,
 3:47 fence line, less shrubs beyond, fence makes angle here;
 3:48 red-headed woodpecker; 3:50 red-headed woodpecker,
 redtail circling and screaming to right; 3:52 red-headed
 woodpecker; 3:53 now on valley floor (Rock Creek) at mouth
 of the redtail canyon, will follow on this level as near
 to Rock Creek as practical; 3 blue jays calling, 2 titmice,
 2 juncos, passing old cement bridge, in summertime
 this area is alive with birds, relatively few now; 3:56
 opposite main bridge over Rock Creek, gray squirrel
 ran 100 down slope to tree at edge of Rock Creek; 3:58 drainage
 and old harrow, fence just beyond, 3 juncos, 3 cardinals,
 2 chickadees; 4:00 downy woodpecker, insects not out except
 few gnats; 4:01 red-headed woodpecker, occasional male ridge,
 white petaled flower, valley floor much greener than hillside;
 4:03 great horned owl left tree and flew $\frac{1}{10}$ mile before stopp-
 ing, male ridges about 1 per 150 ft; 4:05 hairy woodpecker
 and large mammal digging, red-bellied woodpecker,
 white-breasted nuthatch; 4:07 turkey vulture, red-headed
 woodpecker displaced downy woodpecker on tree, some
 white flowering tree just in blossom, blue jay calling; 2
 chickadees, Consocias on valley floor up to base of hill
 and then a interval of 5-10 feet before climax hillside forest;
 4:08 point, cardinal, now on bank of river, slope erosional
 from river, downy woodpecker, slope 60-70 feet; 4:10 cottontail
 one very old reddish tree; 4:12 end of ridge and crossing
 meandering drainage, damp & some standing water, chickadee,
 4:15 bridge over Rock Creek, sun last hour on and off; 4:18
 can see large sycamore (double) which stands up 20-30 feet,
 higher than other trees in drainage, 5-10 per cent of trees to E in
 canyon have beginning of green color and these mainly yellow;
 4:20 turning off road and now to E., starts bill flower out, com-

considerably more new ground vegetation on valley floor than
 on benches of hillside; 4:21 crossing main drainage, red headed
 woodpecker, water flowing in creek, green algae & moss; elm
 tree 121 inches circumference just 30' beyond crossing; 5 minutes
 stop here; leaving 4:26, good erosional benchland, floor of
 valley green; 4:28 main drainage with pools of water and
 running water between pools, considerable algae, fox squirrel,
 downy woodpecker called, creek cut into hillside, ^{30-46 feet high} and exposed
 yellow dirt and shale formation, titmouse calling, from
 top of cut bank can see beautiful green of river valley directly
 below on other side of bank and on east slope the ^{light} brown of
 dead leaves beneath the trees, it make quite a contrast, the
 dominant sycamore of this drainage (actually 3 together) is in
 the bend of this eroded sidehill  and would
 make a beautiful sycamores → photograph
 with a wide angle lens if taken from
 top of erosional cliff; 4:32 convergence of this drainage
 with Rock Creek directly below, crow calling, red-bellied
 woodpecker, wind blowing dry oak leaves on tree; now
 on high bench trail above river, red-bellied woodpecker;
 4:34 building across river; 4:35 red-headed woodpecker,
 trails leave river as river turns N. for a short distance,
 chickadee, old rabbit fur in trail, red-bellied woodpecker,
 2 chickadees; 4:39 drainage; 4:41 larger drainage, animal
 trails on both side of drainage slope near top; both these
 drainage creeks are dry; 4:43 downed elm across trail, cut;
 sycamore along Rock Creek as white as I have seen; 4:44
 juniper tree 71 inches circumference at 3 feet high; basement
 of old house 40 feet to W, elm tree 33 1/2 inches in circumference
 growing in bottom of partly filled cellar or basement, this
 could easily be bypassed without seeing the structure; trails
 down sidehill to river about 1 every 300 feet; males
 1 per 110 miles; 4:48 2 cardinals; 4:51 first of 2 crossings, 2
 red-headed woodpeckers, 2 chickadees, 2 red-bellied wood-
 peckers, 4 juncos, 1 downy, well developed trail on E side
 of drainage; 4:50 second drainage, broad, 2 downy woodpeckers,
 white breasted nuthatch; 4:52 diagonal road up slope (old),
 large juniper trees here up slope from road; 4:52 a well developed
 trail down slope, Rock Creek directly below, 4 goldfinches
 passing over; 4:54 downed sycamore in creek and a tree
 30 feet down stream with large cavity that could be used by owl -

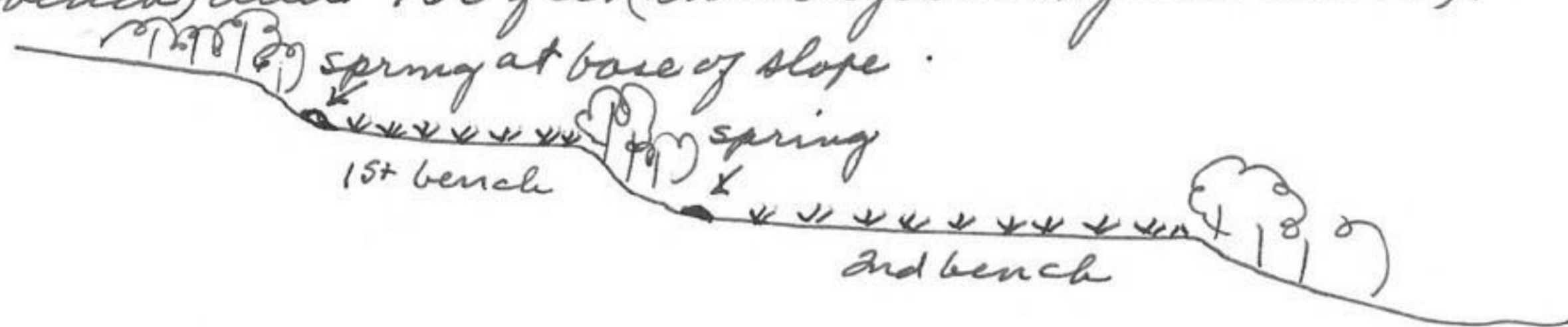
tires, 2 woodducks. ♂ + ♀ got up from below and flew up creek; the leaf scales or buds have back up 10 feet above sycamore that is downed, first 8 feet brown, then 1 foot green and then 1 foot green calyxes; 4:56 edge of open field, 2 chickadees, well developed trails a few feet before field, meiotic trails in field, especially where higher weeds offer overhead protection, 2 mourning doves flew down canyon, 4:57 song sparrow and only bird noted across field; 5:00 drainage, 2 chickadees, clear water with algae; 5:02 road, 2 chickadees, 2 cardinals, 4 juncos; 5:05 water along right side of road and must be spring, 2 juncos, 2 chickadees, three starlings chasing each other almost straight up into air and then returned; 5:07 arrived at car. Left at 5:10 at 0.7 mileage. 1.2 chickadee; 1.4 meadowlark; 1.8 meadowlark; 2.4 meadowlark; 3.9 sparrow hawk; 4.0 sparrow hawk; 4.3 sparrow hawk; 4.6 S end proposed Clinton Reservoir dam. and end of complete census. at Washington Creek bridge 2 woodducks flew down creek. Temp 54° F.

Rock Creek, Clinton area, Douglas Co., Kansas

April 8, 1966 (see map of April 3, 1966)

Continued census of mammals and birds on upper bench of S side of Rock Creek Valley starting at 2700 ft E of SW corner 27, R18 E, T13S to 2000 ft E and 2500 ft S of NW corner sec 34, R18 E and T13S. Started complete census by car from S end of proposed Clinton Reservoir dam at 5.3 mileage and 9:05 A.M., Temp 48° F, low black bottom clouds, blue sky between closely arranged clouds, strong cold wind from N.W. just before dam noted an eastern phoebe ^{fly} over service bridge over canal, also 2 male redwing blackbirds and 2 meadowlarks. at mileage 5.9 meadowlark; 6.8 Rock Creek bridge, ♀ ♀ redwing blackbirds; 7.4 2 horned larks, 1 meadowlark; 7.7 meadowlark; 8 ♂, 2 ♀ redwing blackbirds; 8.6 2 meadowlarks; 8.9 mourning dove; 9.4 Clinton at store or center of town; 9.8 meadowlark; 9.9 meadowlark; 0.5 robin; 0.6 2 cardinals; 1.5 Rock Creek bridge; 1.6 bluebird ♂; 1.7 road kill opossum; 1.9 parked car, ^{at 9:17 AM} on road to right. Left 9:18 and climbed side of valley to first bench down from plateau; 9:19 titmouse calling. 9:24 first bench & starting bench census, continued 5; 9:25 2 chickadees; 9:28 rock quarry road and end of first bench, now across barren

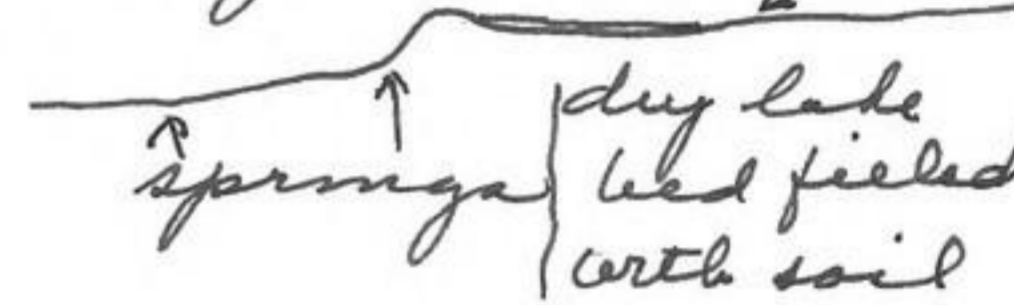
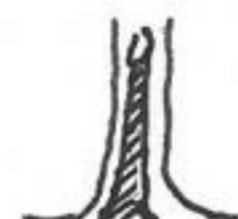
surface of quarry to NE; 9:37 crossing ^{lateral} main drainage, 2 chickadees, downy woodpecker, 4 juncos, 1 song sparrow; 9:38 main drainage, titmouse, field sparrow; 9:42 2 chickadees, one carrying a feather, benchland (1st) broad and gently sloping, cardinal, would estimate the bench as 150' wide, trees mainly small + elm; 9:47 point and spring area with 3 separate spring sources with dam grassland + sedges below springs covering an area of 120' (width of bench) and 160 feet (in length along the bench).



Another spring below first bench and not from flow water from first bench. Area of dam grassland on second bench approx. 200' (width of bench) and 400' (along length of bench). These springs are at the very point or promontory of bench. Birds in this area are 2 Cardinals, 1 song sparrow, 3 blue jays, 6 juncos and 3 red-headed woodpeckers. From this same point low hear 5 field sparrows ^{and 4 Cardinals} singing in various directions. An elm tree leans over one of the springs on the first bench. Grasslands support many microtine trails, some raccoon tracks in mud, spring flowing water. Leaving spring area at 10:17, white flowered tree in blossom; 10:18 blue jay, elm tree measured 120 inches circumference 2 feet above ground, this tree was a double base, red-headed woodpecker in this tree, chickadee, another large elm down approx 100 feet beyond down slope bench, apparently area cleared at one time except larger trees; 10:22 field sparrow, cardinal, plate-like bark is oak, many large elm have been cut for main trunk of tree; 10:24 rock fence, 2 chickadees; 10:26 2 chickadees, mourning dove calling, field sparrow calling, sparrow-bush just coming out with yellow buds or inflorescence; 10:27 2 red-bellied woodpecker, titmouse, 3 blue jays; 10:30 downy woodpecker, 6 juncos, 10:31 lateral drainage, red-bellied woodpecker, Eng. sparrow, 2 Cardinals; 10:32 point now more to E, trail leading down along drainage from cliffs, chickadee, titmouse calling; 10:35 first of 2 headwater drainages

4 juncos, downy woodpecker, blue jay, chickadee, 10:37
 large osage orange approx. 38 inches in diameter, neotoma
 nests associated in rocks above, Carolina wren; 10:39
 song sparrow, recent cutting of osage orange and numerous
 brush piles falling in the entire upper drainage, water
 pools in creek, noted 5 goldfinches, 2 cardinals, Carolina
 wren, downy woodpecker; 10:41 crossing over drainage,
 this creek has considerable green algae, drainage continues
 up for approx 200 to cliff interception which at this
 point is worn flat by water erosion, entire valley
 in brush piles of osage orange, among brush noted 26
 Harris sparrows, 2 cowbirds, 1 red-bellied woodpecker,
 2 chickadees, 5 blue jays, 2 lizards, 2 titmice, meadow
 lark on plateau beyond, 6 bobwhites, white + yellow
 butterflies (2 each); leaving crossover at 11:03, water
 confined to area of first bench; 11:04 18 Harris
 sparrows, 6 juncos, 2 titmice, hairy woodpecker,
 3 cardinals, chickadee, 4 goldfinches, 2 crow flew over;
 11:06 chickadee, ♂ + ♀ goldfinch feeding on ground
 under current bush (Ribes); 2 chickadees, downy,
 8 Harris sparrows, song sparrow; 11:08 2 cardinals, 4
 juncos, 2 chickadees, blue jays; 11:05 beginning of
 large piles of dirt associated with rock quarry, now
 bench more heavily wooded with osage orange, no grass,
 Ribes dominant as understory, osage from 1 1/2 to 3 feet
 in diameter, base of all trees covered with eaten fruit
 of the osage orange; 11:13 2 blue jays, Symphocarpos
 wiped in with current, now into more open area; 11:14
 active gopher and point, 2 juncos associated with this
 point above ^{and in} cliffs, abnormal growth from stumps is
 osage orange and not elm as surmized on yesterday's
 observation; 11:18 road + drainage into quarry area, one
 large osage approx 3 feet in diameter in bottom of drainage,
 2 blue jay, 3 juncos, cardinal, red-bellied woodpecker,
 field sparrow calling; 11:20 point, cardinal, Eng sparrow; 11:21
 directly below bard, 4 mourning doves; 11:23 farmer's water
 reservoir of cement, 8 Eng sparrows, cardinal, 5 Harris sparrows,
 4 juncos, now pond directly below and house directly above,
 field sparrow calling; 11:24 rock fence; 11:25 field sparrow,
 cottontail; 4 juncos, 6 Harris sparrows; 11:26 4 juncos,
 large black diptera out, 8 juncos, 4 Harris sparrows;

11:27 bluebird, red-bellied woodpecker, 2 red-headed woodpeckers,
 8 juncos, ♂ + ♀ bluebird; 11:28 shagbark hickory grove with
 ground covered with nuts, soil dry, powdery, no grass;
 11:28 crossover, no water, redheaded woodpecker, red bellied
 woodpecker, 4 robins, chickadee, damp place on south-east
 side with flowing water at bottom of dam soil; 11:30 point
 now up drainage, rock fences just beyond point, red-
 headed woodpecker, crossed rock fence where rocks
 have recently been displaced and show yellowish
 color instead of gray of rock of fence that are in place,
 2 cardinals, 11:32 2 redheaded woodpeckers, 2 cardinals,
 11:23 brood bench, 95 percent covered with leaves, under-
 story sparse, more like parkland, mainly hickory trees and
 many nuts on ground; 11:34 convergence of 2 upper
 drainages, 2 large pools at convergence each approx
 40 feet in length, ^{8 feet wide} water and algae in both drainages,
 3 redheaded woodpeckers here, fox squirrel, 2 jays,
 2 chickadees, partial rock fence starting down onto
 first bench at point for about 20 feet, red-bellied
 woodpecker; 11:37 fox squirrel, ran from N to S side of
 gully; 11:38 N side weedy & bushy and difficult to
 navigate, 2 titmouse, considerable fox squirrel
 digging among leaves, 2nd tree squirrel; 11:35 large
~~maple~~ ^{elm} down in gulch, gulch broad and may take con-
 siderable water at times, orange has fallen onto
 elm, 2 cardinals, 2 red-heads; 11:40 crossing over just
 below road, 2 chickadees, can hear Eng sparrows;
 creek dry, some pools below & with moss on rocks, now
 dry, field sparrow calling, 6 goldfinches passed by, cowbird
 calling from top of tree, 8 Harris sparrows, 2 of which are
 singing, fox squirrel; 11:44 2 chickadees, 1 titmouse;
 S side of this drainage is covered with ~~understory~~ ^{Ribes}
 whereas the N side is relatively free of understory
 except head of gulch; 11:46 8 black capped chickadees
 fussing in one area at edge of creek, checked but could
 not see source of disturbance, more pools of water in
 creek as one goes down canyon; 11:43 point, large ^{dead} ^{stumps}
 mammal digging 10 feet south of the two large ^{dead} ^{stumps}
¹⁵⁻³⁰ ¹⁰⁻¹⁵ feet high; hickory uprooted about 100 ft to S; 11:54 many
 trees blown over by tornado, mainly on ledge line ^{above}
 and below first bench, trees pointing mainly NW but
 some pointing more to north, good *Symphoricarpos* he-

re; 11:56 along erosional gully with long straight course of
 rocks paving the gully; 11:57 minor drainage to left, many
 orange trees uprooted, one tree at convergence of drainages
 approx. ³⁶~~40~~ inches in diameter, cardinal singing, 1 red-bellied;
 very severe damage at convergence of drainages; metal roof
 material present; on elm about 40 inches in diameter that
 should have gone over by force of tornado but did not, orange
 trees only 1/2 height of elm were uprooted (meaning tree
 over and roots exposed with one side still anchored to ground),
 red-bellied woodpecker; 12:00 cross over, beyond ~~is~~ ^{20'} to E at
 crossover is a wet spring area that covers an area of 20 sq ft
 and enters main creek, beyond to S at headwaters 3 springs
 with flowing clear water but heavily stained with an iron
 like mineral (yellow), ^{many frogs here, Rana pipiens & some other ones} directly above what appears to be an old
 man made dam is a pond that is filled in with soil, dry ^{Cattails}
 but supporting cattails on S side of pond, beyond several
 acres of weedy marshlike associations; 
 good meadow nest tree just beyond
 last end of dam; leaving spring
 area at 12:09; this area is an
 example of what should be done to perpetuate marsh areas
 around the future Clinton Reservoir area, stream 400' below
 crossover is covered with green moss and stream becomes
 ephemeral; 4 chickadees, 12:10 red-bellied woodpecker, 2
 chickadees; 12:11 excellent understory of *Symphoricarpos* with
 some current, some natural grasses of single & bunches of
 grasses; 12:13 back to convergence of creeks, eroded cliff on
 E side just before creek enters main stream from E; 12:14 red-
 tailed kerling and calling, Carolina Wren, considerable
 Ribes thru here; 12:16 crossing lateral drainage, 4 blue jay at
 head of drainage; 12:17 patch of young trees with leaves out
 1 1/2 inches covering first and part of second bench, giving more
 yellow to vegetation, titmouse calling, fewer birds there
 here than elsewhere; 12:20 large elm tree with natural hole
 20 feet high with white stained bark to ground; 
 this tree about 120' from rock fence and near
 drainage proper; 12:22 fence; rock fence has
 considerable character here and is an original pioneer one;
 bluebird singing, bench 100 percent covered with leaves and
 all dry, 8 juncos, 4 goldfinches, 2 red headed woodpeckers,
 12:25 point, rock fence comes up slope to point and then le-

aves again down slope beyond, most points facing \nearrow and some in other directions seem to be bare of ^{ground} vegetation and dry, dusty soil exposed; 12:27 fox squirrel ran up to ledge, \circ° cardinal; 12:28 minor point; 12:30 crossing drainage (all crossovers are on first bench), at crossover the creek has made a wide meander to W } with old hickory tree in island, this stream }
 at one time continued directly \nearrow , intermittent water and dry green moss on rocks, tree medium size and understory of current and Symphoricarpos, ground covered with leaves, trees elm, hickory & orange orange and others; 12:35 point with rock fence just ^{100'} before point, point grassy, field sparrow calling; 12:38 almost impenetrable mass of Ribes and other understory, not open and grassland like bench below; 12:39 high steep slope between first and second bench, usual large animal digging in rocks of this slope. 12:39 40 point, open and grassy, very point size of room flat, well developed animal trail down ridge leading to point, good vantage point, point rounded, trees up to 1 foot in diameter and considerable gray lichens or mosses on bark; 12:43 unusually large, spreading orange tree in middle of bench; 12:44 rock fence, native forests beyond & Symphoricarpos dominating understory, tree nests of fox squirrels orange approx 1 per 2/10 mi or less, birds uncommon; 12:48 crossing over, flowing water, considerable moss, water clear, 2 cardinals and 4 chickadees (headwater crossovers seem to support more birds and consistently so, than elsewhere along benchlands, crossover where drainage & bench makes slight bend to right, red-bellied woodpecker, 3 chickadees, umbrella-like plants just starting to 6 inches high with leaves expanded; 12:51 titmouse; 12:52 lateral drainage; 12:53 minor lateral drainage and rock fence again, planted grass and more open beyond, cardinal calling, chickadee, chickadee, considerable shrub on bench, plant grass, many old trees 2 feet or so in diameter have been cut, main grass & open areas are on benchlands below and in valley, 3 blue jays calling; 12:57 point, original clearing of area is gradually growing back again into small trees & shrubs, bench beyond this point become a slope about 30° angle which is frequently the case of ^{\nearrow exposed} benchland beyond point, one juniper tree about 100' beyond on bench with elm? tree growing up thru the juniper

tree, small trees about 5-6 inches in diameter, grass among
 trees, cardinal, creek below with large pond, poor cliff exposure,
 field sparrow calling; 1:05 minor drainage, some sumac along
 here, 1:08 juniper with mourning dove nest 4 feet above
 ground, 2 eggs, $\frac{3}{4}$ incubation, large walnut grows 3 feet N of tree,
 minor point about 50' to W; 1:10 point, good vantage point;
 1:12 2 red-headed woodpeckers, better rock ledges; 1:13
 beautiful sycamore with intricate branching of upper limbs;
 1:14 fence, 16 bobwhites, 2 cardinals, 3 jays, large orange
 orange 10' beyond fence, 2 turkey vultures; 1:15 minor
 drainage; 1:16 2 cardinals, 2 titmice, 1:17 lateral drainage,
 2 red-headed woodpeckers, 2 chickadees; 1:20 3 blue jays,
 crossing over approx 200 feet down from road, 3 meadowlarks
 flew over, 18 Harris sparrows, 4 of which were singing, 2 chickadees,
 1 red-bellied woodpecker, 5 juncos, water just flowing in creek,
 no moss associated, lower in drainage it is dry, the relocation
 of water in these drainages at first bench indicates a spring
 in the headwater sections, 100 feet ^{beyond} from left lateral spring with
 moss; 1:24 lateral to left; 1:26 8 Harris sparrows, 8 English sparrows,
 2 starling, 2 chickadees, 8 junco; 1:28 back on bench at
 mouth of canyon, downy woodpecker, 3 robins, 3 Harris sparrow,
~~1:31~~ 1:31 mourning dove; 1:32 fence; plant grass beyond, 3 junco,
 2 blue jays, Cowbird calling in top of tree, 8 Harris sparrows,
 meadowlark singing, field sparrow, meadowlark singing,
 2 cardinals, 4 junco, ^{fox sparrow}, end of bench across from house at
 1:36 P.M. Will continue down drainage to car and will
 make general observations. arrived car 1:52. Between end
 of bench at 1:36 & car observed that creek is almost
 continuous in supporting water, ^{1 to 2 feet in depth} with clear pools lined with
 submerged dry leaves, algae, mosses. Frogs of both Lana
 pepens & Acris-like ones; on flood periods water gets 3-4
 feet higher than present level. Following birds observed
 3 red-headed woodpeckers, 2 red-bellied woodpeckers, 8 chickadees,
 1 fox sparrow, 6 junco, 1 turkey vulture, red-tail hawk, 3
 titmice, downy woodpecker, 6 cardinals, 1 song sparrow,
 2 blue jays, 3 mourning doves in one group, water flowing
 about 1 gal per 10 seconds. Cliffs at mouth 20 feet high &
 bench almost perpendicular up to 50', 3 field sparrows
 which were following each other, 1 meadowlark, 1 bluebird.
 Leaving with car at mileage 11.9; 12.8 redtail perching above
 mouth of canyon that supports its nest; at bend of road where

road killed opossum is located, 2 Turkey vulture fed on the entrails of this animal. They left and circled area just above the ground, one alighting again and then took off as I started up car again; 12.3 Rock creek bridge; 12.6 meadowlark; 12.7 sparrow hawk, crow; 13.4 blue jay; 13.6 "Y" on main road; 14.2 meadowlark singing; 14.5 Clinton, Eng sparrow; 15.3 meadowlark singing; 15.7 robin; 16.3 meadowlark singing; 17.0 Rock Creek; 17.6 meadowlark singing; 18.4 south end of proposed dam at 2:10 P.M. Wind still from NW, cool, clouds in closely arranged series with blue between and entire sky as far as one can see of the same general character

Univ. Kansas Campus, Lawrence, Douglas Co., Kansas

April 11, 1966

10 pine siskin fed on new buds and floescence of ^{elm} maple tree at power plant on campus. One had a yellow wing bar twice the width of the other nine.

April 14, 1966

Pine siskin and goldfinch have been on campus in unusual number in last 3 days. There is definitely an increase in these birds.

Shawnee Lake, Shawnee Co., Kansas

April 13, 1966

At about sundown noted one common loon on lake. Counted 2,300 American Coot in almost continuous raft from near S end of lake to N end. They were moving as groups rather than individuals at random. 38 sculp were associated. Other kinds of ducks could have been present.

Lawrence, Douglas Co., Kansas

April 13, 1966

First Chimney swift noted in Lawrence this season.

12 1/10 mi. N and 1 1/2 mi. E Lawrence, Douglas Co., Kansas

April 14, 1966

Made census of Sand Pit Lakes this A.M. at 9:00 o'clock. Sky overcast. (See Sept 21, 1963 for names of lakes). Refuge Lake 32 coots, 18 bluewing teal (14 males, 4 females), ♂ and ♀ green-

winged teal, kingfisher, 4 pied-billed grebes, 7 male red-wings on territories; a shower passed by lasting about 2 minutes, the coots anticipated this storm and reacted to the thunder while in the water, as the rain started the coots climbed out of water onto dry land where they remained until the rain stopped, they reacted to the thunder on land as well as on the water. The male bluewing teal seemed to fight among themselves and were relatively unattentive to the females. One blue goose inspected this lake and they flew to Bass Lake where it alighted. It was nervous on the lake and swam back and forth for 8-10 feet and then reversing its direction. It remained in the center of the lake for at least 1 hour. Rain got some ducks moving in the air. There is not too much value in making census of birds in these lakes as their numbers are dependent upon man interference and they are continually adjusting to these interferences. House Lake to W contained about the same concentration and kinds of birds as Refuge Lake. The small lake between Refuge Lake and Lotus Lake had a ♂ + ♀ bluewing and 4 coots. Lotus Lake had 8 ♂ shovellers ^{of which} and 3 ♀♀, 8 pied-billed grebes, 54 coots, 18 bluewing teal 4 of which were ♀♀. Connecting lakes (continuous water at this season of year) with about same proportion of ducks except fewer pied-billed grebes; 4 lesser yellowlegs and 1 greater yellowlegs; the most activity of movement both on the water and in the air is among the males of the blue-wing teal; when flying the blue-wing teal fly faster and more erratic than the relatively slow flying shovellers. Red-wing blackbirds have territories averaging about every 150 to 200 feet. Three Forster terns (sp.?) on Shallow Lake. 50 pectorals (sp.?) in one group. All male redwings singing. Pied bill grebes feeding nearer the travelled road than other kinds of ducks. Gull (sp.?) flew over Bass Lake. It did not have white spots in primaries. Ducks, and especially coot feed in compact groups, then disperse and are generally distributed and at times all swimming in same direction. Watched a muskrat swim across Lotus Lake. It was followed by a pied-bill grebe as the muskrat passed by the grebe.

The grebe in turn dove, followed and came up about 1 foot back of the muskrat. Lesser yellowlegs picks up insects from ^{surface of} water, ground and on vegetation as high as it could reach. On Park Lake noted 2 killdeer, 1 dowitcher, 12 coot, 6 shovellers (3 ♂♂, 2 ♀♀), 23 bluewing teal 4 of which were ♀♀, 8 red-wings on territories around this area; 3 pied bill grebes, killdeer not too vociferous this time of year, yellowhead blackbird flew over to Hause Lake, 3 robins and coming into conflict with redwings, many Canada geese, few acris and bullfrogs. 3 ^{lesser} yellowlegs here. Bass Lake for some reason did not have many birds and would say approx 12 coot and 7 blue-wing teal only. Moss Lake with 7 coot and a ♂ ♀ blue wing teal.

From these observations would summarize ^{approx.} numbers for general Sandpits area as: (Deep Lake not surveyed but with glasses could not see ducks)

American Coot 32 - 32 - 4 - 54 - 54 - 12 - 12 - 1 = 201

blue-wing teal 18 - 18 - 2 - 18 - 18 - 23 - 7 - 2 = 106

green-wing teal 2 - 2 - 2 = 6

shoveller 8 - 8 - 6 = 24

lesser yellowlegs 4 - 4 - 3 = 11

greater = 1

blue goose 1 = 1

Forster tern 3 = 3

red-wing blackbird 7 - 7 - 5 - 8 = 27

robin 3 - 3 - 5 - 2 = 13

kingfisher 1 = 1

meadowlark 3 = 3

pied-billed grebe 4 - 8 - 6 - 3 = 21

pectoral sandpiper 50 = 50

gull 1 = 1

muskrat 1 = 1

Total = 468.

killdeer 2 = 2

dowitcher 1 = 1

fishermen = 0

April 14, 1966

This evening at about sundown visited these lakes and noted 12 coot, 6 blue wing teal, 8 grebes or a total of 26 in contrast to 468 of this morning.

Lawrence, Douglas Co., Kansas

April 18, 1966

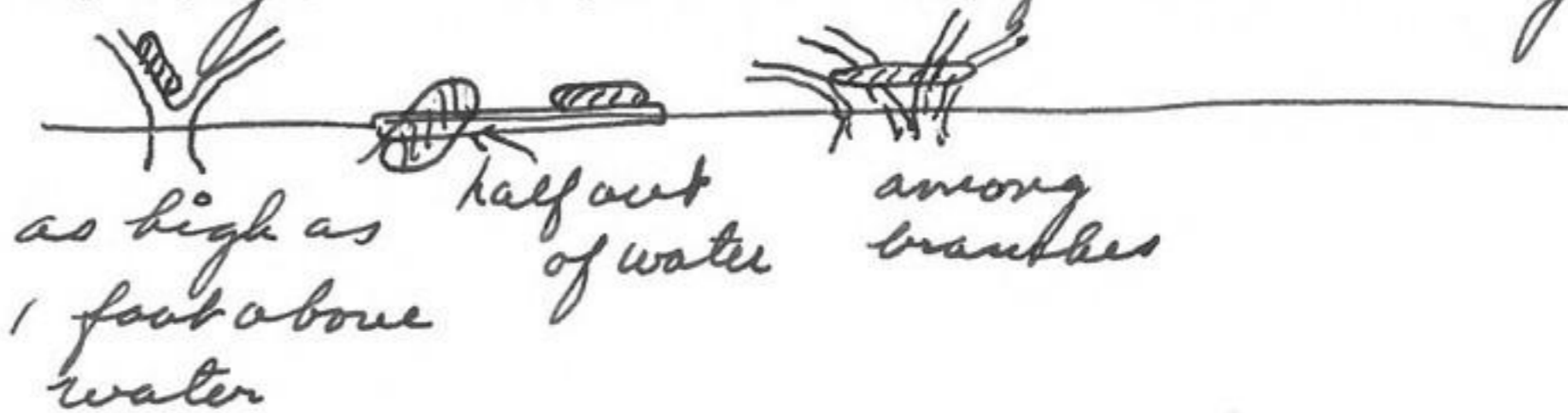
There is a steady increase in numbers of pine siskin in Lawrence.

12 1/10 mi N and 1 1/2 mi. E Lawrence, Douglas Co., Kansas

April 24, 1966

Census of birds at Sandpits, left 9:30 A.M., temp 64°F. at Refuge Lake: 70 am. Coots, 6 pied-billed grebes, 5 blue-wing teal (1 ♀ 4 ♂), 2 fisherman here and forced birds to S and E side. 18 blue winged teal arrived (3 of which were females), 9 male red-wing blackbirds and 3 females, some males chasing females. 3 Robins in area and in conflict with red-wings, 3 lesser yellowlegs, brown thrasher singing in top of cottonwood tree (These birds have been singing from similar positions of highest tree tops in Lawrence for the last 1 1/2 weeks), flicker calling from same line of trees on S side of lake. There are an equal number and proportion of birds at House Lake or perhaps a few more because fishermen have not as yet interfered with these lake. noted that shoveller has less ability to navigate in air and wing beat slower, 3 ♀♀ and 1 ♂ arrived. In an area of approx 40 x 10 feet noted 15 painted turtles (*Chrysemys picta*) sunning or swimming on and among submerged willows isolated from shore. Other ^{at least 30} were on shore vegetation of dead willows. They ranged in size from approx. 7 inches in diameter to 3" in diameter. In swimming, their heads were just sticking out of water and the very upper part of back exposing the minimum of body surface.

Coots and pied-billed grebes passed by within 6 inches of both swimming & resting turtles without conflict. Rating on limbs there:



noted a coot and pied-billed grebe sharing some fish without conflict, working so that they actually touched each other.

at pond between Refuge Lake & Lotus Lake are 15 green-wing teal, 3 of which are ♀♀; 2 male gadwalls, 2 pairs of baldpates, each pair maintaining close relationships and sharing food, 1 lesser yellowlegs, 15 coot. The coot

left the pond while the ducks remained. Apparently Coot do not remain on small bodies of water when danger is threatening. Ducks can afford to remain longer. Lotus Lake has 2 fishermen and most birds on E and E side consisting of 8 Coot, ♂ + ♀ gadwall, 1 lesser yellow legs, ^{1 muskrat}. This lake generally supports more birds when not molested by man. An interconnecting lakes between Lotus and Park Lake were: 40 Coot, 25 blue-wing teal, 6 ♂ shovellers and 4 females, 18 pectoral sandpipers (?), 7 lesser yellowlegs 5 pied-billed grebes. Bass Lake and Moss Lake used by 5 fishermen and no ducks there. At Park Lake 2 male & 1 ♀ greenwing teal, 5 pied-billed grebes, 18 Coot, 14 blue-wing teal. Martin flew by & only one noted, 2 killdeer, 2 ♂ + 1 ♀ gadwall, willow in small leaves, Cottonwoods not as yet in leaves. Summary and approx. estimation of total population. (Deep Lakes not surveyed)

Blue-wing teal 5-18-18-25-14 = 80
 green wing teal ~~#~~ 15-3 = 18
 gadwall 2-2-3 = 7
 baldpate 4 = 4
 Coot 70-70-15-8-40-18 = 221
 pied-billed grebe 6-6-5-5 = 22
 muskrat 1 = 1
 killdeer 2 = 2
 pectoral sandpiper 18 = 18
 lesser yellowlegs 3-1-1-7 = 12
 purple martin 1 = 1
 redwing blackbird 9-9-10 = 28 (probably 3 times or more this number)
 shoveller 4-6-4 = 14
 meadowlark 3 = 3
 fishermen 2-2-1-5 = 10
 robins 3-3-3 = 9
 brown thrasher 1 = 1
 flicker 1 = 1
Chrysomitris picta 100

Univ of Kansas, Lawrence, Douglas Co., Kansas
 April 25, 1966

Fence line of osage orange trees of great antiquity just east

of the Chancellors Residence.



asoge orange tree measured 13 feet 3 inches in circumference at 3 feet high. Two small trees in same general line. This group of trees must have been planted in early pioneer times. These trees should be checked for age. The largest tree is the largest tree of this species that I have examined in Douglas Co.,

Kaw River, Douglas Co., Kansas

April 30, 1966
James Robert Bee & Nancy Hitt made canoe trip down Kaw River from Lawrence to Eudora. Photos 660430-1 to 660430-12 as they approached landing at Eudora. Photos 660430-13 of Mary Buline from bridge. Photo 660430-14 of car & canoe at home.
May 1, 1966

Checked birds at Sandpits at 9:00 A.M., temp cool, strong NW wind. Census is for all lakes: 38 am. Coot; 3 ♂, 2 ♀ gadwalls; 32 blue wing teal; 12 lesser yellowlegs; 2 killdeer; 1 dowitcher; 3 black crown night heron (they flew from edge of Park Lake and flew to center of intermediate lake to S and alighted on branches in water where they remained fully exposed in all directions; usual robins & red-wing black-birds, both on territories; no pied-billed grebes visible, 3 meadowlarks in adjoining field; northern violet green swallow; bank swallow?; 2 fishermen on Refuge Lake. There has been a decided decrease in numbers of birds since last surveyed.

Lawrence, Douglas Co., Kansas

May 2, 1966

Catbird singing for first time but preceded by the brown thrasher by about a month. Pine siskin still in area but in reduced numbers. Robins making cup of nest. Starling feeding young in nest. Brown thrasher copulating.

May 4, 1966

Baltimore Oriole singing

May 13, 1966

Four young blue jays (tail feathers developing) on ground below nesting tree. Pine siskin still in area but not generally distributed as in the first part of May. Olive backed thrush has been in same area and singing for the last 5 days.

Lawrence, Douglas Co., Kansas

May 13, 1966

The following information is from a letter sent by

Miss Valerie Carter, Lab. of Anthropology, Washington State University, Pullman, Washington (April 27, 1966) and some of the questions relate to problems of the Arctic Slope of northern Alaska:

1. When there is hunting pressure and/or forest fires at one point in caribou migration route which are intense enough to cause a shift in route, will the entire route shift or only part.
2. Are wolves indicator of caribou numbers and how reliable are they as indicators.
3. Marshall (1933) mentions that in 1902 the caribou in the vicinity of Arctic Village shifted their migration route, do you have ^{any} further information about such a shift.
4. What is the amount of range utilized by caribou on the arctic slope between 1920-1936.
5. Effects of reindeer upon caribou movements and numbers along the arctic coast.
6. Do caribou fluctuate in numbers on the Arctic slope.
7. Are moose moving northward (1920-1936). and would this movement effect caribou migrations.
8. What effects had forest fires, miners, Hudson Bay Co, whalers, eskimo utilization of caribou when sea mammals were reduced, effectiveness of rifle etc.

Other questions:

Rausch (1953) states that when caribou fail to appear the Nunamut were capable of obtaining other animals in large enough quantity for survival. Gubser (1965) disagrees with this statement. Would Rausch's statement hold true over an extended period of time, say three or more years? Is this feasible when you consider the time and energy that it would take to capture these animals? In what way would cyclic declines effect the validity of this statement? would there be enough oil resources to maintain their needs? Is it true when you consider the relatively small numbers of ~~young~~ ^{animal} types in the area? To what extent could they have utilized vegetable and fish resources beyond that which they were utilizing aboriginally (former - 5% - of diet.

Carter believes that the reduction in numbers of Nunamuts was caused by reduction of caribou & desire for European goods.

Clinton Area, Douglas Co., Kansas

May 25, 1964

visited area of proposed Clinton Reservoir from down. W to Elk Creek. Dad, Grace, Annette & I made the trip. made the following general observations. Eastern Kingbird unusually common and as singles to groups of 12. In one mile counted 34 in groups of 4 singles, 3 groups of 2, 4 groups of 5 and 1 group of 4. They are more common in river bottoms and near trees, than on open field uplands.

One group of 13 turkey vultures sailed E approx. 800 feet above ground. They were in formation and did not flap their wings and sailed directly east without circling as if returning to nesting or roosting area after foraging beyond their territory during the day. I have noted this activity on other occasions and always as the sun is setting. The following birds were noted and an approximation of numbers given.

keeldeer	3	starling	12
spotted sandpiper	2	Eng. sparrow	18
souderling ?	4	olive backed thrush	5
horned lark	24	orchard oriole	3
meadowlark	36	olive sided flycatcher	2
deersel (every 100 feet or so)		Acadian flycatcher ?	1
marsh hawk	1	Baltimore oriole	4
red-tail	6	e. swift	2
turkey vulture	17	black-capped chickadee	8
black tern	8	red-eyed vireo	3
blue-wing teal	2	barn swallow	18
loggerhead shrike	10	crow	5
phoebe	16	cardinal	15
peewee	25	cat bird	1
red-headed woodpecker	12	brown thrasher (4 fresh eggs)	8
red-bellied woodpecker	6	mockingbird	1
hairy woodpecker	1	Bells vireo	4
robin	1	bank swallow	4
blue jay	18	red wing blackbird	18
yellow throat	6	mourning dove	20
lark sparrow	20	common grackle	60
vesper sparrow	2	flicker, yellow shafted	2
field sparrow	6	Cowbird	8
house wren	2	green heron	1
great horned owl	1	savanna sparrow	12

Wakarusa River, Douglas Co., Kansas

May 26, 1966

Dad, James R and I went down river in canoe from China Cliffs (Dingman Crossing) to Eudora. 1 green heron, 1 great horned owl, phoebe in cliffs. Grace made trip up river to Cliffs and return to budge.

Lawrence, Douglas Co., Kansas

May 28, 1966

Starling left nesting box. This box was displaced 30 feet from tree that had been cut down and the parents continued to feed their young plus 2 foster young pecked up on ground from other nests. The adults found the new approach difficult to adjust to.

May 30, 1966

4 pine siskin on Univ. of Kansas Campus. Robins and starling feeding young on ground.

June 15, 1966

A male rose-breasted grosbeak fed a young about size of adult at 1620 Tennessee in Lawrence. It fed in an area of approx 50 x 50 feet while the young remained in an area of 5 x 5 feet of tree space. This is the first time this year I have seen a rose-breasted grosbeak in this area. It remained in same area for approx 25 minutes and then left and was not observed thereafter. In 25 minutes, it fed the young one approx. 8 times.

June 17, 1966

Many kinds of trees including, elm, ash, hickory, and oak have lower branches approx. 3 feet lower than before heavy rains (4 inches) of the last 3 or 4 days. It is assumed that the branches have taken up water (externally) which has weakened their strength.

(See next page for June 18, 1966)

Wakarusa River, Douglas Co., Kansas

June 19, 1966

Annette, Chris, Polly and I made canoe trip Wakarusa River from Dingmans Crossing to Tonganoxie, ^{Sandstone} Cliffs just

about 1/2 mile down stream from where the Little Wokarusa
 River enters the Wokarusa River. Portaged canoe up
 ridge to road. Left Dugman's Crossing at about 2:00 P.M.
 and arrived at cliffs at about 5:30 P.M. having
 leisurely travelled the river course. At China Cliffs
 (Dugman's Crossing) took photos 660619-1 to 660619-4
 of the family in the canoe. Enroute noted 2 young
 great horned owls, one of which flew down river to alight
 in tree 2 feet from another young great horned. These
 owls were about same size as adults. Two other
 great horned owls were noted. Mud on slopes to about
 18-20 feet high. Beaver have used mud slopes at about
 every 2/10 miles. 15 bull frogs, ^(small ones 2 1/2 inches) on banks and look to
 leave; only 3 *Rana pipiens* noted. Other kinds of birds
 noted along river: 5 summer tawagers, 6 common grackles
 feeding on muddy banks, 3 red-headed woodpecker,
 6 red-bellied woodpecker, 2 crested flycatcher, 2 wood
 pewees, 3 titmice, 1 downy, red-eyed vireo all
 along river, 2 Baltimore Orioles, 4 black-capped
 chickadees, ^{and others} no wood ducks, spotted sandpipers
^{red-tails} herons, etc. 10 carp (10-18 inches) jumped
 out of water enroute. At the cliffs (1/2 mile down
 stream from Little Wokarusa) took 2 photos 660619-5
 and 660619-6 of family in canoe at cliffs. ^{One pilot black snake 20 feet high in elm tree over rapids;} Walked
 back to car at China Cliffs and enroute took photo
^{did not keep} 660619-7 of wheat field, farm and corn in foreground.
 Yesterday on June 18, photographed Chris in Flying Junior
 sail boat and members of the mariners group: Dr. Henry D.
 Remple, Lucy Remple, Judy Thompson, Becky Pangle,
 Jane Bishop, ^(Polly) ^(Bee) Photos 660618-1 to 660618-12 of
 the canoes & sail boat. 2 large natrix in water
 along edge of lake, one was 10 feet up bank and
 moved rapidly to water. A scissor-tail flycatcher
 noted at ^{1/10 mi} Wokarusa School between Banners Corner
 and Lone Star village.

Lawrence, Douglas Co., Kansas

June 23, 1966

Pete Pierson of 2201 Louisiana St found a hoary bat on the lawn of his residence and presented it to me. This bat had fallen from a tree and was unable to fly because of the weight of the two young which were clinging to the body. These bats measured:

660623-1 *Lasiurus cinereus* 150-61-14-18-32 gms. wing spread 434 mm. ♀. This is the female of the two young. This bat and her two young were placed in a cage and she secured herself to the 1/4 inch screen top where she remained overnight and the following day. At 5:00 P.M. when inspected, she was dead and post-maternal changes had already started in the abdominal region. The two young still remained on the mother.

660623-2 *Lasiurus cinereus* 107-41-13-13-17 gms. ♀ wing spread 322 mm.

660623-3 *Lasiurus cinereus* 105-41-13-13-16 gms. ♂ wing spread 315 mm.

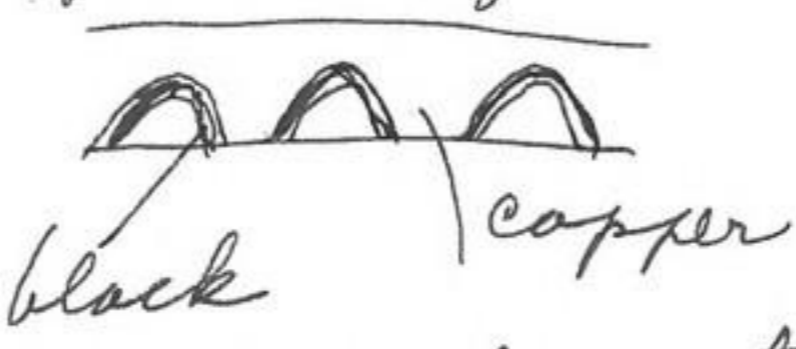
Wakarusa River, Douglas Co., Kansas

June 26, 1966

Annette C & Mary and I made canoe trip on Wakarusa River from bridge at South edge (middle) of Sec 10 of T 13 S and R 18 E to middle of sec 14 of T 13 S and R 18 E. River 1/2 full from rains of early this A.M. Length approx 3 2/10 miles and even water but fast moving with upheavals and whirlpools. Enroute to area (Lawrence to Siegel School House) noted the following kinds of birds: Eng. sparrow, starling, 5 logger-head shrikes, cardinal, meadowlark, grackles, Baltimore oriole, turtle (box), dickcissel, mourning dove, Considerable sails from morning's rain, scissortail flycatcher (at a point 3/10 mi. W of the SE corner of sec 4, R 19 E, T 13 S), red-wing blackbird, blue jay, Siegel School at mileage 75.8 and start of complete census (11:00 P.M.), meadowlark, 5 grackles in brush pile, dickcissel, 76.2 grackle, dickcissel, 76.8 dickcissel, 76.9 "Y" in road, 5 Eng Sparrows, 2 starling, 77.1 bridge, wheat brown, dickcissel, 77.6 N end of old

660626-117
proposed dam; 78.1 ♂ red wing blackbird; 78.2 dickcussel;
78.3 red-wing blackbird; dickcussel; 78.5 dickcussel; 78.6
2 dickcussels, 2 dickcussels; 78.7 dickcussel; 78.9 passing
road to Petersons, 3 dickcussels, 79.0 dickcussel; 79.1
2 meadowlarks, 1 dickcussel; 79.4 Wapakarusa bridge;
79.8 horned lark; 80.1 Clinton turn-off, 1 dickcussel;
dickcussel, blue bird (eastern); 80.4 dickcussel; 2 dickcussel
80.5 dickcussel; 80.6 red-headed woodpecker; 80.7
Wapakarusa bridge at 1:45 P.M. Left car here and put
canoe in river at 1:55 P.M. 2 narrow mouth toads and a
cricket frog calling, barn swallow; 1:58 P.M. pewee, black-
capped chickadee; 2:00 cardinal, catbird; 2:02 cowbird,
yellow warbler; 2:05 bl. capped chickadee, cardinal, house
wren, pewee; 2:07 hairy woodpecker, cardinal, mourning
dove; 2:08 titmouse cuckoo; 2:09 cardinal, red-bellied
woodpecker, yellow warbler; 2:11 pewee, cardinal, chickadee,
crow, redwing blackbird, red eyed vireo; Coon Creek from
left, fox squirrel crossed over trees, pewee; 2:18 2 red-
wing blackbirds and 2 young, pewee, dickcussel; 2:18
2 dickcussels, 2 redwings; 2:20 contact with east
N side of valley at drainage from left, heard a frog call
which I was not acquainted with and sounded like a
distress call; pewee, cardinal; 2:22 drainage from
left, cricket frog approx 1 per 1/10 mi, redwing blackbird;
2:24 cardinal, meadowlark, B. oriole, pewee, yellow
warbler; 2:26 chickadee, cardinal, red-bellied woodpecker,
cuckoo; 2:30 drainage from left (from Petersons Pond),
indigo bunting, cardinal; 2:33 3 cowbirds, chickadee,
2 cardinals, indigo bunting, chickadee; 2:34 cardinal,
chickadee, have noted several dying elm; 2:35 cardinal,
2 titmice, indigo bunting, cardinal; 2:36 matrix crossed
river, gnatcatcher, indigo bunting, pewee; 2:41 cardinal,
titmouse, red-bellied woodpecker; 2:42 cardinal, goldfinch,
mourning dove, titmouse, red-bellied woodpecker, have
noted that wood debris is confined mainly to center of river
as if kept there by deflection of water from edge of river,
chickadee, indigo bunting, cuckoo; 2:45 indigo bunting;
2:48 bridge, pulled canoe out at N side of bridge.
While standing on bridge noted a copperhead snake

start to swim across the river from the south side. It swam out 2 feet and then returned to bank. This snake was approx 3 feet long and had the following pattern



on sides. It did not swim as confidently as the matrix. Left

bridge at 3:00 P.M for return to car via regular valley road by walking. Will keep complete census. 3:01 mourning dove, 3 crows, hairy woodpecker; 3:10 dickcissel; 3:12 dickcissel; 3:13 dickcissel; 3:15 2 dickcissels at road turn off to Clinton; 3:17 eastern bluebird, many birds can be heard beyond the usual 100 foot strip along road; 3:22 dickcissel; 3:23 bluebird; 3:25 lark sparrow; 3:26 indigo bunting, pewee, dove; 3:29 2 indigo bunting; 3:30 bridge and car, barn swallow + phoebe here.

On return trip to Conae by car along same route noted the following, leaving 3:32. 80.9 red-headed woodpecker, dickcissel; 81.2 dickcissel; 81.3 dickcissel; 81.5 2 dickcissel at Clinton Rd turn off; 81.6 dickcissel, indigo bunting, lark sparrow; 82.3 bridge + Conae. Left bridge at 3:42 P.M at 82.3 mileage, pewee, 82.6 dickcissel; 8:27 dickcissel; 8:28 horned lark, m dove, 8:31 dickcissel; 8:33 dickcissel, 4 dickcissels; 83.6 dickcissel; 83.6 red wing blackbird; 83.7 Cowbird; 84.0 N end proposed dam, Cuckoo, bobwhite, cardinal, indigo bunting, dickcissel; 8:46 cardinal; 84.8 "Y" in road, 3 starling, 5 Eng sparrows; 84.9 dickcissels; 85.2 indigo bunting; 85.5 2 dickcissels; 85.7 m dove; 85.8 3 grackles 85.9 Siegel School House + end of census (complete). Between here + Lawrence noted the following kinds of birds: m dove, indigo bunting, meadowlark, dickcissel, pewee, red wing, shrike, eastern Kingbird, cardinal, m dove flew 35 MPH., Eng sparrow, red headed woodpecker, grackle. Today the temperature in afternoon about 77° F. Rain early this AM and cloud broke at about 1:30 but remained overcast.

Wakarusa River Valley, Douglas Co., Kansas
June 28, 1966

Annette P and I made complete census of birds +

mammals from the S end of the proposed Clinton dam to a point N of Richland. Followed main highway thru valley. Was particularly interested in the per cent frequency of the dickcissel. Day hot and slight wind. Travel approx 30 miles per hour and recorded birds on both sides of the road to 100 feet beyond. Mileage at S end of dam 33.7, at 3:40 P.M.

33.8 mourning dove, dickcissel, red-wing blackbird, 6 cowbirds; 33.9 2 dickcissels, 34.0 dickcissel; barn swallow, redwing, dickcissel; 34.1 dickcissel; 34.2 2 dickcissels, 34.3 dickcissel; 34.3 dickcissel; 34.5 dickcissel; 34.6 dickcissel; 34.6 3 dickcissels; 34.7 dickcissel; 34.9 dickcissel; 35.0 Rock Creek; 35.2 dickcissel, 4 Eng sparrows; 35.5 dickcissel; 35.6 2 dickcissels, 35.7 horned lark; 35.8 dickcissel; 36.0 meadowlark & dickcissel, Eng. sparrows; 36.2 mourning dove, indigo bunting, 3 Eng sparrows; 36.4 indigo bunting, meadowlark, dickcissel, mourning dove; 36.6 dickcissel; 36.9 meadowlark, dickcissel; 37.0 dickcissel, dickcissel, indigo bunting, dickcissel; 37.2 dickcissel, Eng sparrow; 37.4 indigo bunting; 37.6 Center of Clinton, 5 Eng sparrows; 37.8 dickcissel, meadowlark, 2 meadowlarks, 38.2 2 mockingbirds, meadowlark; 38.2 shrike, Eng sparrow (these birds seen common and not necessarily associated with farm houses); 38.4 dickcissel; dickcissel, meadowlark, 38.5 meadowlark; 38.7 dickcissel, dickcissel; 38.8 Clinton Cemetery, Eng. sparrows; 39.0 2 indigo buntings; 39.4 cardinal; 39.5 dickcissel; 39.6 2 dickcissel, dickcissel; red-wing; 39.8 dickcissel; 39.8 4 cowbirds; 40.1 bridge over Wokarusa, indigo bunting, eastern flycatcher, meadowlark; 40.3 dickcissel; 40.3 dickcissel; 40.5 dickcissel, common grackle, cowbird; 40.7 dickcissel, meadowlark, dickcissel, dickcissel, dickcissel, eastern kingbird, Eng sparrow; ~~41.1~~ 41.1 dickcissel; 41.2 mourning dove; 41.4 dickcissel, meadowlark, red wing, meadowlark; 41.6 mourning dove; 41.7 2 grackles, 8 grackles, 2 redwings; 42.0 lark sparrow, Eng sparrow; 42.1 dickcissel, dickcissel;

42.2 chipping sparrow; 42.4 crow, 4 mourning doves,
 2 grackles, mourning dove, meadowlark, shrike,
 42.6 2 mourning doves, 2 starling, 2 starling,
 42.7 dickcissel; 42.9 bobwhite; 42.8 mourning
 dove, meadowlark; 42.9 shrike, dickcissel; 43.0
 dickcissel, 2 dickcissels, grackle, dickcissel,
 2 red-wings; 43.1 dickcissel, yellow warbler,
 mourning dove, Eng sparrow, barn swallow,
 43.3 dickcissel, mourning dove, 43.5 meadowlark,
 road turnus to S; 43.6 meadowlark; 43.7 meadow-
 lark, 5 mourning doves, meadowlark, shrike; 43.8
 meadowlark; 43.8 meadowlark, meadowlark; 44.0
 dickcissel, dickcissel, barn swallow, dickcissel;
 44.2 dickcissel, red wing, mourning dove, 44.5 shrike,
 (travelling 30 mph); dickcissel, meadowlark; 44.6 now
 to W, dickcissel, meadowlark; 44.7 dickcissel, indigo
 bunting, brown thrasher, dickcissel, 44.8 dickcissel,
 meadowlark, 44.9 dickcissel; 45.1 Cowbird, dickcissel,
 dickcissel, dickcissel, bobwhite, meadowlark; 45.3
 dickcissel, dickcissel, 45.4 dickcissel, eastern
 kingbird, mourning dove, dickcissel; meadowlark,
 45.6 meadowlark; 45.7 Shawnee Co. line; 45.8 dickcissel,
 3 cowbirds; 46.1 Eng sparrows, meadowlark, dickcissel,
 2 dickcissel, 46.4 dickcissel, meadowlark, mourning
 dove, 46.7 meadowlark, indigo bunting, meadowlark,
 46.8 dickcissel, meadowlark, 47.0 blue jay, Eng sparrows,
 barn swallows, 47.2² dickcissel; 47.3 road turnus S to
 Richland and end of census. Distribution of dickcissel
 according to mileage is as follows:

	0	1	2	3	4	5	6	7	8	9
33.0									1	2
34.0	2	1	2	1		1	4	1		1
35.0			1			1	2		1	
36.0	1				1		1			1
37.0	3		1						1	
38.0					2			2		
39.0						1	3		1	
40.0				2	4		1		4	
41.0		1				1				
42.0		2				1			1	
43.0	5	1			1					
44.0	3		1			1	1	2	1	1
45.0	3			2	2				1	
46.0		3			1				1	
47.0			2							

Total observed and heard = 83 The greatest separation was $\frac{4}{10}$ mile, the greatest concentration was 5 per tenth of mile.

Pomona Reservoir,

Kansas

July 3, 1966

Enroute noted a scissor-tail flycatcher 1 mi. west of Baldwin junction. Another at 110 mi Creek on Pomona Reservoir as well as 1 marsh hawk in some area. At lake took the following photos

- 660703-1 of the Seawitch.
 660703-2 Mc Callister on the searail sailboat
 660703-3 hot dogs on grill.
 660703-4 Mary Pauline in canoe at head of 110 mi. Creek
 660703-5 " " " " " " " " " " " "
 with rock fence foreground.

Lawrence, Douglas Co., Kansas

July 3, 1966

at 8:05 P.M. sky reading on Weston exposure meter was at no. 1. At this time & lighting the chimney swifts left the sky. They were in the air up to 8:05 and then abruptly disappeared. The common grackle flew east over house (1620 Tean) in groups of 1 to 12 in a half hour period $\frac{1}{2}$ hr before the swifts left the sky.

Baldwin, Douglas Co., Kansas

July 5, 1966

made census of dickcissels from Gardiner to Lawrence, via Baldwin, ^{11:00 A.M.} (on regular highway). Recorded birds observed & heard on only left hand side of road. Speed of car 50 miles per hour, wind from S. From Gardiner to Baldwin (16 miles) noted 60 dickcissels, from Baldwin to highway 10 at Lawrence, ^(14 miles) noted 51 dickcissels.

at 2/10 mi. E Venland on highway noted a scissor-tail flycatcher and at Haskell Bottoms, a striped skunk road kill.

Lone Star Lake, Douglas Co., Kansas

July 8, 1966

Took Chris & scouts to Lake for water safety training for canoe trip to Minnesota. At 2.0 mi. N of Lone Star Village noted a scissor-tail flycatcher, also one at 1/10 mi. N of Wakarusa School in same location as noted on a previous date.

Lake of the Ozarks, Warsaw, Missouri

July 18, 1966

Drove to Oakledge Scout Camp to pick up Mary Pauline, Annette, Chris & I made trip. Left Lawrence 7:30 A.M. at mileage 735. Route via Ottawa, Harroville etc. First redtail at Garden City. Two turkey vultures in same general area. 4 hour trip.

Sandpits, NE Lawrence, Douglas Co., Kansas

July 18, 1966

♀ mallard duck and ^{per} young in area. One solitary sandpiper.

1620 Tennessee, Lawrence, Douglas Co., Kansas

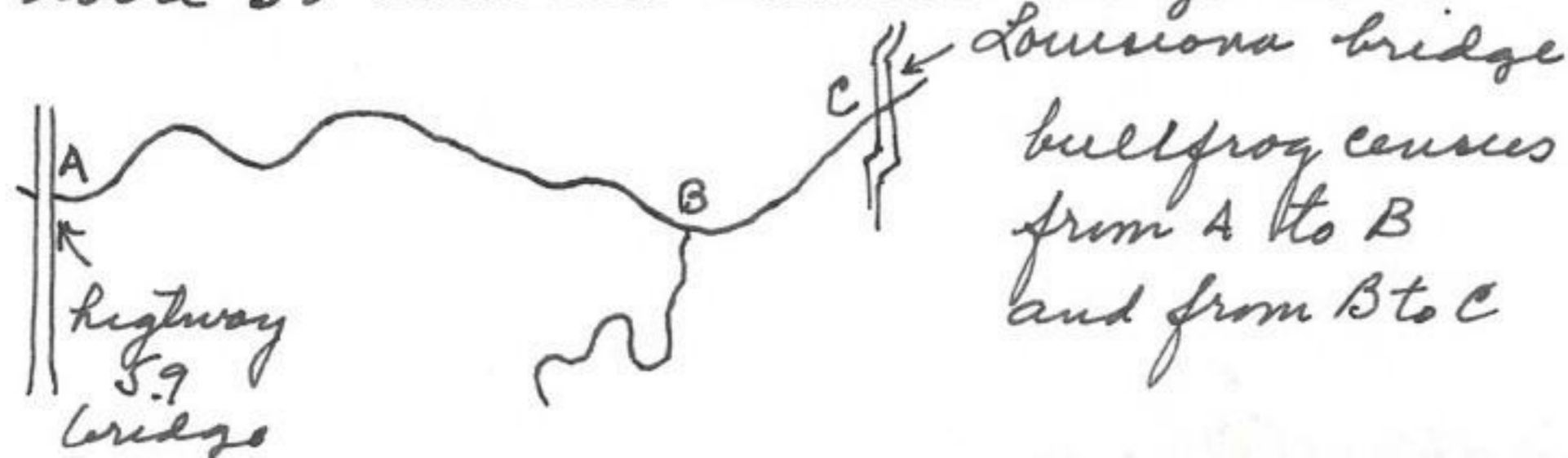
July 18, 1966

A belted kingfisher flew NE over house and first one every noted in this area. Red-headed woodpecker also noted for first time in this area this season.

Wakarusa River, Lawrence, Douglas Co., Kansas

July 21, 1966

Annette C and I made canoe trip from bridge on highway 59 to Hasbell bridge (Hasbell Avenue). Trip between 3 & 5 P.M. For 1 mile between highway 59 bridge and drainage to right at cliffs counted 113 bullfrogs *Rana estessiana* ranging from large six inch total length (snout to anus) to 1 1/2 inches in length. There were 38 between this drainage and Louisiana bridge.



119-23
 a matrix, approx 18" in length submerged in water at rapids at pool at cliffs. The bull frogs were in various situations from submerged with eyes protruding above water to positions 3-4 feet from water on the bank. Some were in holes dug by crayfish, muskrat or other kinds of animals, some, and especially large ones, under protection of willows or vegetation or at base of roots. When approached some would remain undisturbed, others would cross river (30-40ft) ^{hopping} on the surface to gain other bank. Most of them called as they left the bank or edge of the water.

Wakarusa River, Lawrence, Douglas Co., Kansas.

July 22, 1966

made canoe trip, with member of summer school class, from bridge in NW corner of sec 16, T13S, R19E to Hasell Avenue bridge in NE sec 19, T13S, R20E, a distance of approx. 8 1/2 miles. Started 7:45 A.M. and arrived highway 59 bridge at 11:30 and Hasell bridge 3:30 P.M. or 6 hrs & 45 mins. Day started with rain from 6:50 A.M. to 7:55 and then again from 2:00 to 2:30 P.M. Day overcast and temp at 68° F at 7:00 A.M. and 80 at 3:00 P.M. Birds noted enroute (all records selective):

♀ wood duck at 8:05 A.M. Flew down river.

spotted sandpiper - singles, pairs and 2 groups of 3. nearly all along river

great horned owl - 3

red-tailed hawk - 1

little green heron - 1

common grackle - 8 in one group

^{white} red-breasted nuthatch - 2

red-bellied woodpecker - approx 15

downy 3

hairy 1

yellowthroat 3

red-eyed vireo - several

titmice 4

blue jays - 2 groups

cuckoos - 6

phoebe 4

peewee - approx 18

cardinal - fewest ever noted on river. &

approx 30

summer tanager 4

indigo bunting 12

robin - 3

g. b. heron feathers

chickadee 4

muskrat - 1

beaver activity only

kickapoo 1

In some area as bull frog census of yesterday counted only 38 (between bridge & drainage) as compared to 113 of yesterday. The only difference today, in addition to fewer

is the tendency for bull frogs to escape up slope into vegetation. made the following collections:

- 660722-1 *Natrix* 528 body length, 180 tail, 115 gms
- 660722-2 *Acris* destroyed

660722-3 Unionids. Collected selectively and included.

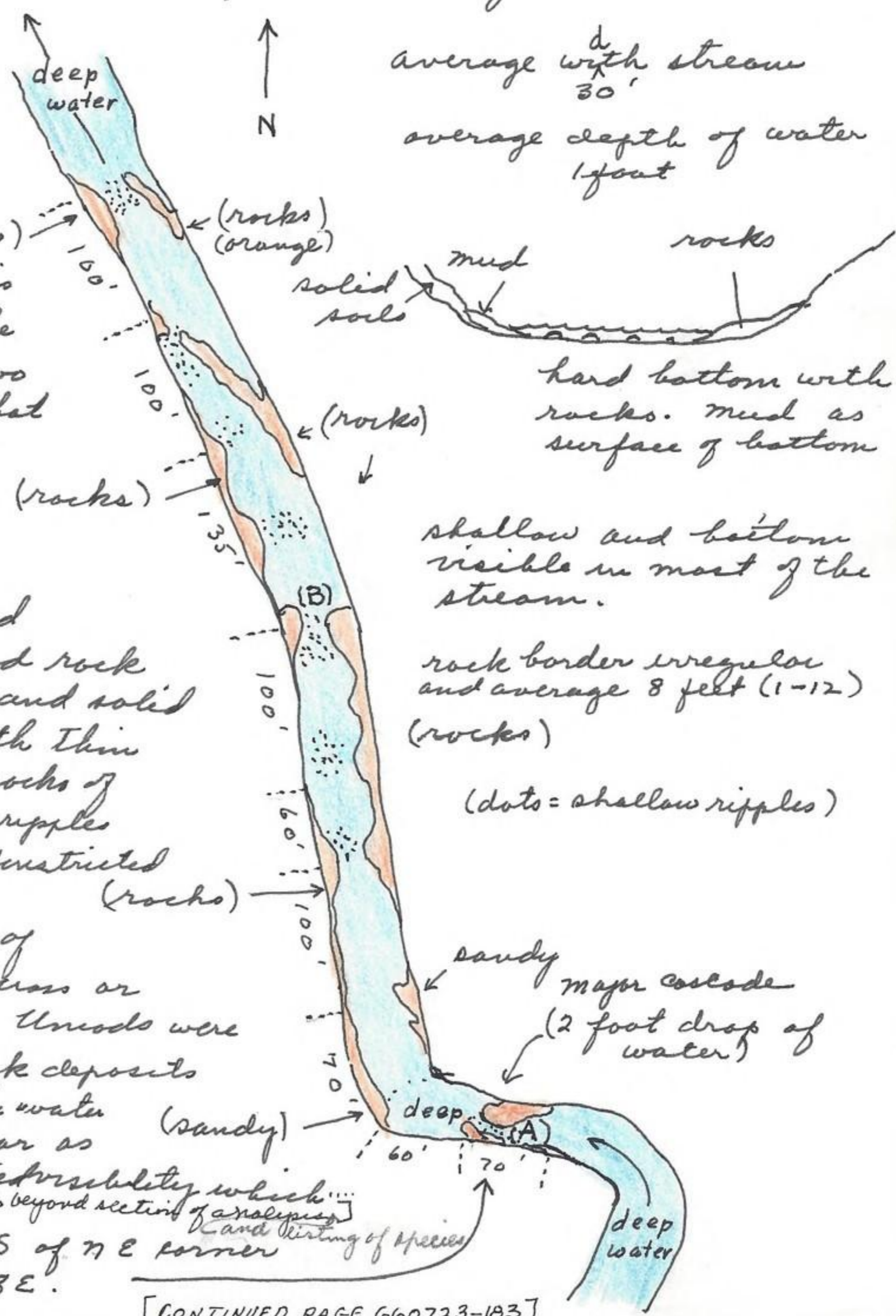
~~Below~~ ^{Above} highway 59; *Quadrula quadrula* (largest total length 116); *Quadrula pustulosa* (63); *Quadrula ovata* *Lampulus ovata ventricosa* (121); *Lampulus anodonta* (105); *Lampulus selysianus* (133); *Truncicula donaciformis* (47); *Proptera alata* (180); *Lampulus selysianus* (125); *Trigonostoma reticulosa* (179); *Crenadonta costata* (134).
~~Below~~ ^{Above} highway 59 same except no *Lampulus ovata ventricosa* or *Lampulus selysianus*.

Wakarusa River, NW Clinton, Douglas Co., Kansas

July 23, 1966

Collected a sample of unionids, 660723-1 from a section of the Wakarusa River (see definite locality below) measuring 460 linear feet.

all unionids were collected from this section of the river. (rocks) from A to B. This area is part of the river between two deep channels that remain permanent in all seasons of the year. The area between is shallow and lined with sand bars and rock accumulations and solid bottom covered with thin layer of mud and rocks of various sizes. At ripples the water passage constricted and water flowed over exposed rocks of the rock barriers across or at side of stream. Unionids were collected on all rock deposits above the level of the water and waterward as far as depth of water permitted visibility which



(see next page)
 average width stream 30'
 average depth of water 1 foot

650' E and 1500' S of NE corner of sec. 15, T13S, R18E.

From this population of unioids (NW 660723-125
 River) catalogued the following: * of Clinton on Wakarusa,
 Douglas Co., Kansas

- 660723-1 *Quadrula quadrula pustulosa*
 660723-2 *Elliptica dilatatus*
 660723-3 *Quadrula quadrula*
 660723-4 " "
 660723-4a *Quadrula pustulosa* (fresh)
 660723-4b " " (fresh)
 660723-4c " " (fresh)
 660723-5 *Unio merus tetralasmus*
 660723-6 *Crenodonta peruviana*
 660723-7 " "
 660723-8 *Lampsilis ovata ventricosa* †
 660723-9 " *anodontoides*
 660723-10 *Proptera alata*
 660723-11 *Synnomia triquetra*
 660723-12 *Proptera alata*
 660723-13 " *purpurata*
 660723-14 *Lampsilis anodontoides*
 660723-15 " *ovata ventricosa*
 660723-16 *Quadrula pustulosa*
 660723-17 *Quadrula quadrula*
 660723-18 *Lampsilis radiata siliquoides*
 660723-19 " " "
 660723-20 *Lampsilis anodontoides*
 660723-21 " "
 660723-22 *Carunculus parva*
 660723-23 " "
 660723-24 *Ligumia subestrata*
 660723-25 " "
 660723-26 " "
 660723-27 *Lampsilis anodontoides*
 660723-28 *Truncellus donaciformis* (complete)
 660723-29 " " (complete)
 660723-30 *Unio merus tetralasmus*
 660723-31 *Crenodonta peruviana peruviana*
 660723-32 *Lasmigona complanata*
 660723-33 *Quadrula quadrula*
 660723-34 *Fuscania flava*
 660723-35 *Ligumia recta latissima*
 660723-36 *Unio merus tetralasmus*
 660723-37 *Trilogonia verrucosa*
 660723-38 *Lampsilis radiata siliquoides*
 660723-39 *Proptera alata*
 660723-40 *Anodonta grandis*
 660723-41 *Leptodes fragilis*
 660723-42 *Leptodes laevissima*
 660723-43 *Ligumia subestrata*
 660723-44 *Lampsilis anodontoides*
 660723-45 *Quadrula nodulosa*
 660723-46 " *pustulosa*
 660723-47 *Strophites triquetra*

<u>660723-48</u>	<i>Proptera alata</i>
<u>660723-49</u>	<i>ibid</i>
<u>660723-50</u>	"
<u>660723-51</u>	"
<u>660723-52</u>	"
<u>660723-53</u>	<i>Trigonia verrucosa</i>
<u>660723-54</u>	
<u>660723-55</u>	<i>Leptodea laevissima</i>
<u>660723-56</u>	<i>Lampsilis radicata siliquoidea</i>
<u>660723-57</u>	<i>Quadrula quadrula</i>
<u>660723-58</u>	" "
<u>660723-59</u>	<i>Lampsilis anadontoides</i>
<u>660723-60</u>	" "
<u>660723-61</u>	" "
<u>660723-62</u>	<i>Anadonta grandis</i>
<u>660723-63</u>	" "
<u>660723-64</u>	<i>Fusemia flava</i>
<u>660723-65</u>	<i>Unionites tetralasmus</i>
<u>660723-66</u>	" "
<u>660723-67</u>	<i>Lampsilis anadontoides</i>
<u>660723-68</u>	" "
<u>660723-69</u>	<i>Truncellus donaciformis</i>

Check list of Unionids of Kansas

- * Wakarusa River specimens
- Recorded but no specimens
from Wakarusa River.
1 Specimens outside
Wakarusa River.
- * *Fusconia flova* (Rafinesque)
 - | *Megalonaias gigantea* (Barnes)
 - * *Crenodonta peruviana peruviana* (Lamarck)
 - * *Crenodonta peruviana costata* (Rafinesque)
 - * *Quadrula quadrula* (Rafinesque)
 - * *Quadrula pustulosa* (Lea)
 - * *Quadrula nodulosa* Rafinesque.
 - | *Quadrula metaneura* Rafinesque
 - | *Quadrula cylindrica* (Say)
 - * *Tultogonia verrucosa* (Barnes) ♂♀
 - | *Plethobasus cyphus* (Rafinesque)
 - | *Pleurobema cordatum loccineum* (Conrad)
 - | *Pleurobema cordatum catillus* (Conrad)
 - | *Pleurobema cordatum pyramidatum* (Lea)
 - * *Elliptis dilatatus* (Rafinesque)
 - * *Unomeus tetralasmus* (Say)
 - | *Lasmigona costata* (Rafinesque)
 - * *Lasmigona complanata* (Barnes) ♂♀
 - * *Anodonta grandis* Say ♂♀
 - | *Anodonta imbecilis* Say
 - | *Anodonta suborbiculata* Say
 - | *Obovaria obvaria* (Rafinesque)
 - | *Ptychobranhus fasciolaris* (Rafinesque)
 - | *Arcidens emarginatus* (Say)
 - * *Strophitus rugosus* (Swainson)
 - | *Obliquaria reflexa* (Rafinesque)
 - | *Cyprogenia aberti* (Conrad)
 - * *Actinonaias carinata carinata* ♂♀
 - *Truncella truncella* (Rafinesque)
 - * *Truncella donaciformis* (Lea) ♂♀
 - | *Plagiola lineolata* (Rafinesque)
 - * *Leptodea fragilis* (Rafinesque) ♂♀
 - * *Leptodea laevissima* (Lea)
 - * *Proptera alata* (Say) ♂♀
 - * *Proptera purpurata* (Lamarck)
 - | *Proptera capax* (Green)
 - * *Carunculina parva* (Barnes) ♂♀
 - * *Ligumia recta latissima* (Rafinesque) ♂♀
 - * *Ligumia subrestrata* (Say) ♂♀
 - * *Lampsilis anodontoides anodontoides* (Lea) ♂♀
 - * *Lampsilis anodontoides fallaxiosa* (Smith) Simpson ♂♀
 - * *Lampsilis radicata seliguoidea* (Barnes) ♂♀
 - * *Lampsilis ovata ventricosa* (Barnes) ♂♀
 - *Drynomia triquetra* (Rafinesque) ♂♀

(indicate right or left shell.)

weight.
length posterior ridge

In grams. Indicate right or left shell.
External curved measurement
from first developing point of umbo
to ventral edge of posterior ridge

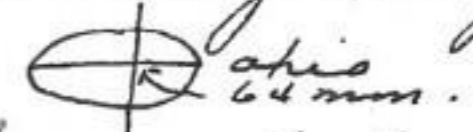
umbo-posterior ridge
width
height

Internal diagonal (straight)
greatest thickness one shell
greatest height perpendicular to
hinge ^{base.} line.



length

greatest length parallel to hinge
base line axis.



Center greatest height.

position along axis from anterior
edge  axis 6.4 mm.


height from umbo
umbo from anterior edge.

perpendicular to hinge base line 
line 90° from hinge base line to Ant. edge 

height from notch
notch to posterior edge
anterior wing - umbo
posterior wing - umbo.
umbo - notch

perpendicular to hinge base line 
from a line 90° from hinge base line 

lateral teeth from umbo.
height lateral teeth.

anterior upper edge of notch to umbo.
length of lateral teeth
at notch 

ventral edge pseudo-umbo



bridge below umbo



height umbo adductor
height anterior ^{adductor} scar
post basal swelling
posterior angle

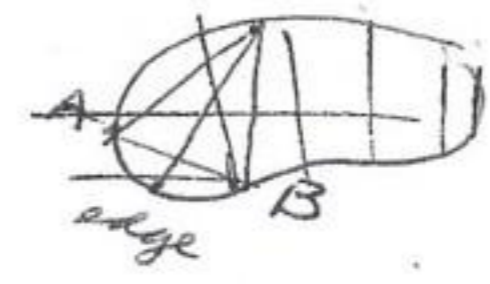


from posterior ridge (ventral)
to point below notch.
or distance
from line A-B
to edge.

ventral angle



degree of basal basal swelling



or distance from line A-B to edge

Measurements of Catalogued specimens (Unionids) collected July 23, 1966, NW Clinton, Kansas

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	REMARKS		
WEIGHT IN GRAMS																											
CURVED POST. RIDGE																											
WIDTH (1/2 SHELL)																											
CR. LENGTH																											
CR. HEIGHT																											
UMB. - POST. EDGE (DIAG.)																											
NOTCH - ANT. EDGE (DIAG.)																											
HEIGHT FROM UMB. (90° FROM BASE LINE)																											
LENGTH FROM NOTCH (90° FROM BASE LINE)																											
LENGTH HINGE LINE																											
UMB. - POST. EDGE (AXIS)																											
HEIGHT - ANT. EDGE (AXIS)																											
BASE TOOTH (90° FR. LIG. LINE)																											
UMB. - ANT. - UMB. (90° FR. BASE UMB.)																											
REQD. ADD. SCAR. EDGE																											
HEIGHT UMB. ANT.																											
WIDTH HINGE LINE (AT NOTCH)																											
A. POST. EDGE																											
A. UPPER POST. EDGE																											
A. POST. RIDGE																											
A. HINGE LINE - BASE TOOTH																											
660723-34	57	92	20	93	62	79	69	57	53	36	36	20	8	12.0	14.0	15.0	3.6	7.5	64	138	27	134					
FUSC. FLAVA																											
660723-31	180	148	26	136	98	128	97	72	90	64	44	22	16	21.0	9.0	19.0	4.2	8.6	90	115	38	115					
CREN. PERV.																											
660723-33	57	95	20	92	72	80	75	66	66	35	30	25	14	17.0	16.0	14.5	4.0	5.2	108	110	42	112					
QUAD. QUAD.																											
660723-40	103	100	24	88	71	82	76	60	59	45	24	18	14	20.0	11.0	17.0	4.6	6.3	87	113	38	109					
QUAD. PUST.																											
QUAD. NOD.																											
660723-37	186	136	24	164	91	138	113	83	76	68	65	34	12.3	17.3	21.0	19.0	3.5	8.0	63	140	38	116					
TRIT. VER																											
660723-32	19																										
UNIO. TETRA.																											
660723-32	201	163	26	173	112	150	122	100	106	61	68	37	16.4	21.0	31.0	25.0	2.0	9.5	80	135	22	135					
LAS. COMP.																											
660723-40	56	133	27	149	85	113	105	78	75	49	55	46	.5	3.0	27.0	31.0	4.5	2.3	62	154	26	150					
ONOD. GR.																											
660723-28	5	43	9.6	51	32	37	34	29	29	14	17	15	2.5	3.0	7.5	5.5	2.8	2.1	72	160	15	143					
TRUN. DONI.																											
660723-41	68	139	21	146	85	126	107	71	80	70	48	31	2.0	2.0	16.0	21.0	2.8	5.5	54	145	34	170					
LEPTO. FRAG.																											
660723-42	41	137	24	150	109	121	107	91	98	46	52	50	3.0	4.7	26.4	22.0	2.0	4.0	145	122	28	152					
LEPTO. LAEM																											
660723-39	61	116	20	130	94	112	86	71	88	45	48	34	7.0	9.5	13.7	16.4	1.9	7.0	126	119	30	130					
PROPT. ALA																											
♀																											
♂																											
CARUN. PAVIA																											
♀	1																										
660723-35	20	79	15	90	40	72	61	35	38	38	30	20	3.5	4.0	8.5	11.0	2.1	3.2	70	158	16	150					
LE. REC. LAT																											
♀																											
660723-43																											
LE. SUB.																											
660723-24	3																										
LE. SUB																											

660723-128

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

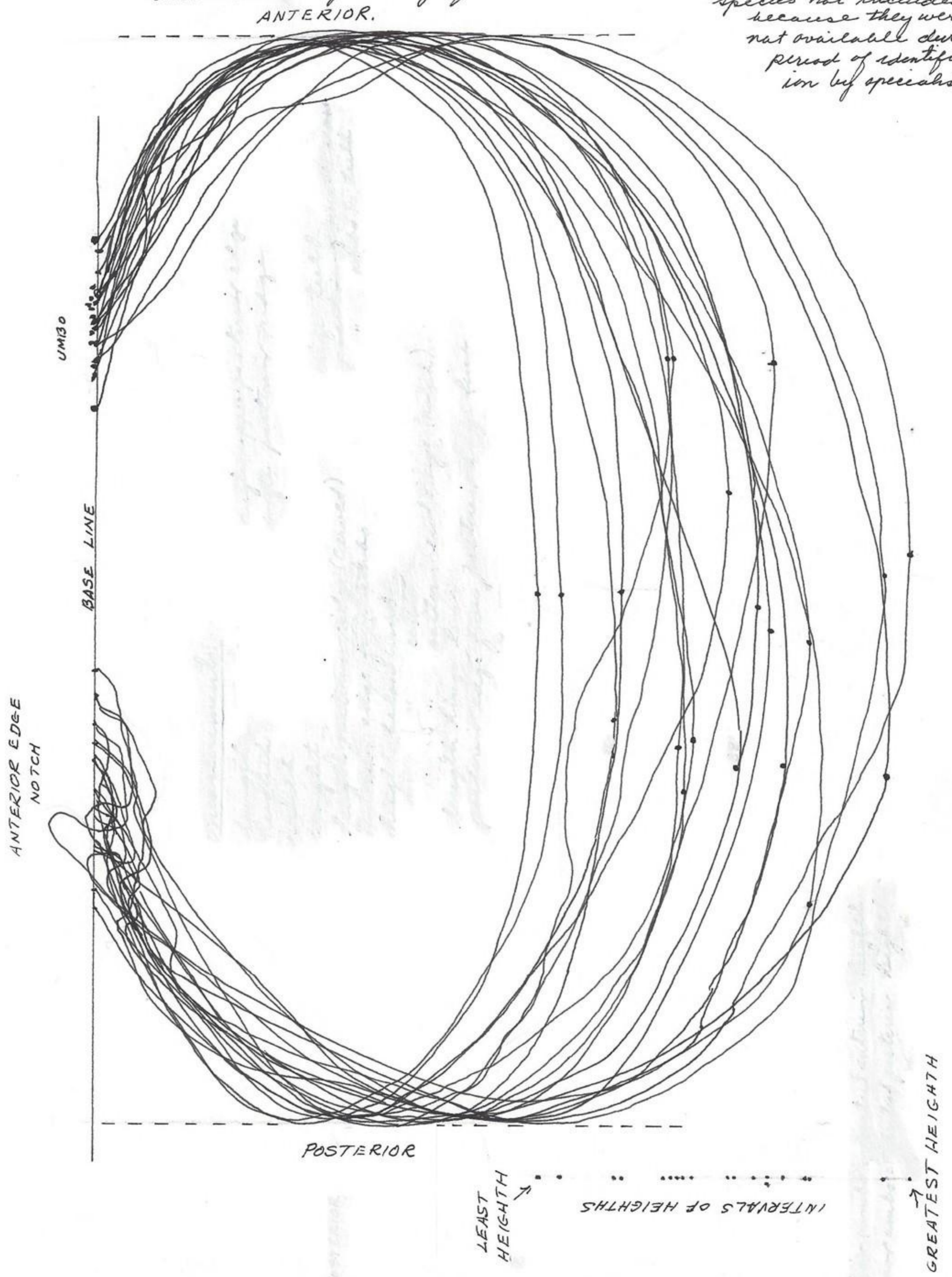
WGT. IN GRAMS
 CURVED POST. RIDGE
 WIDTH
 GR. LENGTH
 CR. HEIGHT
 UMB0-POST. EDGE (DIA)
 NOTCH-ANT. EDGE (DIA)
 HEIGHT FROM UMB0 (90° FROM BASELINE)
 LENGTH FROM NOTCH (90° FROM BASELINE)
 NOTCH-HINGE LINE
 UMB0-POST. EDGE (AXIS)
 HEIGHT ANT. EDGE (AXIS)
 GASE TOOTH LINE (90° FROM RIG. LINE)
 UMB0-UMB0 (90° FROM RIG. LINE)
 ANT. APP. SCAR. BOGE
 PREP. DIAM. ANT.
 HEIGHT-UMB0
 WIDTH HINGE LINE (AT MATH)
 A-POST. EDGE
 A-UPPER POST. EDGE
 B-POST. EDGE
 A-HINGE LINE -
 A-BASE TOOTH

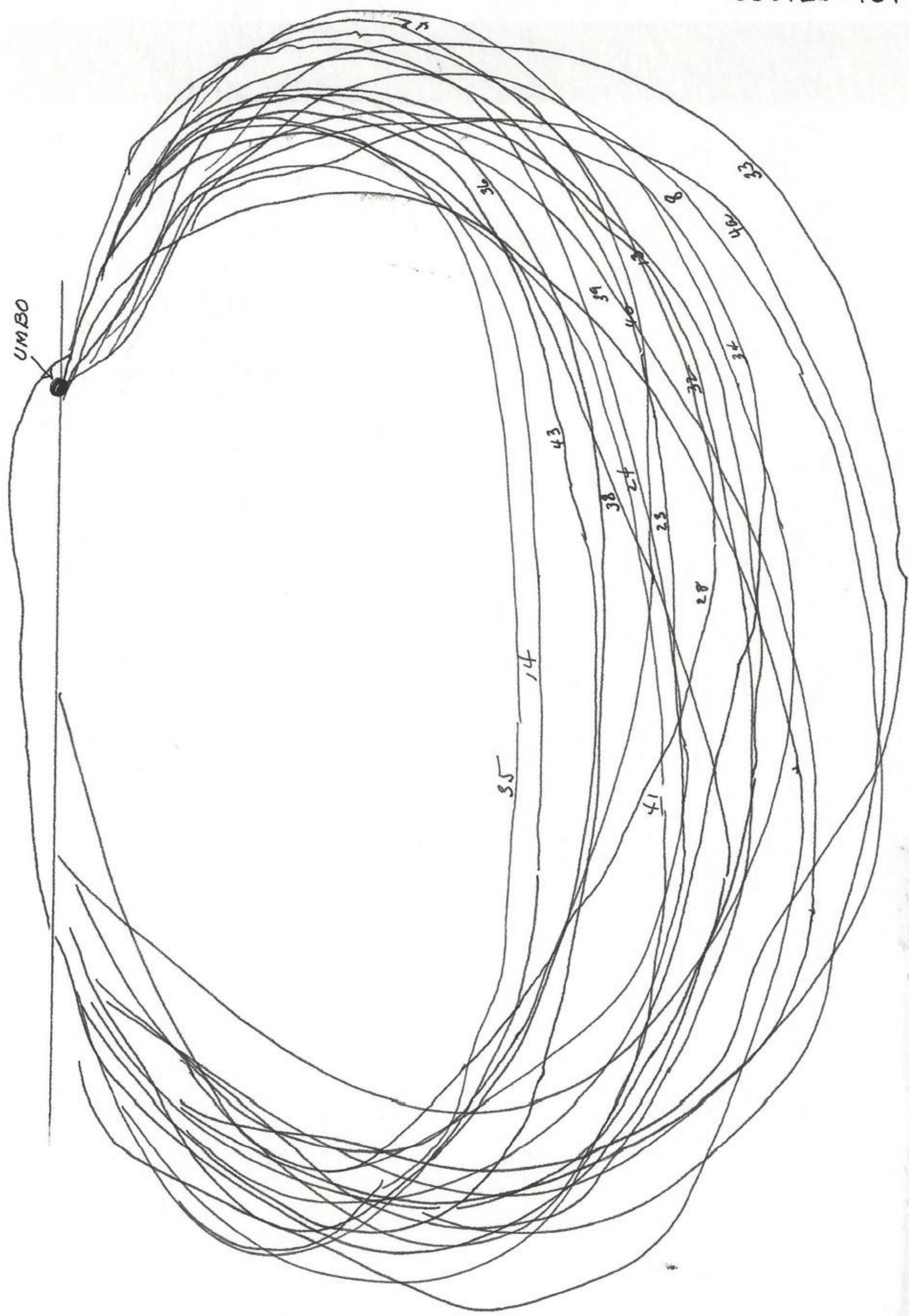
LAMPS. ANOD.	62	94	23	108	52	86	78	45	46	48	35	24	4.5	5.5	15.5	14.0	6.0	5.0	70	150	14	143		
LAMPS. ANOD																								
LAMPS. R.SIL.																								
LAMPS. R.SIL	85	108	25	116	71	99	88	56	71	54	35	26	5.6	7.0	11.0	18.0	3.0	6.0	86	138	33	144		
660723-138																								
LAMPS. O.VEN	236	151	36	151	100	124	120	86	85	72	38	40	11.0	14.6	22.0	23.0	7.0	10.0	105	138	28	135		
660723-89																								
LAMPS. O.VEN	105	115	29	119	93	102	102	77	80	59	26	33	6.0	10.0	19.0	20.0	6.0	8.5	120	123	27	125		

130

660723-130

The following outlines are from species collected and catalogued on June 23, 1966 NW of Clinton on the Wakarusa River. Drawings show all specimens enlarged to same length. Species can be determined by overlay of individual outlines to follow. (2 or 3 species not included because they were not available during period of identification by specialist)





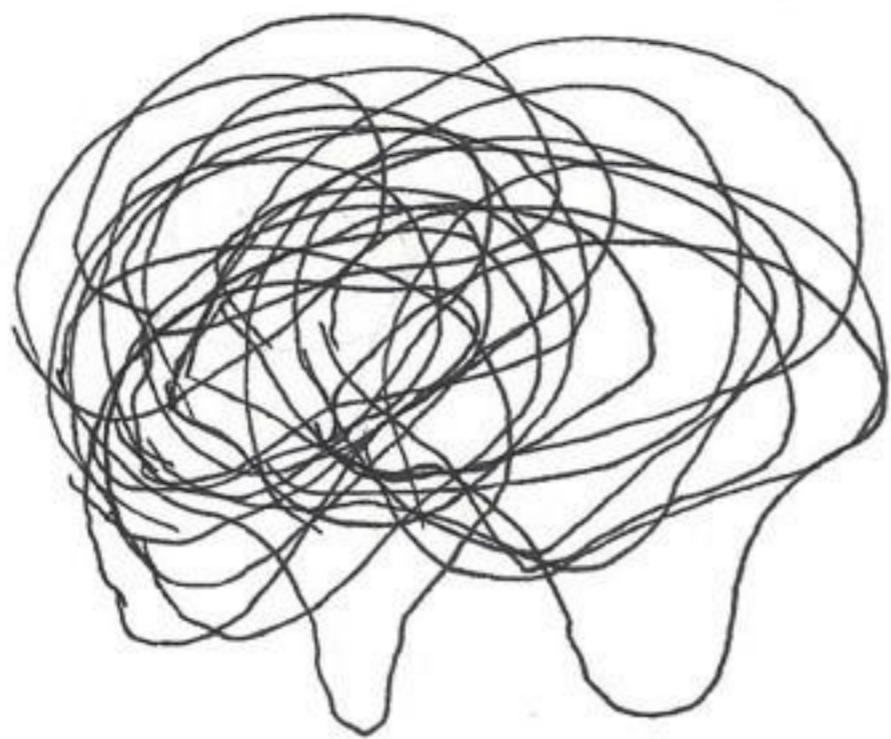
Outlines of Unionids collected and catalogued June 23, 1966 from NW Clinton (Wakarusa River). The specimens that were enlarged to common length were superimposed with the point of the umbo as common focal point; numbers are the consecutive catalogue numbers of the species illustrated. Example 660723-(34) For this figure and preceding one see outline drawings of each species beyond.

147
132

660723-132

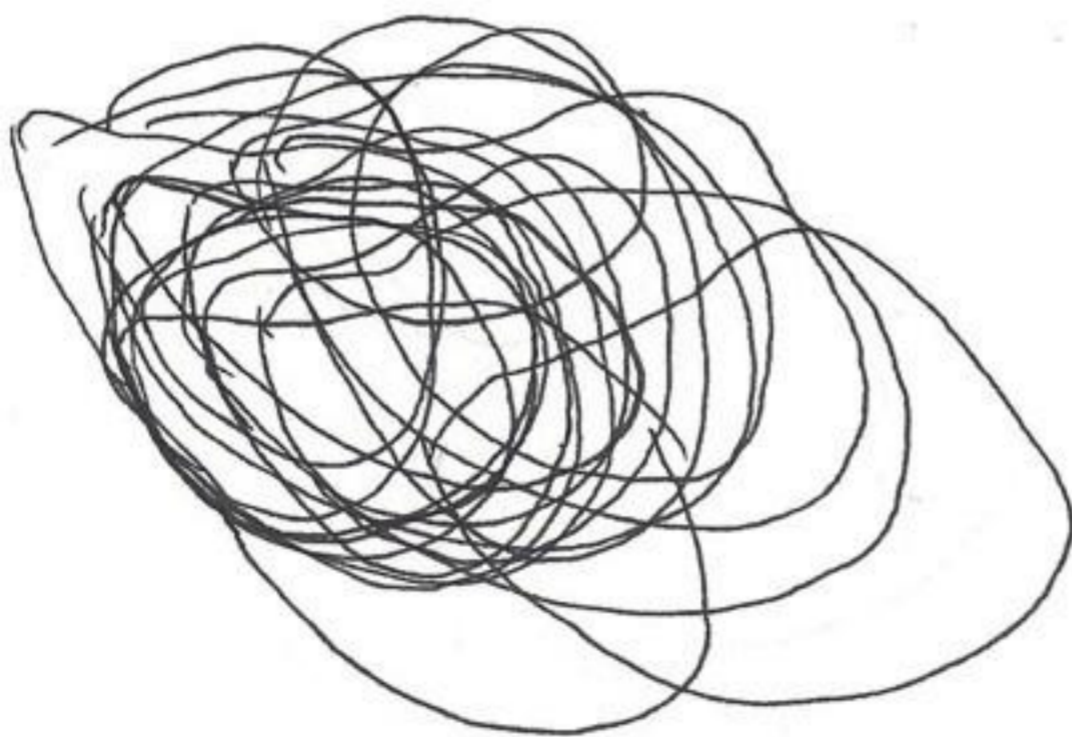
Muscle scars of catalogued specimens of *Unio* collected July 23, 1966. All specimens enlarged to common length.

ANTERIOR



BASE LINE

Muscle scars:

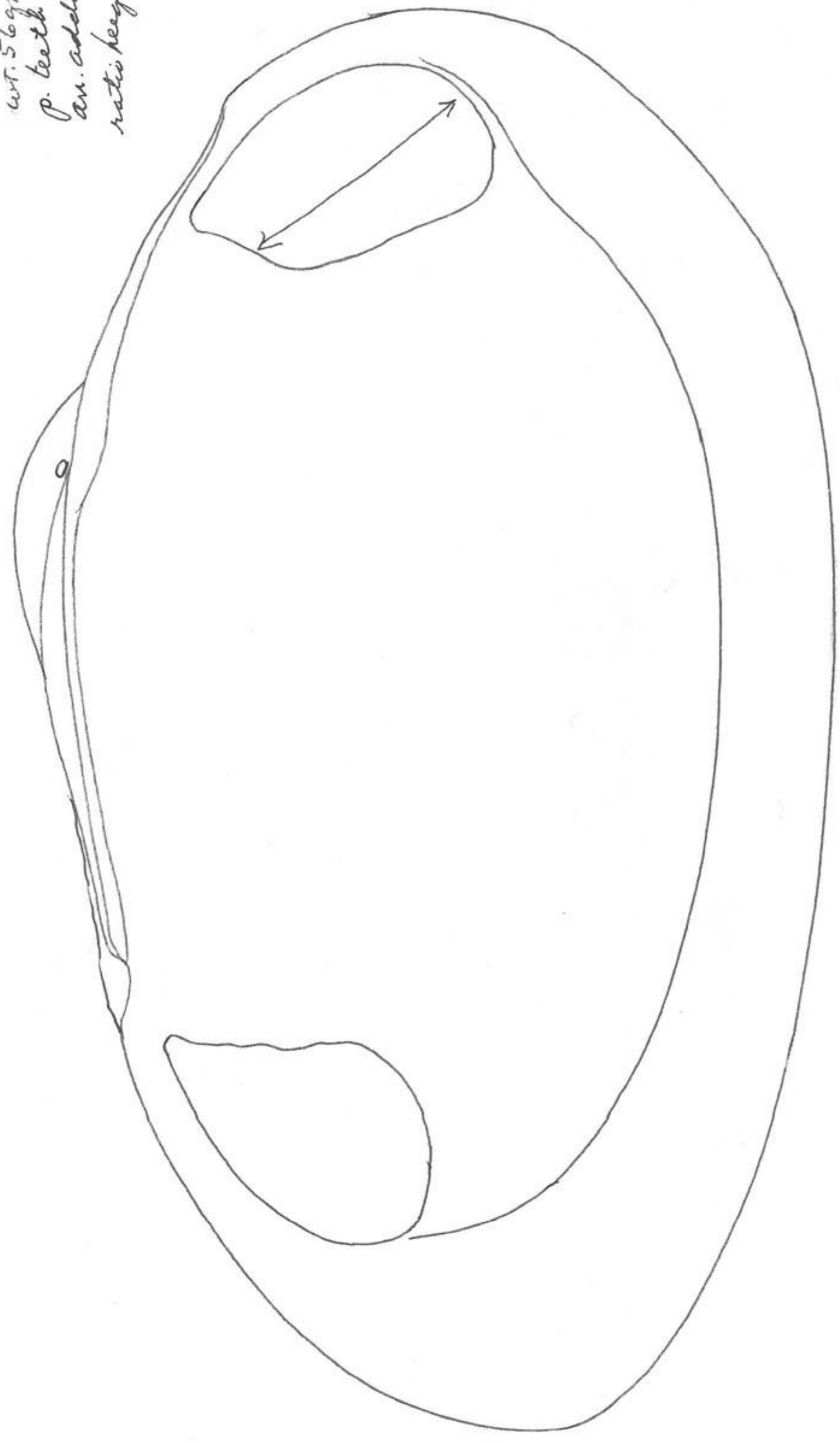


POSTERIOR

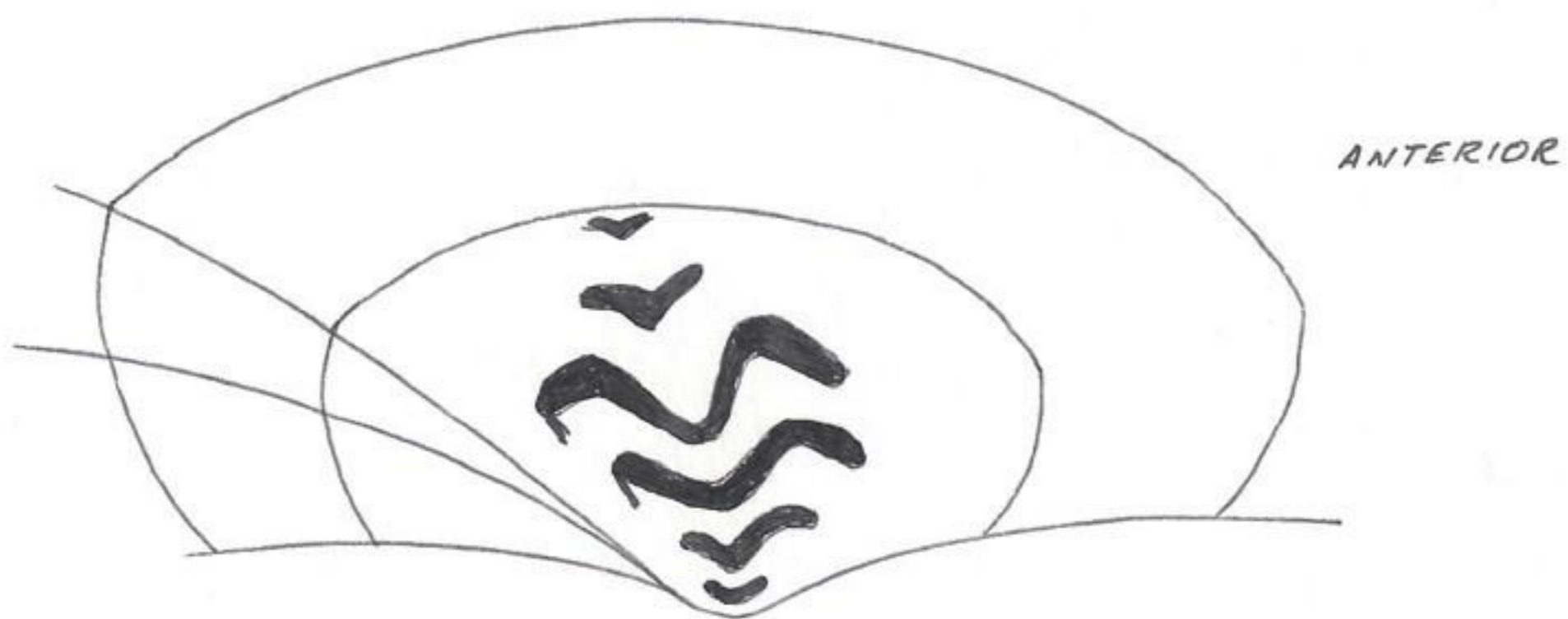
43
133
8

ANODONTA GRANDIS

660723-40
L. 148; h 85; w. 27.
wt. 56 mg
P. teeth .5 mm
An. adductor 28
ratio height to length .53



This drawing and the 17 species of Anodonta to follow are specimens collected July 23, 1966, NW of Clinton, Kansas. The measurements employed are in upper left side of each drawing. All specimens enlarged to a common length. Suture drawings and other figures of specimens may or may not be of the catalogued specimen.

ANODONTA GRANDIS

SCULPTURE OF UMBO

Dark color in contrast to yellow of *Leptodea fragilis* is a good field character.

135

CARUNCULINA PARVA

660723-23

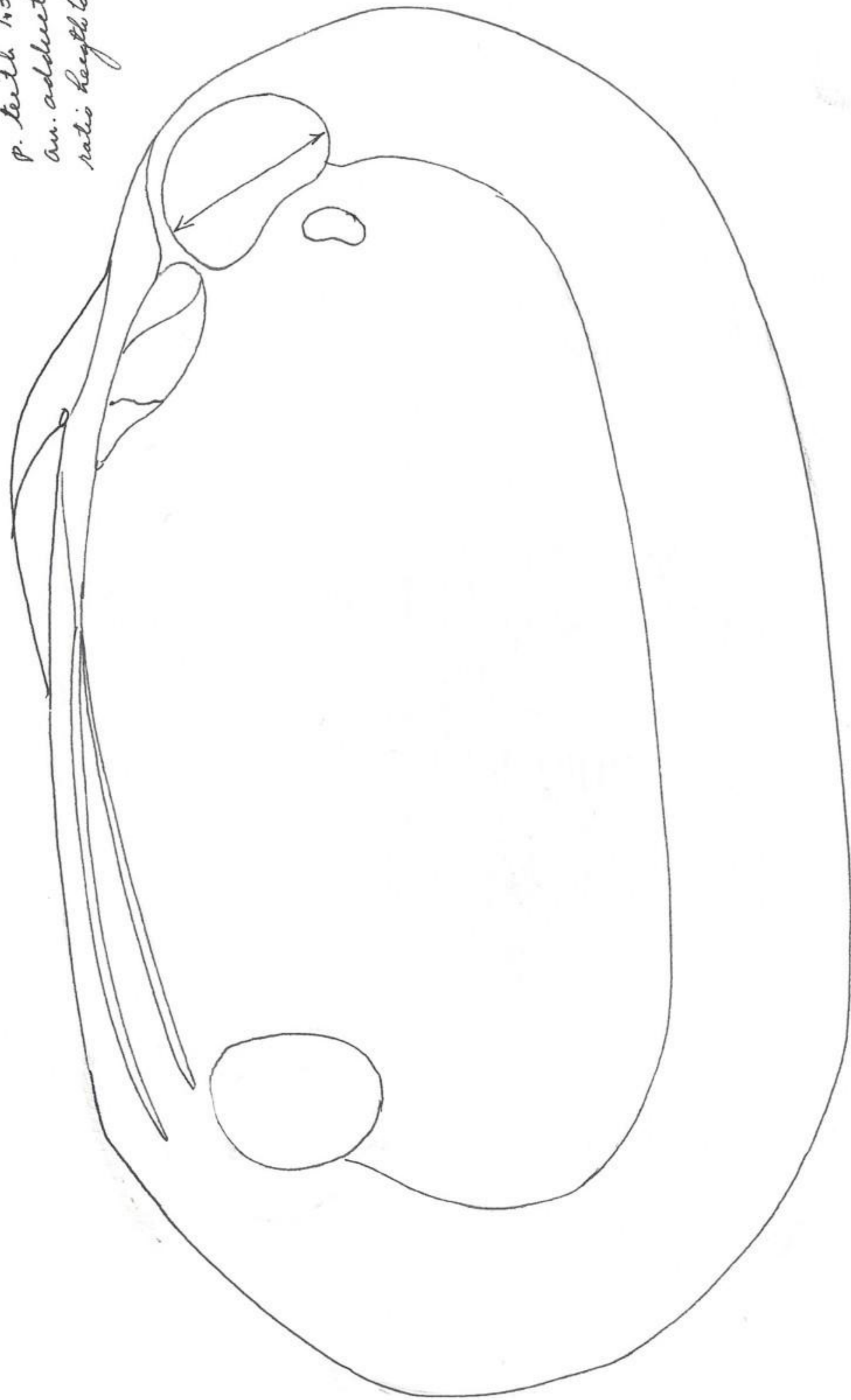
L. 2.6 mm; h. 1.5; 5 width.

wt. 1 gm

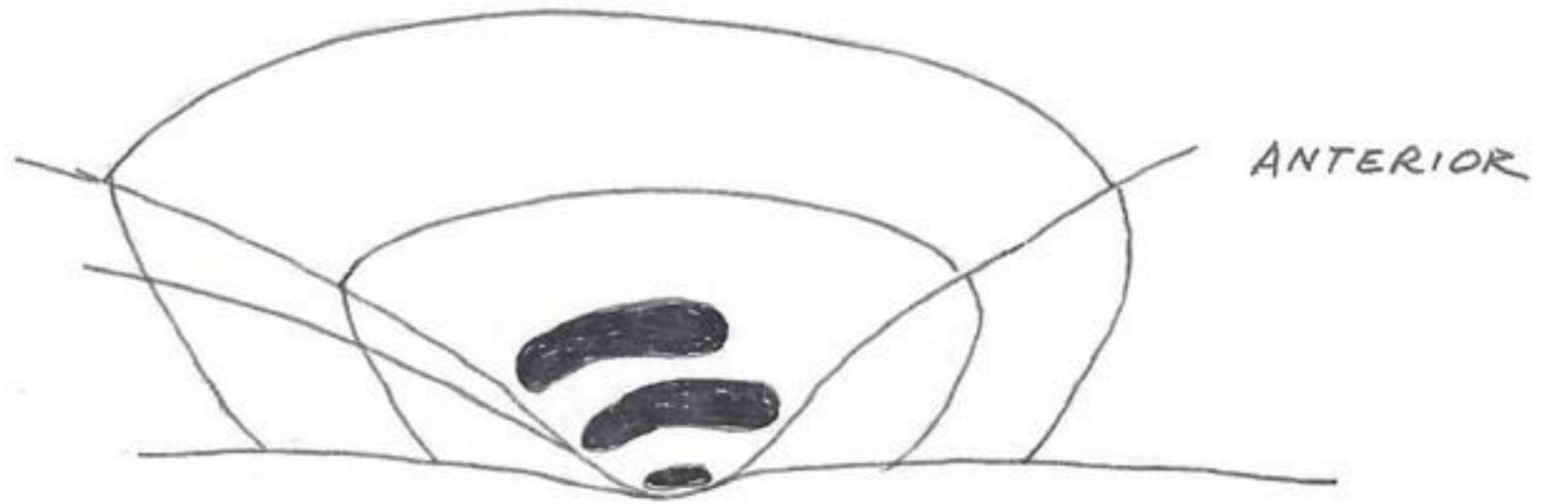
P. teeth 1+3

an. adductor 3.2

ratio height to length 5%



CARUNCULINA PARVA



660723-23

SCULPTURE OF UMBO

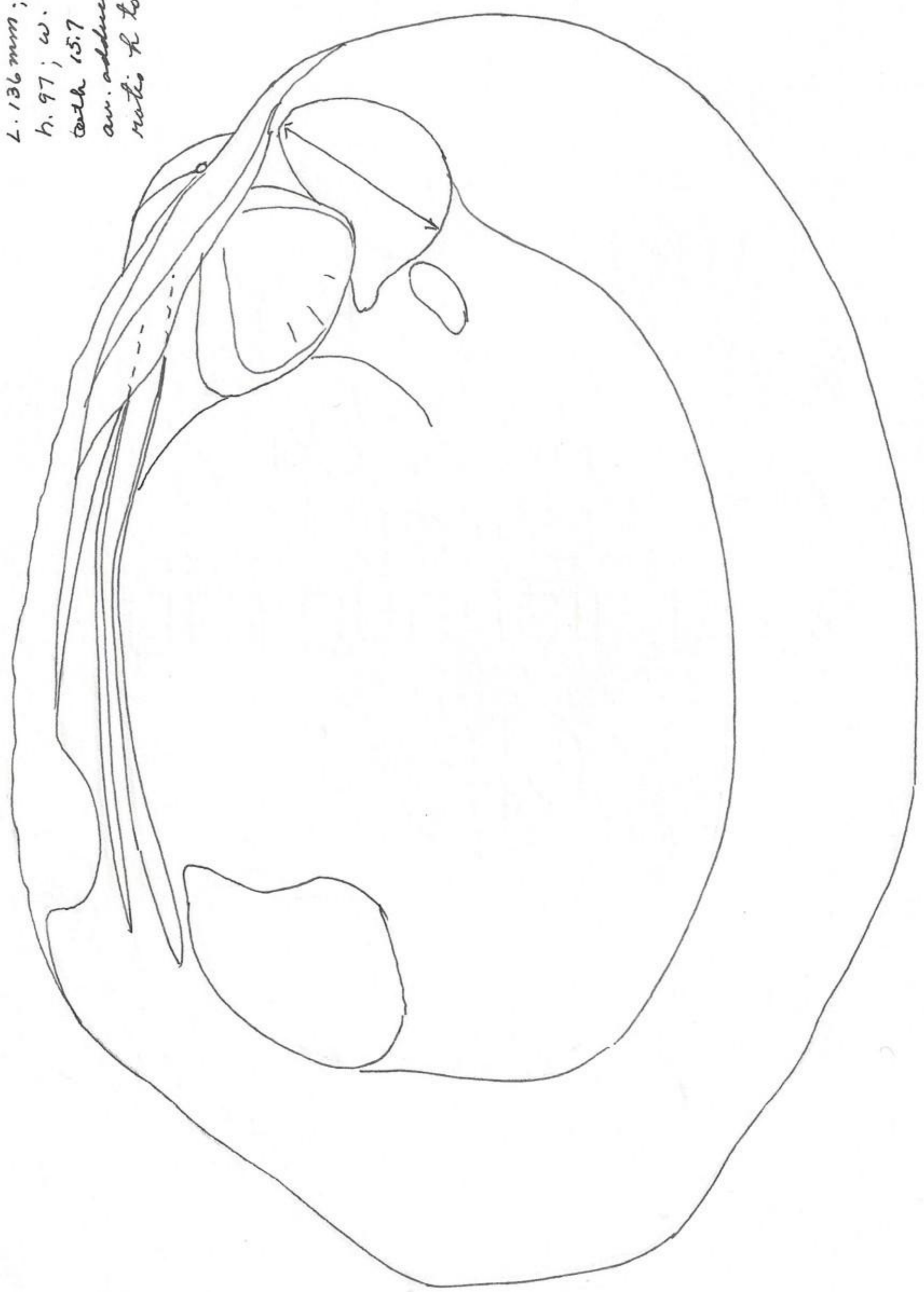
44
137
✓

660723-137

CRENODONTA. P. PERUVIANA

660723-31

L. 136 mm; wt 180 gms
h. 97; w. 26.
teeth 15.7
an. adductor 20 mm
ratio R to Leng = 64

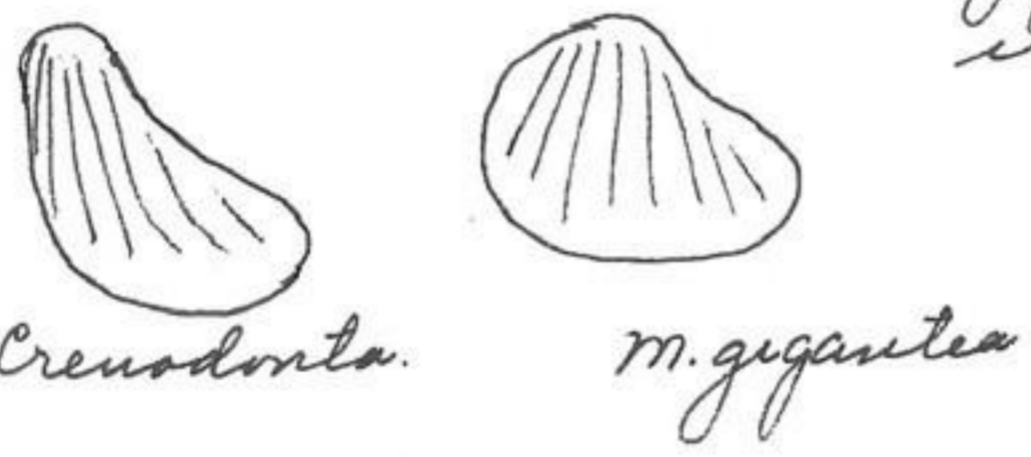


CRENODONTA PERUVIANA PERUVIANA

In comparison with *Megalonacis gigantea* which it closely resembles, *Crenodonta* is more rounded than *Megalonacis*. The valley of ^{right} pseudocardinal teeth, is deep in *Crenodonta* but shallow in *M. gigantea*.

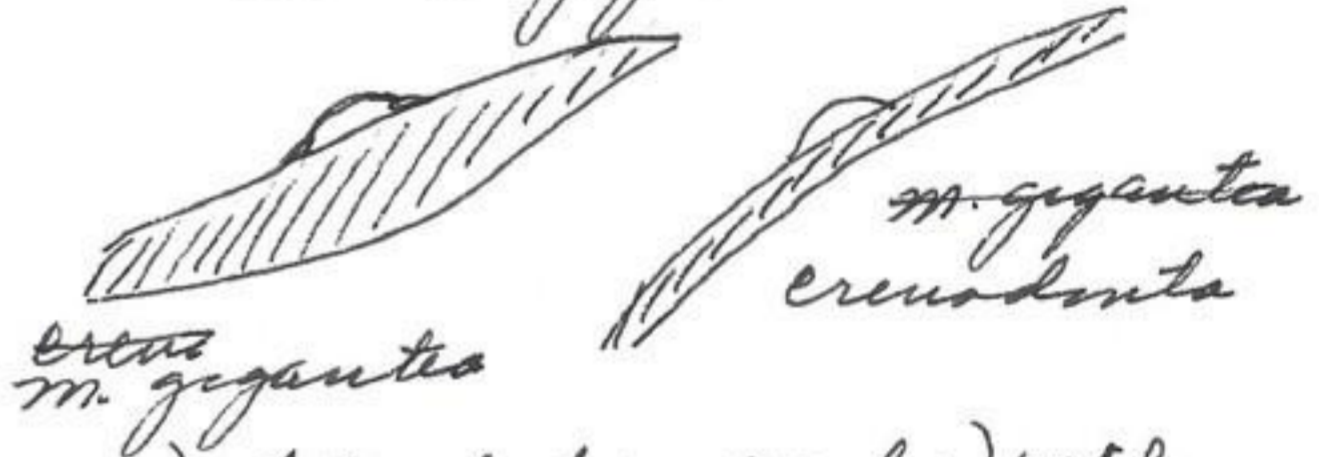


The anterior scar in *Crenodonta* is more pointed and to anterior, whereas in *M. gigantea* it is rounded and apex is to center.

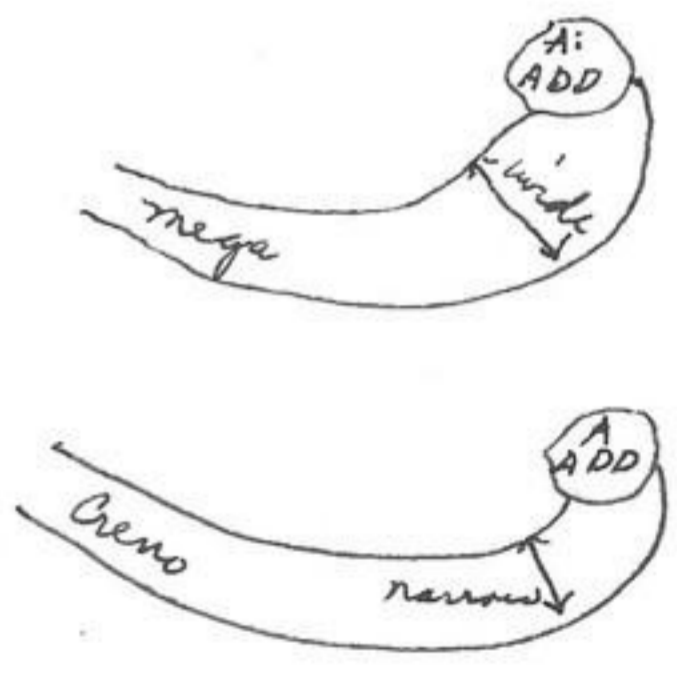
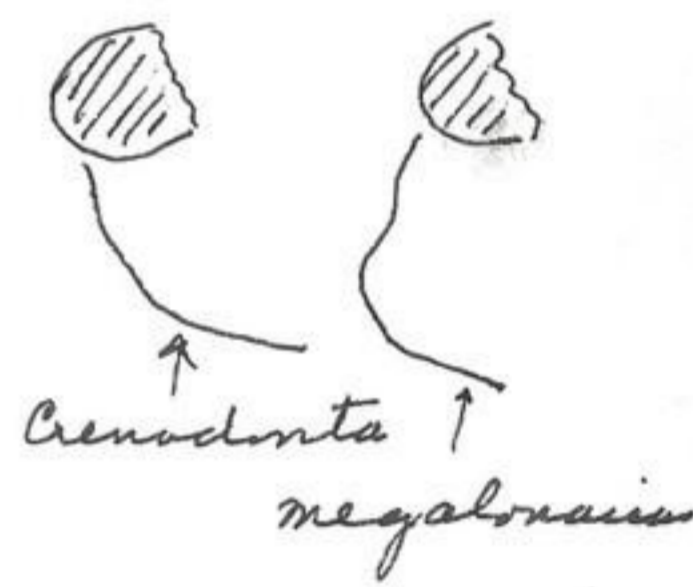


The hinge ligament is narrow in *Crenodonta* and wide in *M. gigantea*.

Hinge in *Megalonacis* relatively longer. Umbo cavity deeper in *Megalonacis*.



Megalonacis has (in some specimens not eroded on umbo) with characteristic wrinkles. Umbo of *Crenodonta* more anterior. Pallial line at posterior adductor muscle irregular ridges in *Crenodonta* anterior to lateral ridge but seldom beyond in *Megalonacis*.



FUSCONAIA FLAVA

660723-34

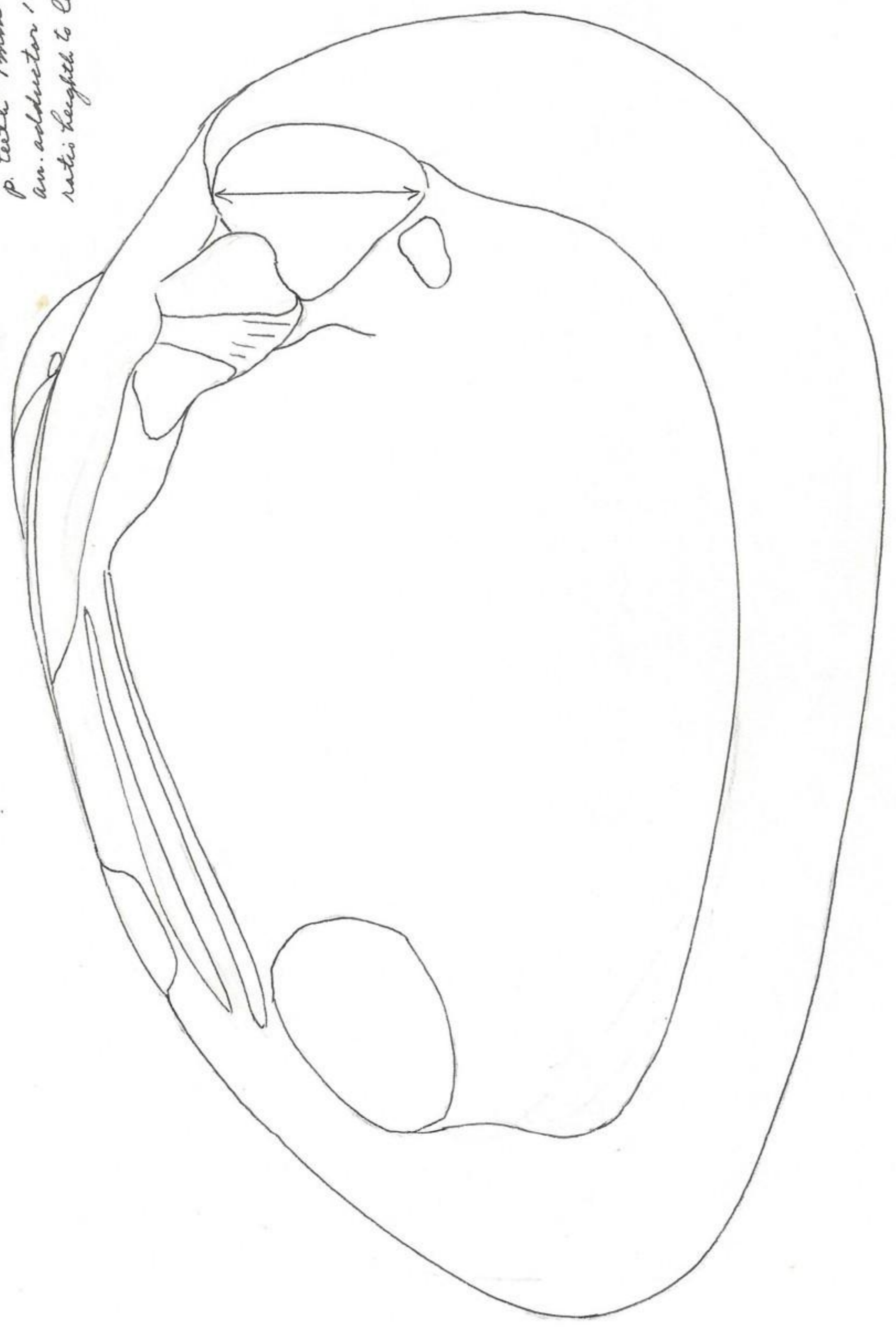
L. 94 mm; 62 h; 20 width.

wt. 57gms

p. teeth 7mm

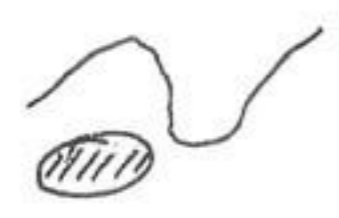
an. adductor 15mm

ratio height to length = 63



FUSCONAIA FLAVA

Like *Q. quadrula* but lacks pustule and is more elongate and anterior adductor scar with level of pseudocardinal tooth rather than fitted along side. Posterior edge (lower) is noticeably more extended than in *Quadrula quadrula*



F. flava



Q. quadrula.

LAMPSILIS A. ANADONTOIDES

660723-14

L. 110; h. 54; w. 22.

wt. 62 gms

p. tooth 4.6

an. adductor 14

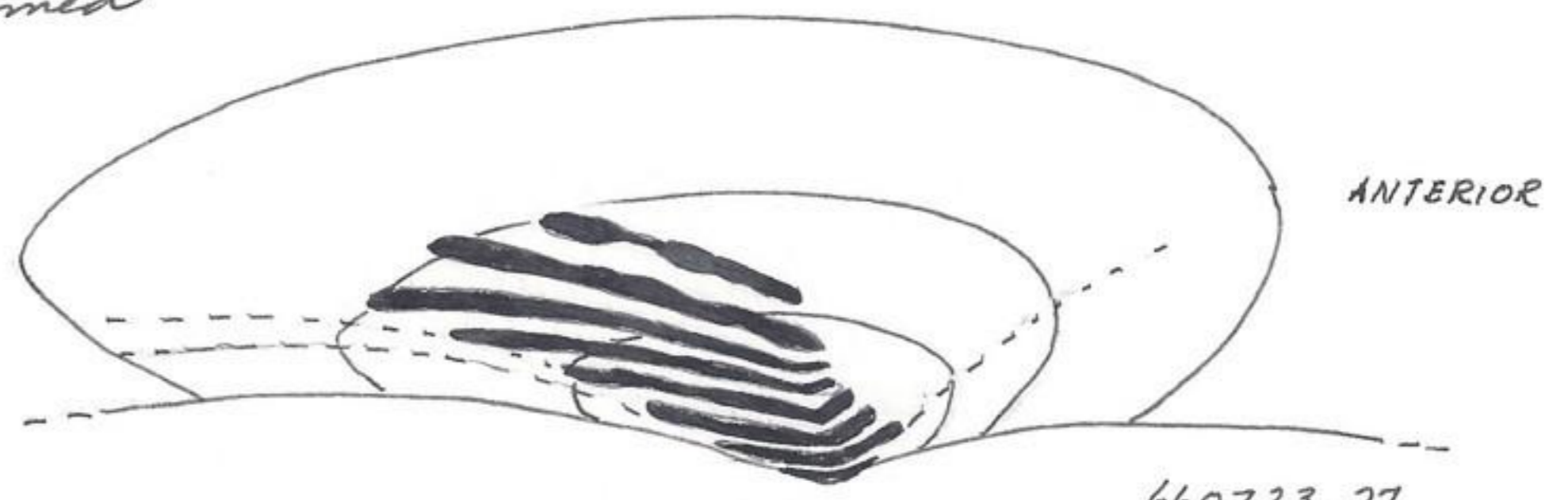
ratio height to length = 45



142

LAMPSILIS ANODONTOIDES ANODONTOIDES

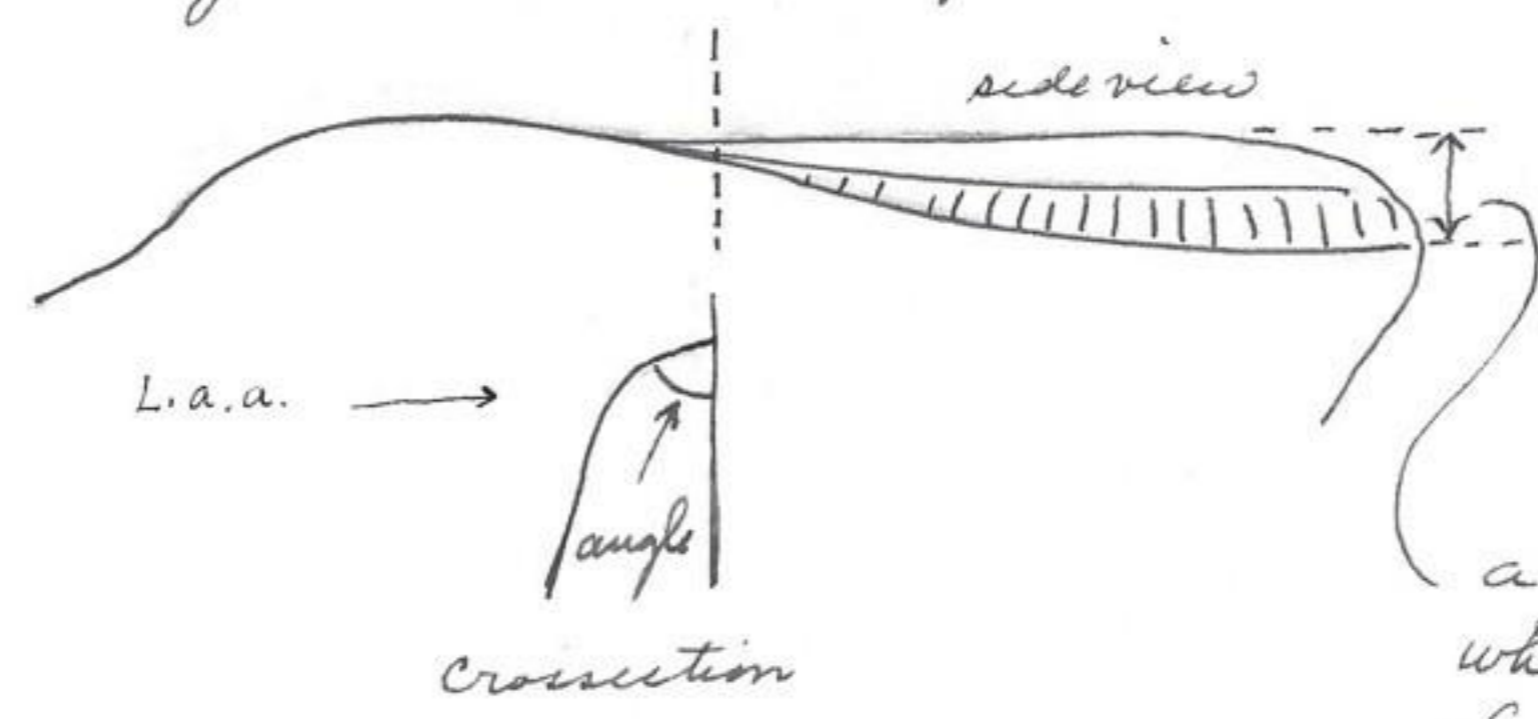
sculpturing with widely spaced, slightly diverging lines to posterior. anterior lines more closely spaced and short in length. Lines do not transgress on hinge slope of posterior ridge. Outer lines incompletely formed



660723-27

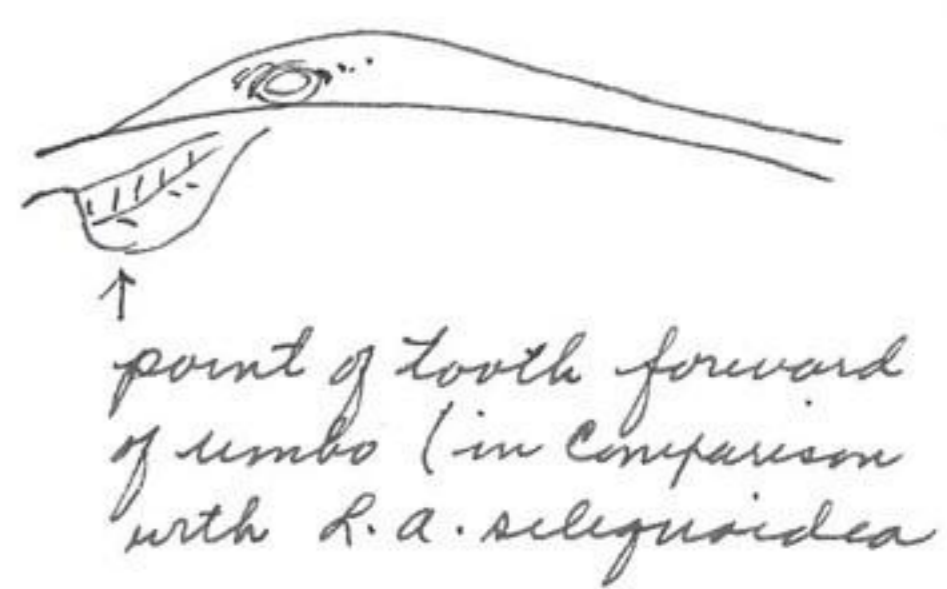
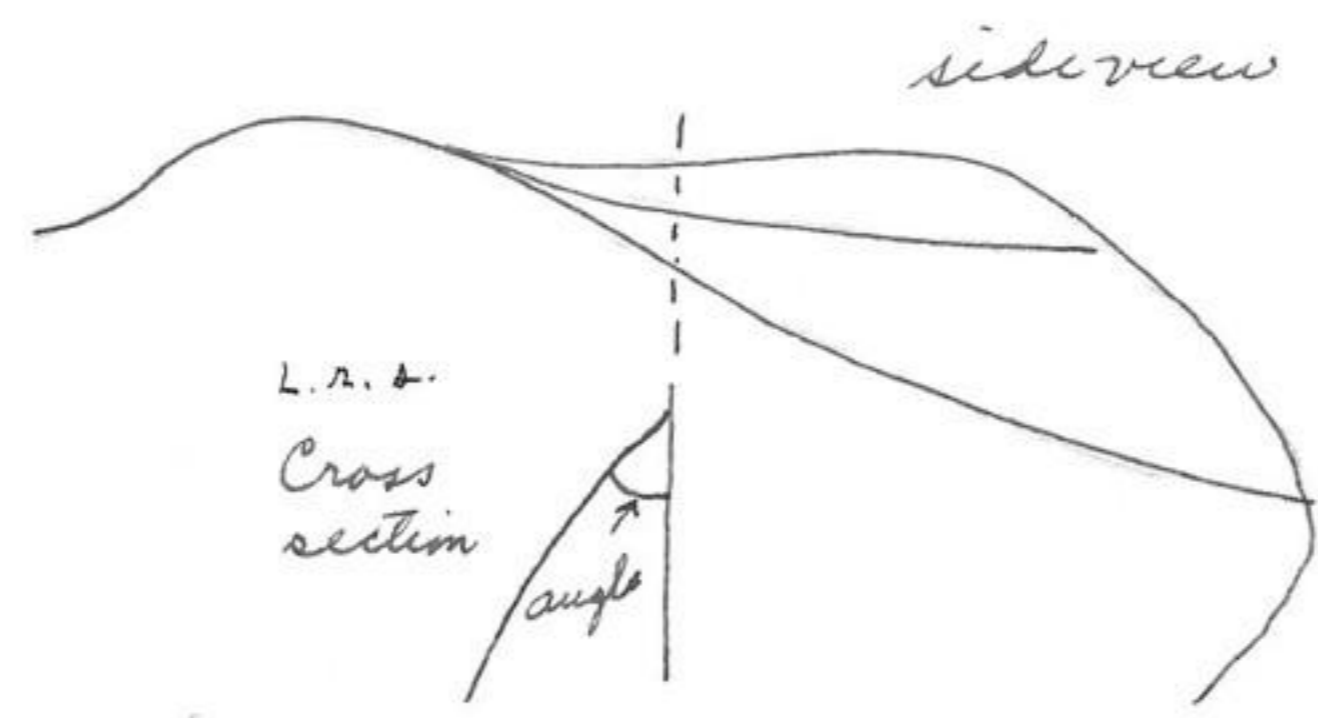
SCULPTURE ON UMBO

posterior ridge close to hinge line and as a result produces a greater angle than does *Lampsilis radiata siliquoides* (see below)

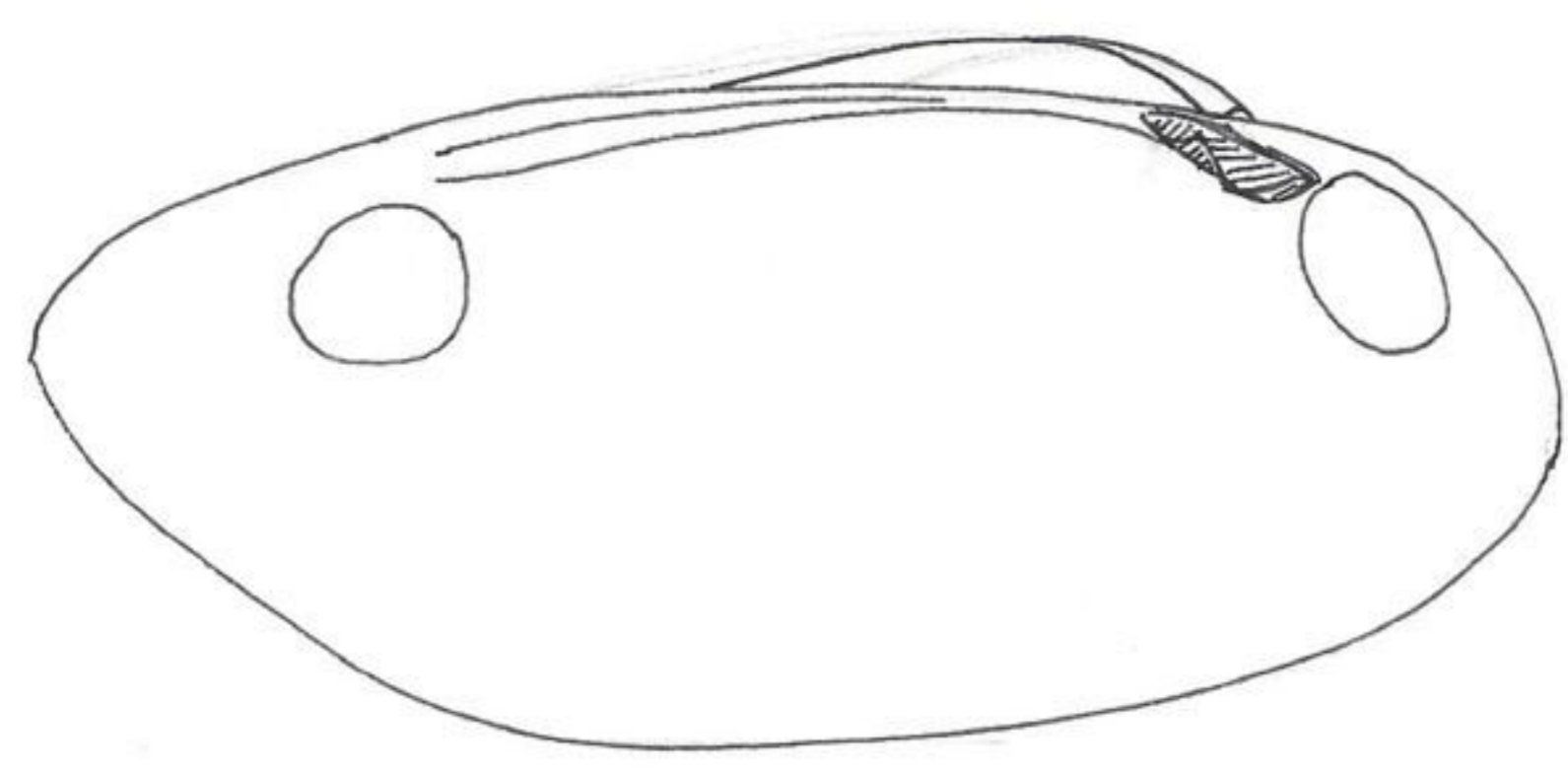


this means that when shell is viewed from inside with vision 90° to perpendicular shell.

a good measurement when comparing with *L. a. siliquoides*



L. r. siliquoides for comparison



LAMPSILIS OVATA VENTRICOSA ♀

660723-8

L. 120 mm; 97 h; 29w.

wt. 105 gms

teeth 7 mm

an. abductor 20.5

ratio length to length 78



LAMPISILIS OVATA VENTRICOSA

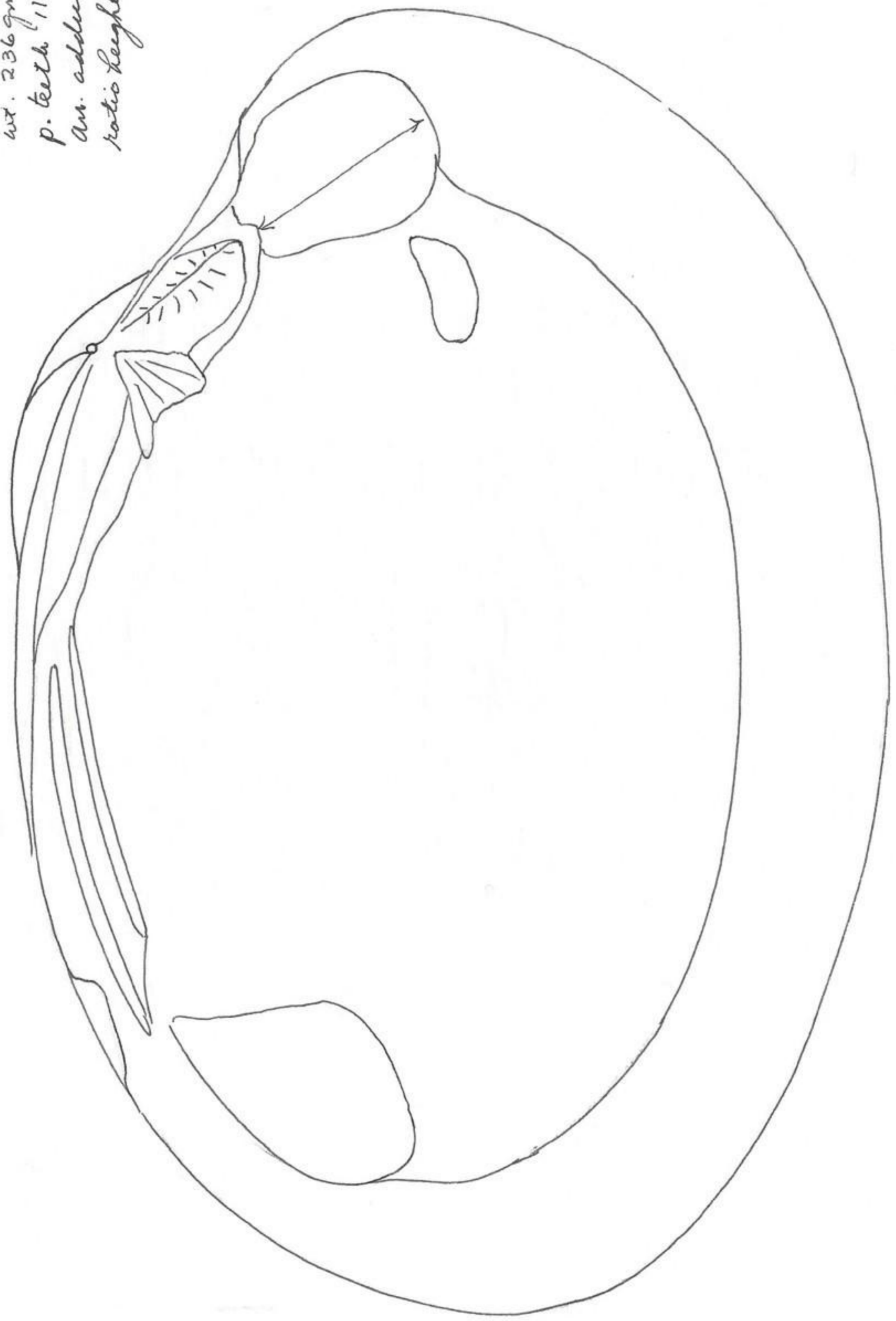
660723-13

L. 151mm; h 100; 36 w.
wt. 236 gms

p. teeth 11 mm

an. adductor 22.5

ratio length to length = 65




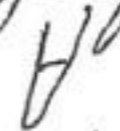
LAMPSILIS OVATA VENTRICOSA

End of beak cavity can ^{not} be seen in comparison to Actinonacis which cannot be seen.

Interdentum thick

teeth heavy

Ratio ligament to posterior extension (♂) approx ~~47%~~ ^{L.O.V. ~~less than~~ ^{is} 63%}. In ^{actino} $\frac{8}{7}$ about $\frac{1}{1}$ 26 to 1.11%.

Anterior edge of shell thick and wide angle  but thinner in Actinonacis 

Posterior ridge in Actinonacis is concave and straight while in L. ovata the ridge is convex and arched.



Teeth higher + more tapered in fit with better support of the two lateral supporting teeth



Actino. L. ovata.

Anterior adductor muscle



Actino

Anterior adductor muscle



L. ovata

LAMPSILIS RADIATA SILIQUOIDEA

660723-38

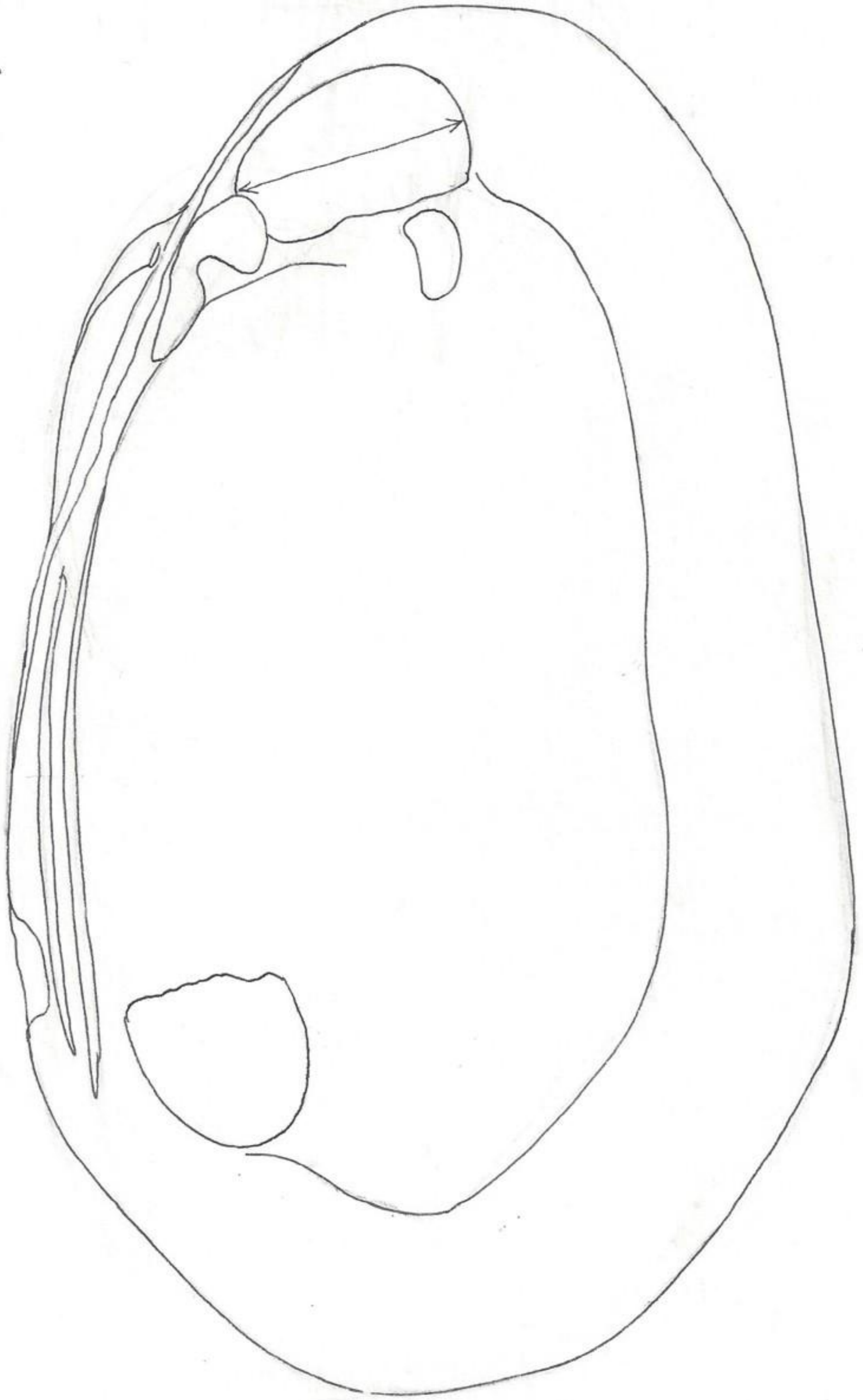
L. 118; h 72; 25 wid.

wt. 85 gms

P. tooth 4.6 mm

an. adductor 20

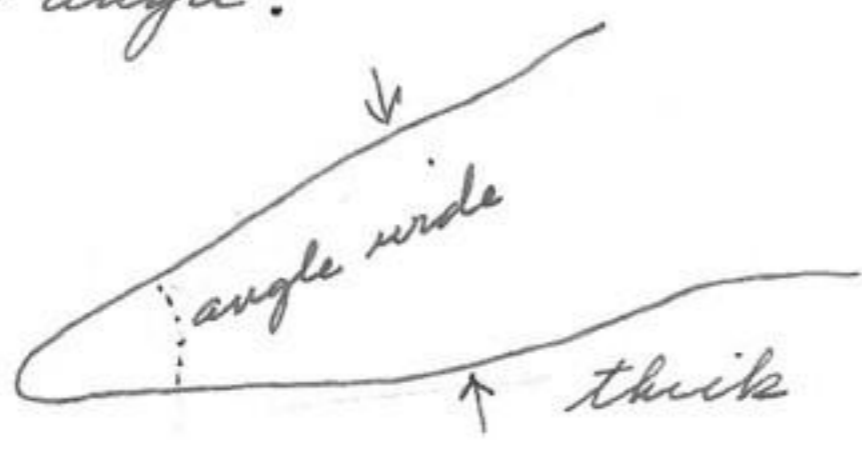
ratio length to length = 62



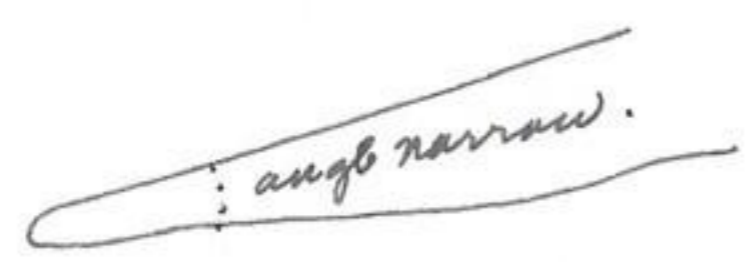
147

LAMPSILIS RADIATA SILICOIDEA

Anterior edge of shell unusually thick with wide angle.



in comparison with *L. a. anodontoides*




L. r. sil has more of a rounded posterior end than *L. a. anodontoides*.

greatest thickness more in ♀ because of post-basal swelling. In ♂ more centered



width of shell  greater

than *L. a. anodontoides* which is 

LASMIGONA COMPLANATA

660723-32

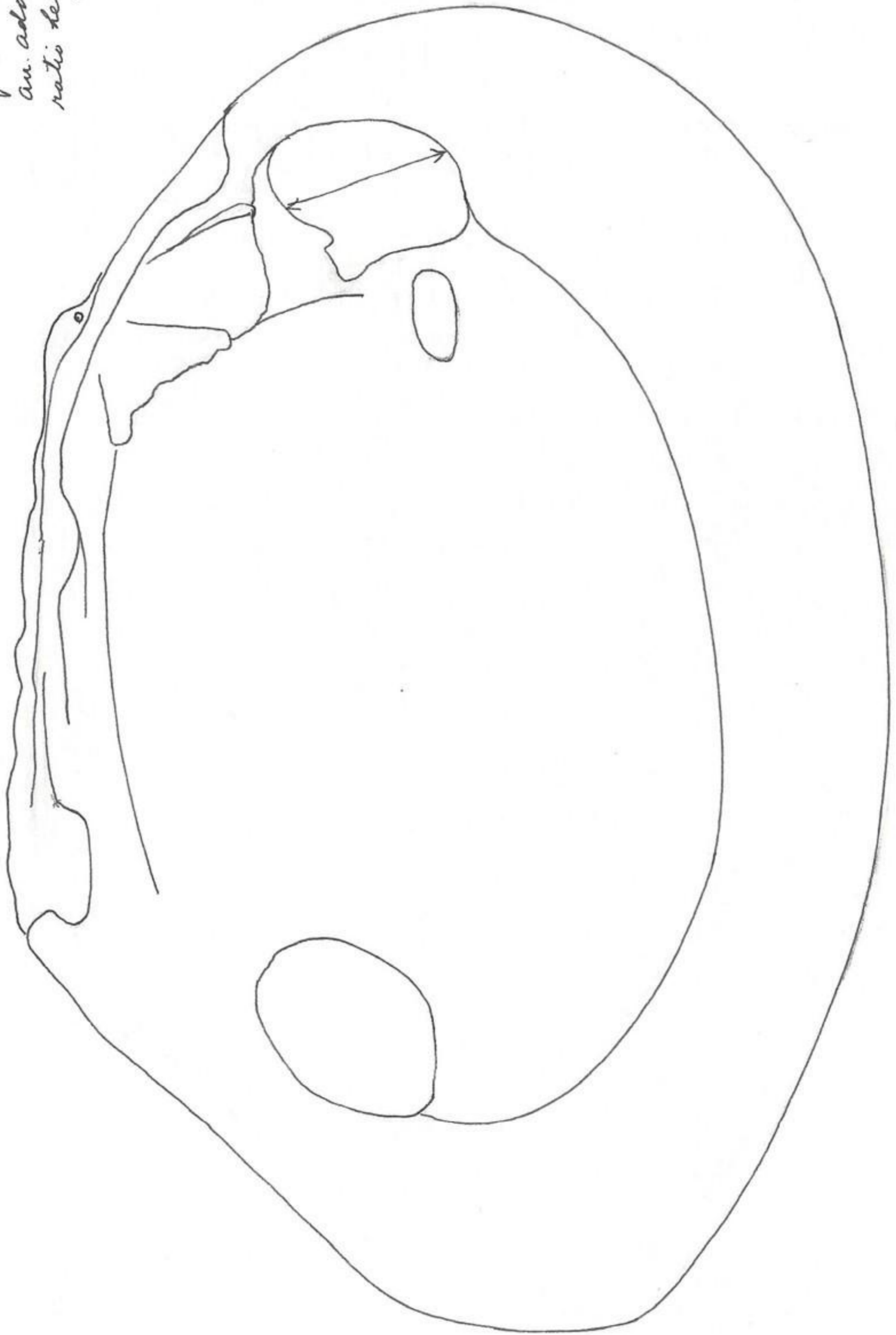
L. 173 mm; h 112; w. 25

wt. 201 gms

P. teeth 17 mm

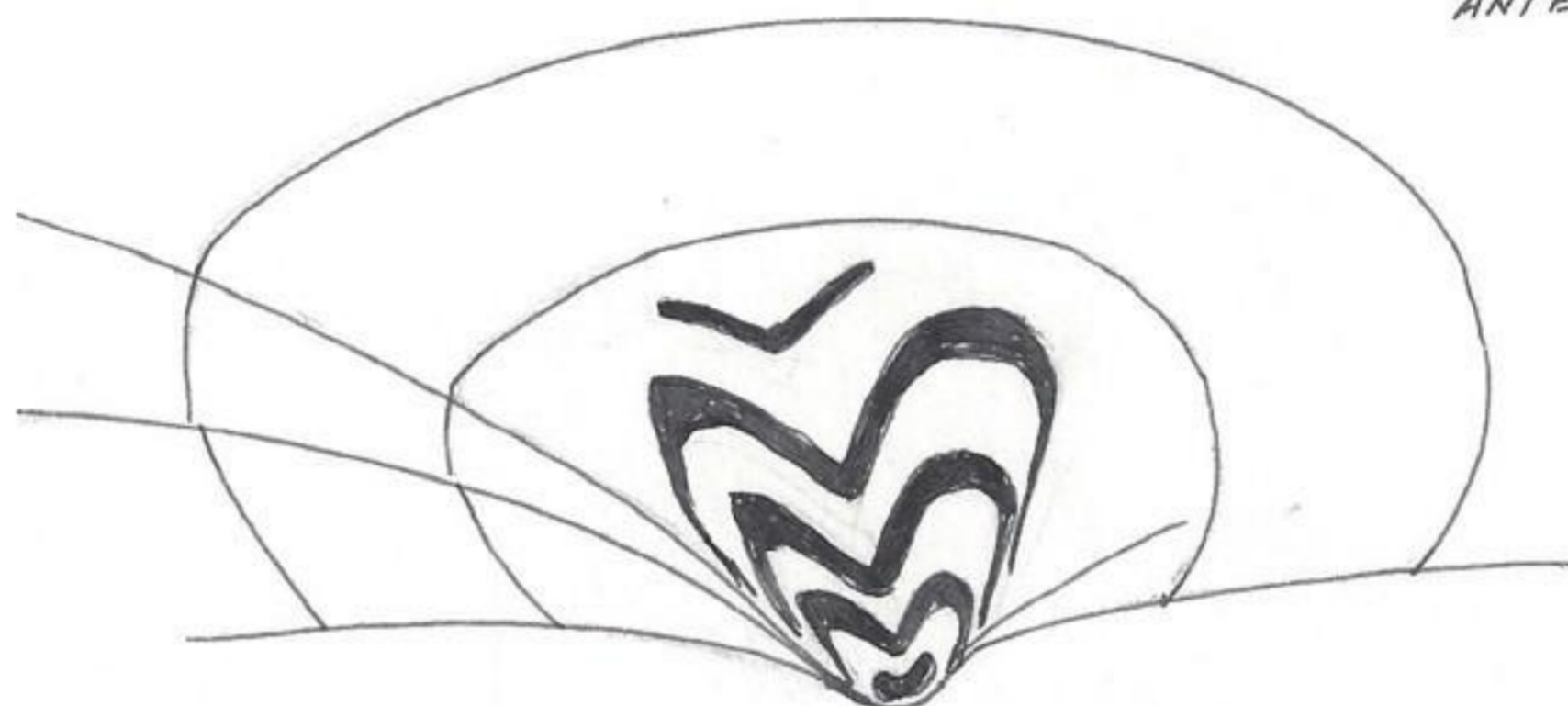
an. adductor 23.2

ratio length to length = 64



LASMIGONA COMPLANATA

ANTERIOR.



SCULPTURE OF UMBO

check increase in width from young to adults and correlate with weight or thickness of shell.

check frequency of ridges on posterior slope. Some have them and some do not.

♀♀ of this species have slightly swollen post-basal region. Check to see if species can be separated into ♂ + ♀.

Get index of height to length and compare with *L. costata*.

LEPTODEA FRAGILIS

660723-41

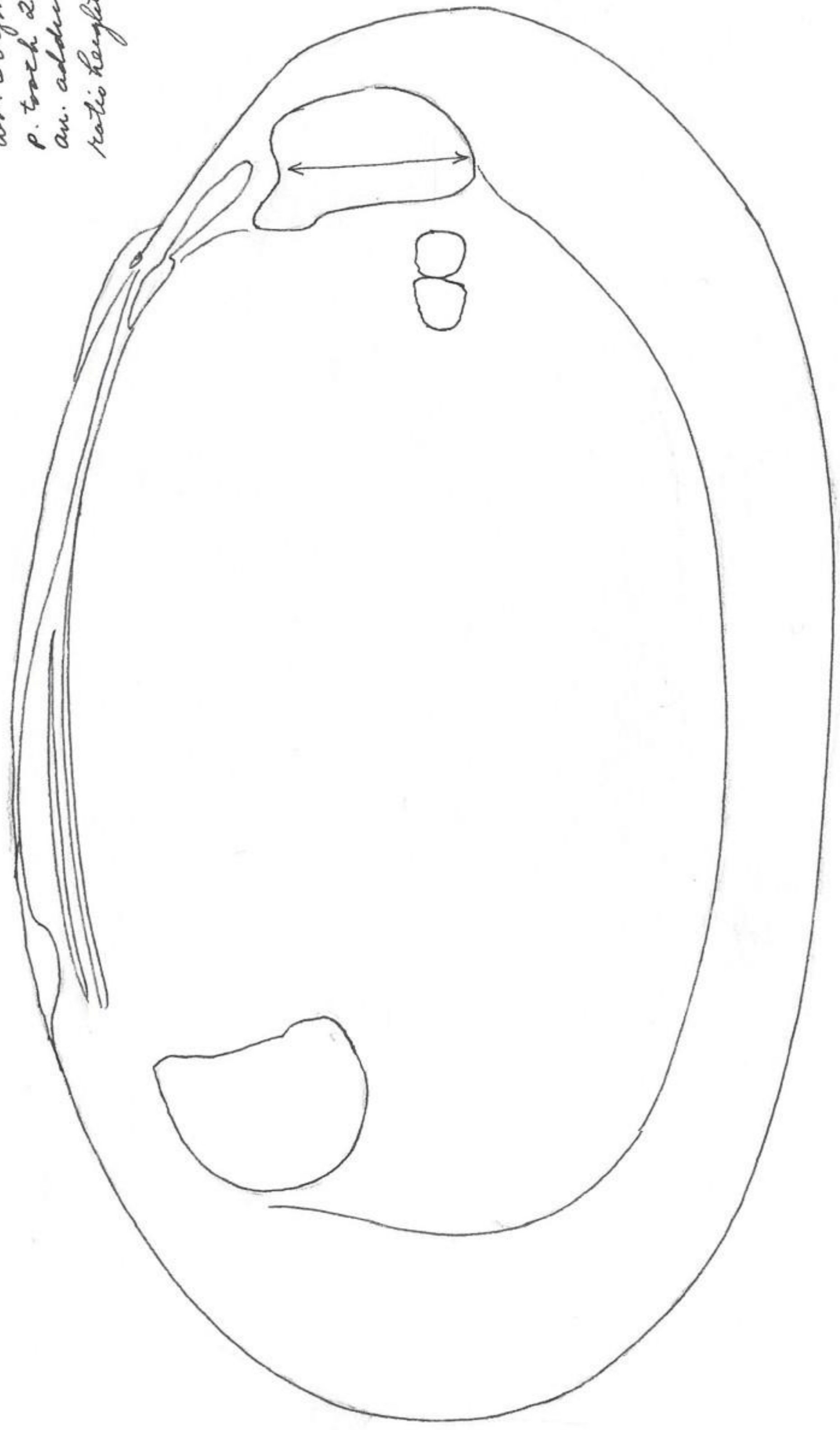
L. 1.47 mm; h. 86; w. 21.

wt. 6.8 gms

P. tooth 2 mm

an. adductor 20

ratio height to length = .55



LEPTODEA FRAGILIS

In comparison with *laevissima*, it is more elongate; the lateral teeth are relatively longer and less curved; the umbo is more anterior, the wing is less developed; the shell more inflated, shell color yellow in comparison to darker brown; nacre white with some pink & yellowish tint whereas in *laevissima* it is deep mauve or pink.

Dorsal muscle scars easily seen and entrenched. (For sexual dimorphism see *Leptodea laevissima*)

Comparisons with *laevissima*:

Posterior wing high in *laevissima* & lower in *fragilis*

Umbo large

In left valve the 2 knobs or teeth are present, both



rounded. The one under the umbo can be the largest or merely a change in direction of the tooth line. Ordinarily the one under the umbo is the best character to differentiate *fragilis* from *laevissima*. Hypostracum more developed to support tooth.

In the right valve the tooth is usually short and rounded

The teeth are more at an angle from the hinge line than in *laevissima*

Anterior adductor muscle scar smaller

Distance between umbo & dorsal edge ant. add. m. long

Perostracum - dark - yellowish, green brown, Posterior slope (dorsoposterior) dark brown in contrast to light of remaining shell (demarcates upper edge of posterior ridge. Green stripes sometimes on posterior part of shell.

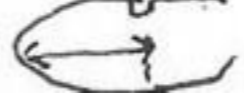
Nacre - pink in scar (ant. & post add.) first in posterior then anterior, then between but rarely ventral edge of shell. General base color salmon or white.

Hinge line - long height - less in proportion to length depth - greater than in *laevissima* (good)

Ant. wing at edge of ant. add. scar (use as measurement in addition to standard)

Ant. part of shell from umbo short

Posterior part of shell from notch short



Diagnostic.

1. yellow shell
2. distribution purple of nacre
3. anterior wing forward of or at anterior edge ant. add. m.
4. pseudo. below umbo (large to hind of tooth line)

laevissima

umbo small

In the left valve the tooth is long, angular at distal end and usually split or showing a shelf on tooth or showing a sharp

In right valve the tooth is usually long, angular and sometimes split

There is variation in the length of these teeth but in the main are longer than in *fragilis*. The angle from the hinge line is usually parallel but sometimes at an angle

[There are examples where teeth arrangement is indistinguishable between the two species, but there are pincer tracks

Ant. add. muscle scar larger & directed toward umbo

Distance between umbo & ant. add. m. short.

Perostracum - light brownish yellow. Less contrast between posterior slope & rest of dark shell.

Nacre - all purple, pink or salmon In small shells purple shows through perostracum & is characteristic. Faded shells (extremely old) very light pinkish-salmon.

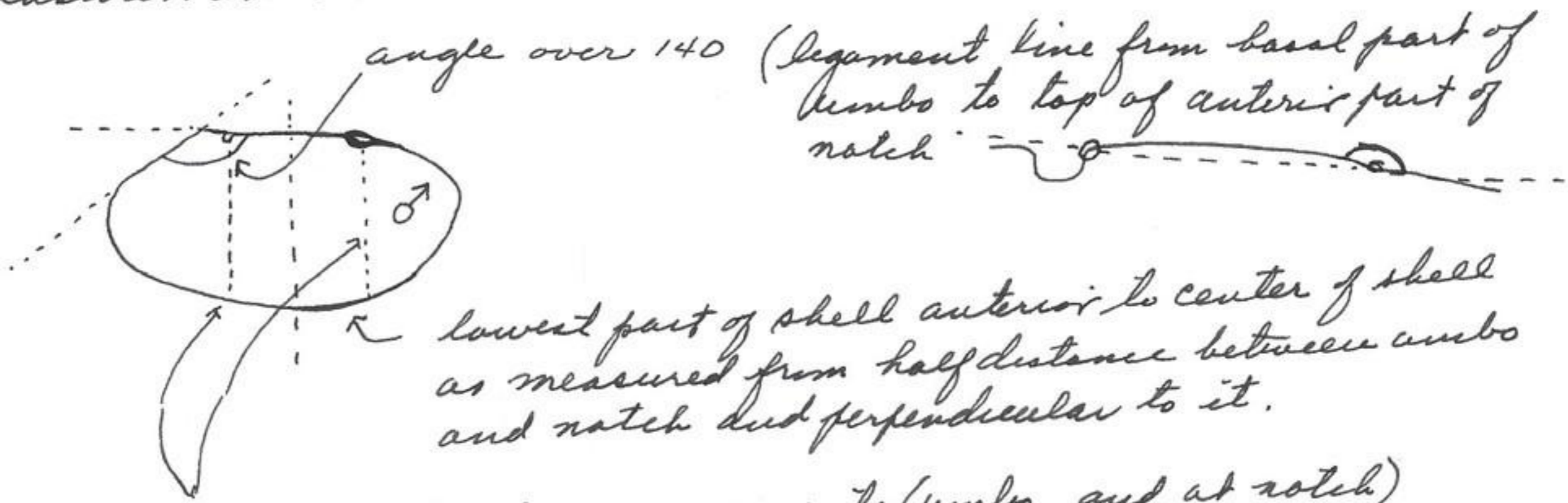
Hinge line short height & greater in prop. to length depth - less than in *fragilis*

Ant. wing in middle or posterior to ant. add. muscle scar

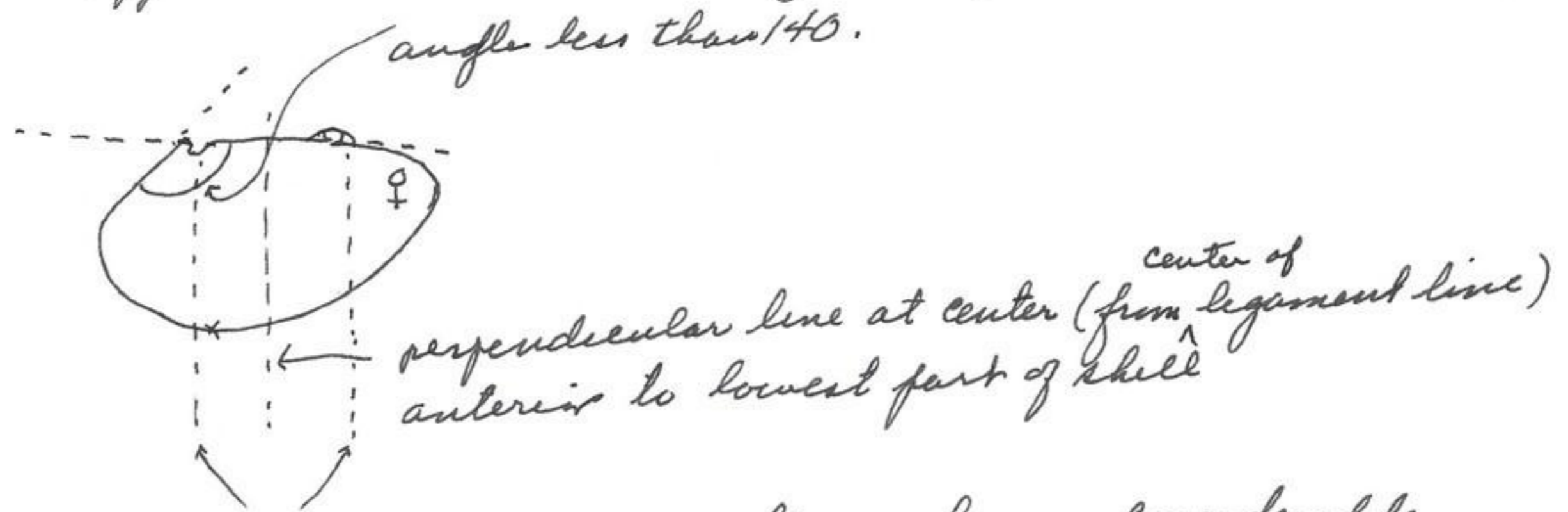
Ant. part of shell from umbo long posterior part of shell from notch long

Leptodea fragilis (cont.)

Sexual dimorphism can be ascertained by the following measurements:



Two perpendicular measurements (umbo and at notch) appear the same (posterior generally larger).



Two perpendicular lines showing considerable difference in length (the anterior one considerably shorter than posterior one)

153
12

660723-153

LEPTODEA LAEVISSIMA

660723-42

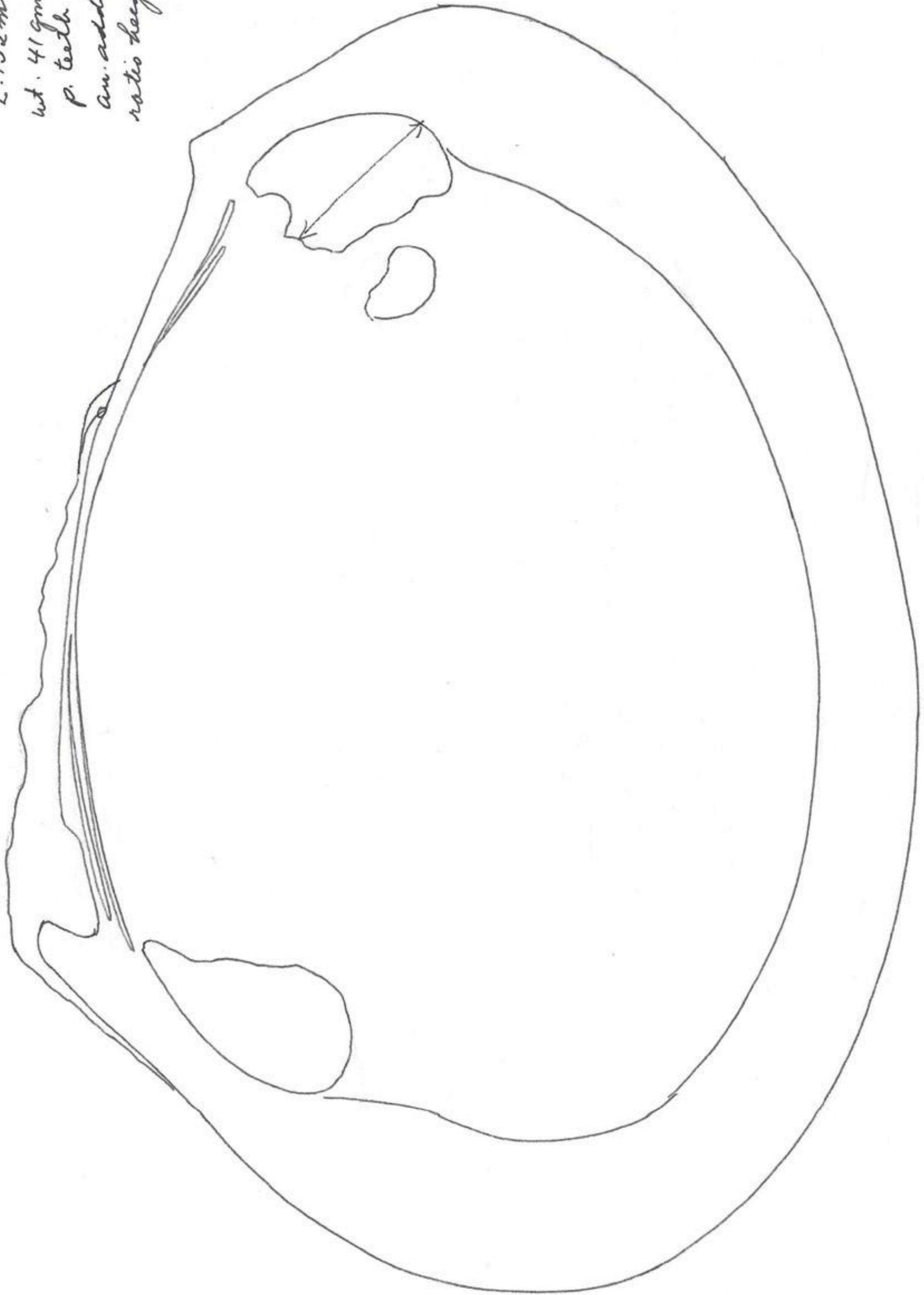
L. 152 mm; h. 108; w. 24.

wt. 41 gms

P. teeth 2.5 mm

an. adductor 22.5

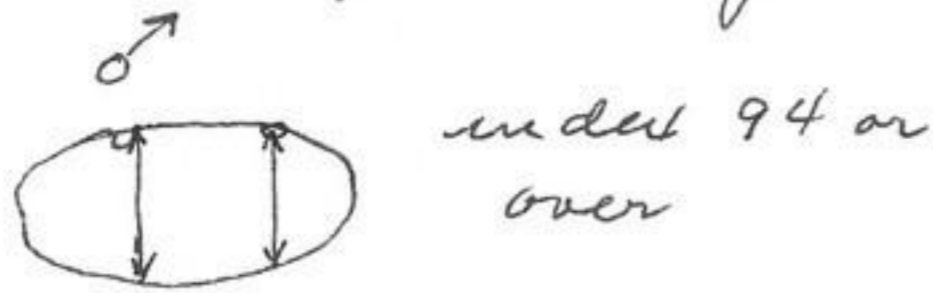
ratio height to length = 69



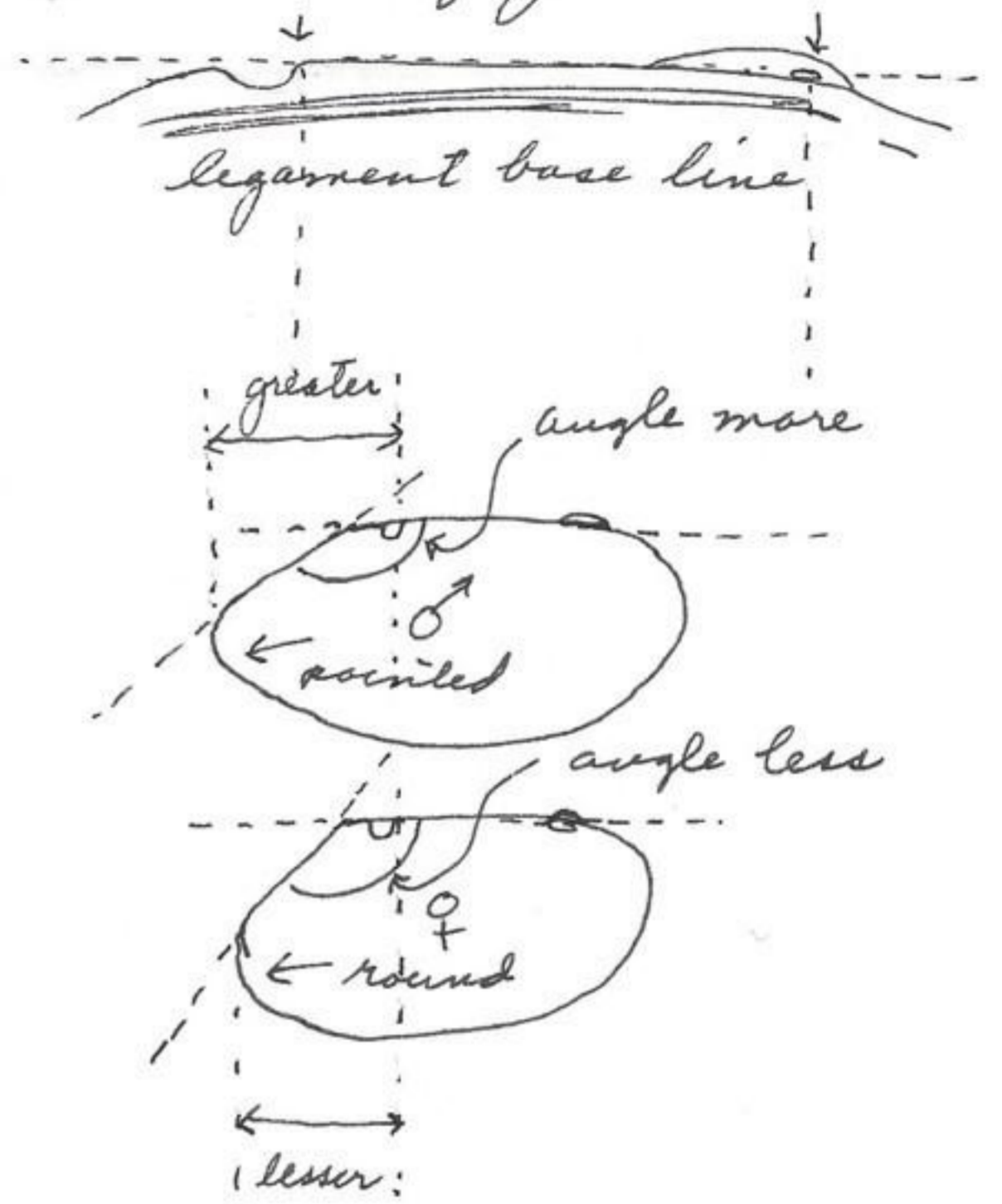
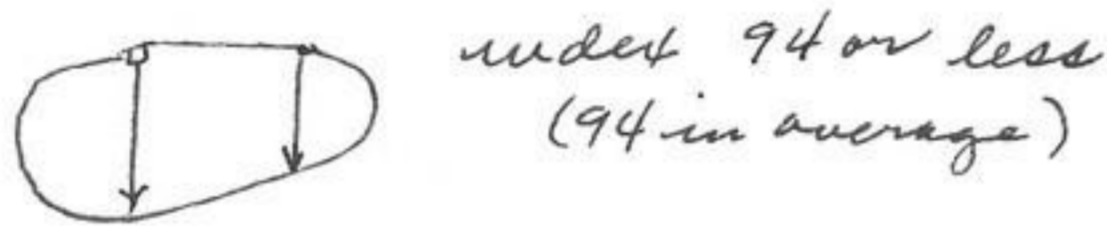
LEPTODEA LAEVISSIMA

Anterior wing present, as is also true for *Leptodea fragilis*. Sometimes in *fragilis* the wing is larger.

Sexual dimorphism is present in equal degree in both *fragilis* & *laevissima*



measurements
top anterior edge notch
base umbos



Distance between umbos and dorsal edge of Ant. add. scar variable and size (length) of pseudo-cardinal teeth vary accordingly



LIGUMIA RECTA LATISSIMA

660723-35

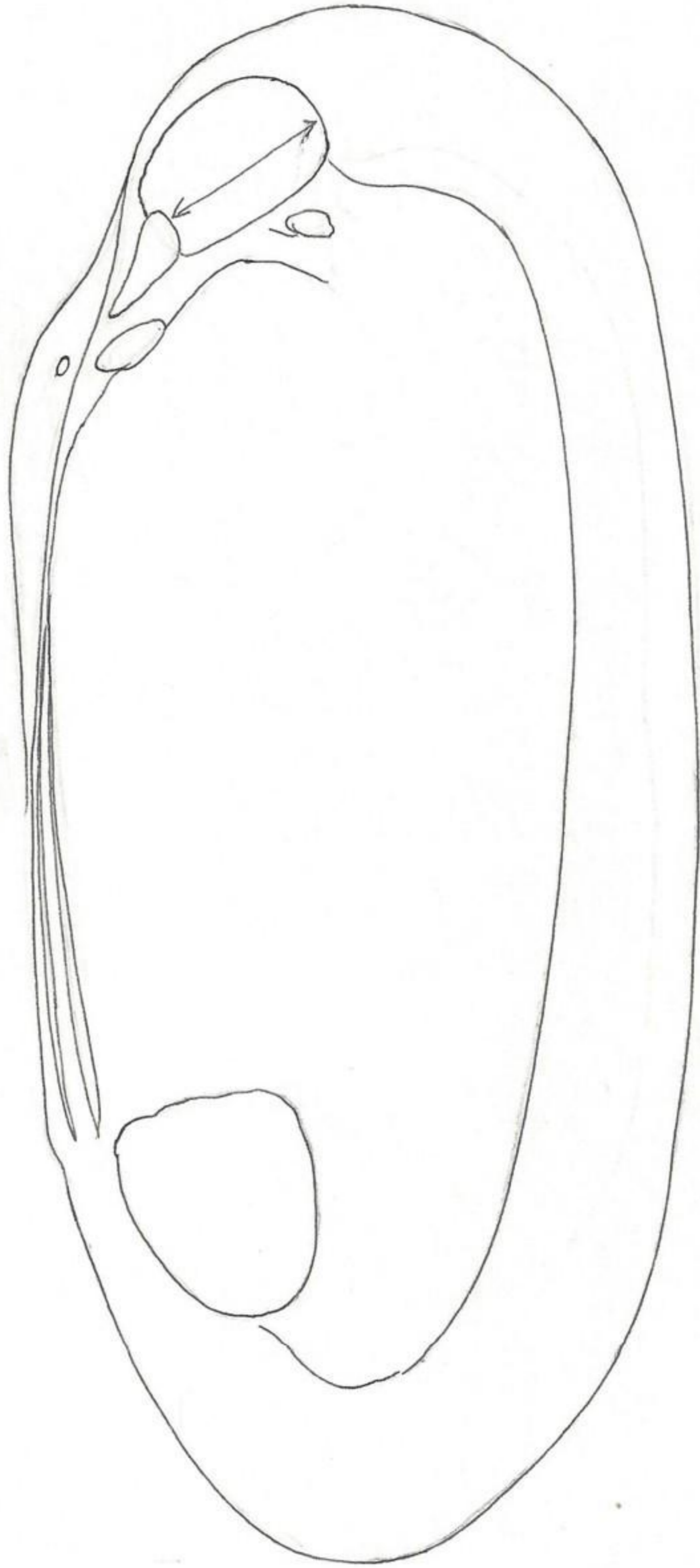
L. 91; h. 39; w. 15.

wt. 20 gms

P. teeth 3.5 mm

An. adductor 11 mm

ratio length to length 43



LIGUMIA SUBROSTRATA

660723-24

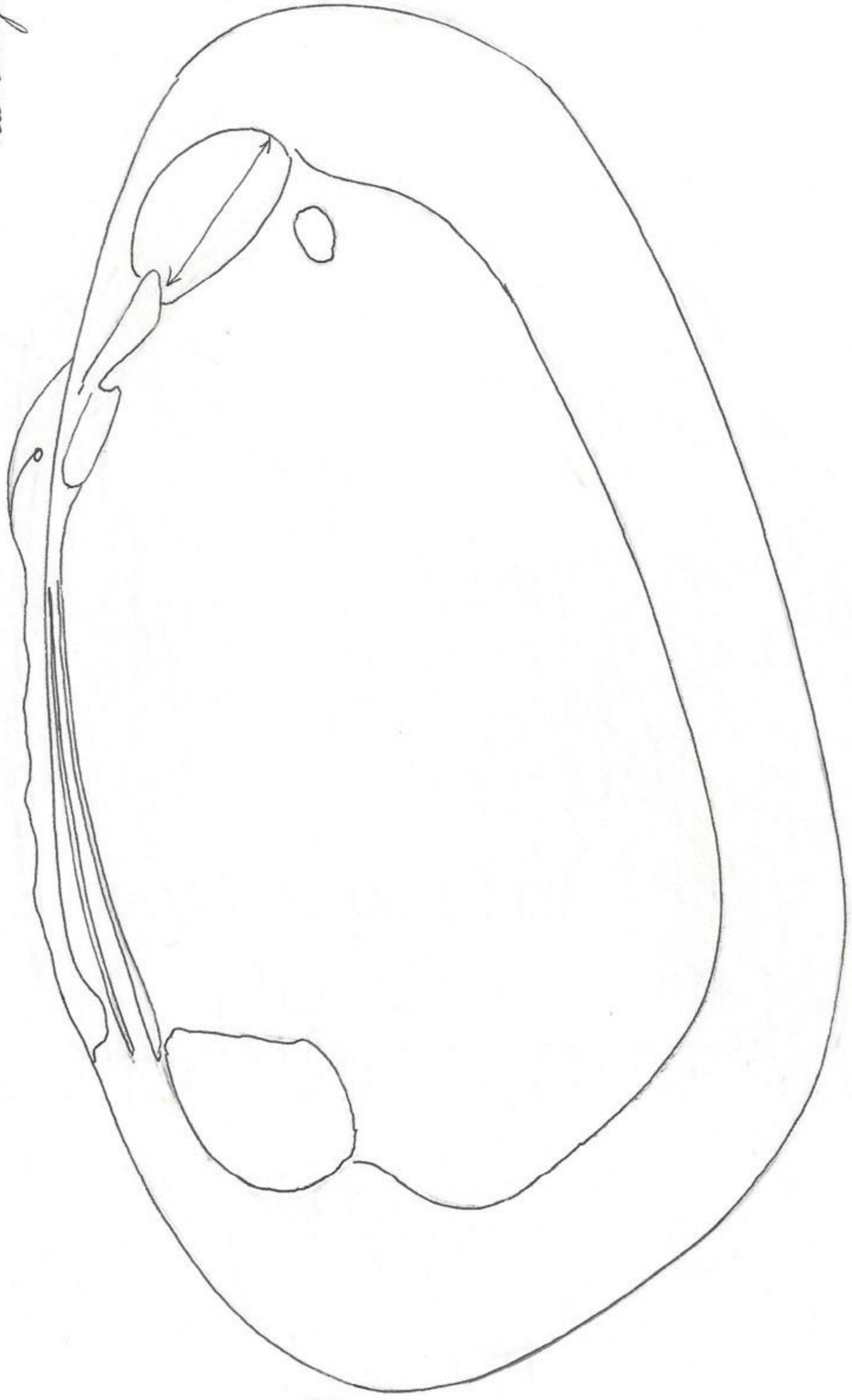
L. 50 mm ; h 29 ; 9 width

wt. 3 gms

P. teeth 1.5

an. adductor 6.5

ratio height to length = 56



LIGUMIA SUBROSTRATA

660723-43

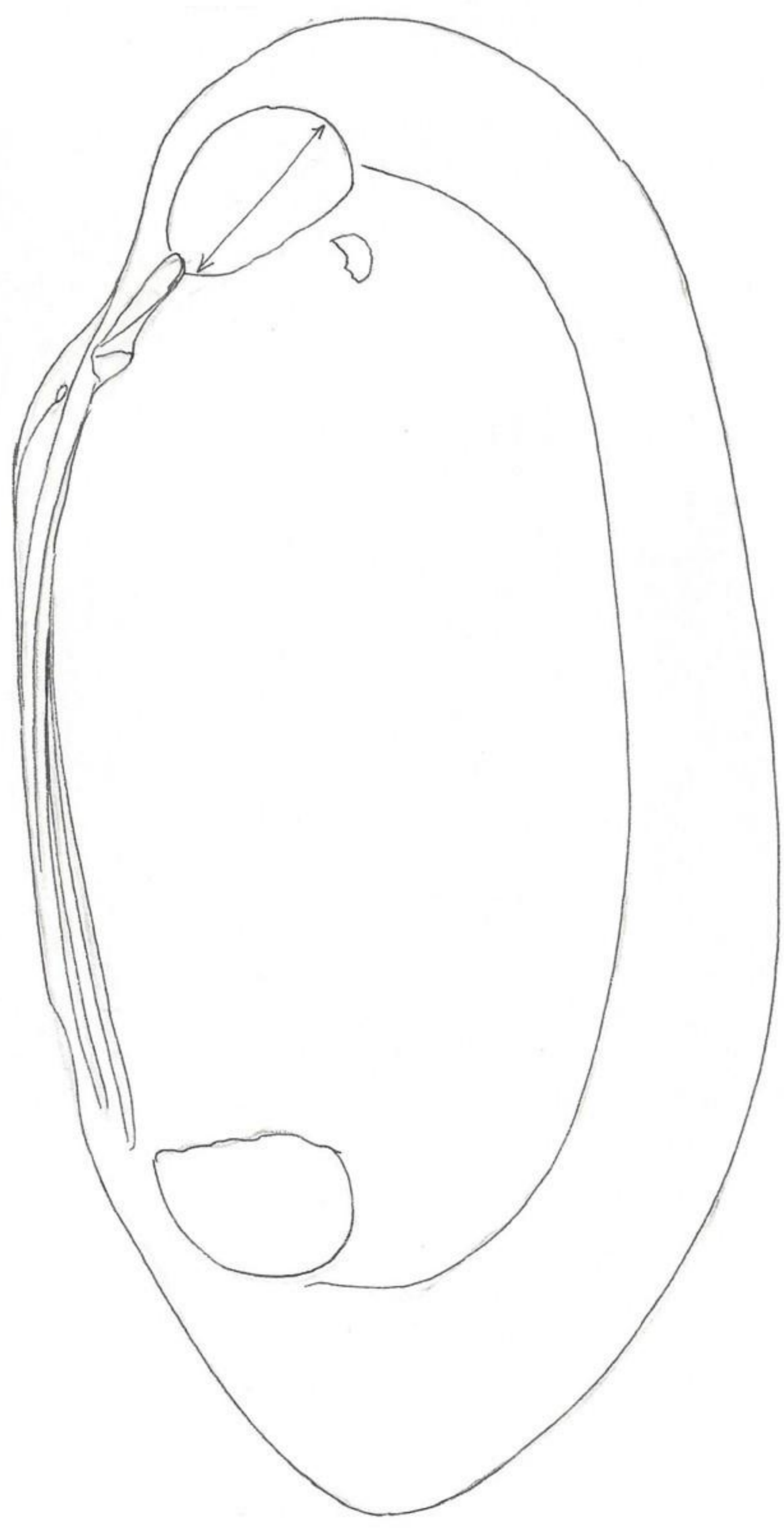
L. 67; 433; 10 width

wt. 5 gms

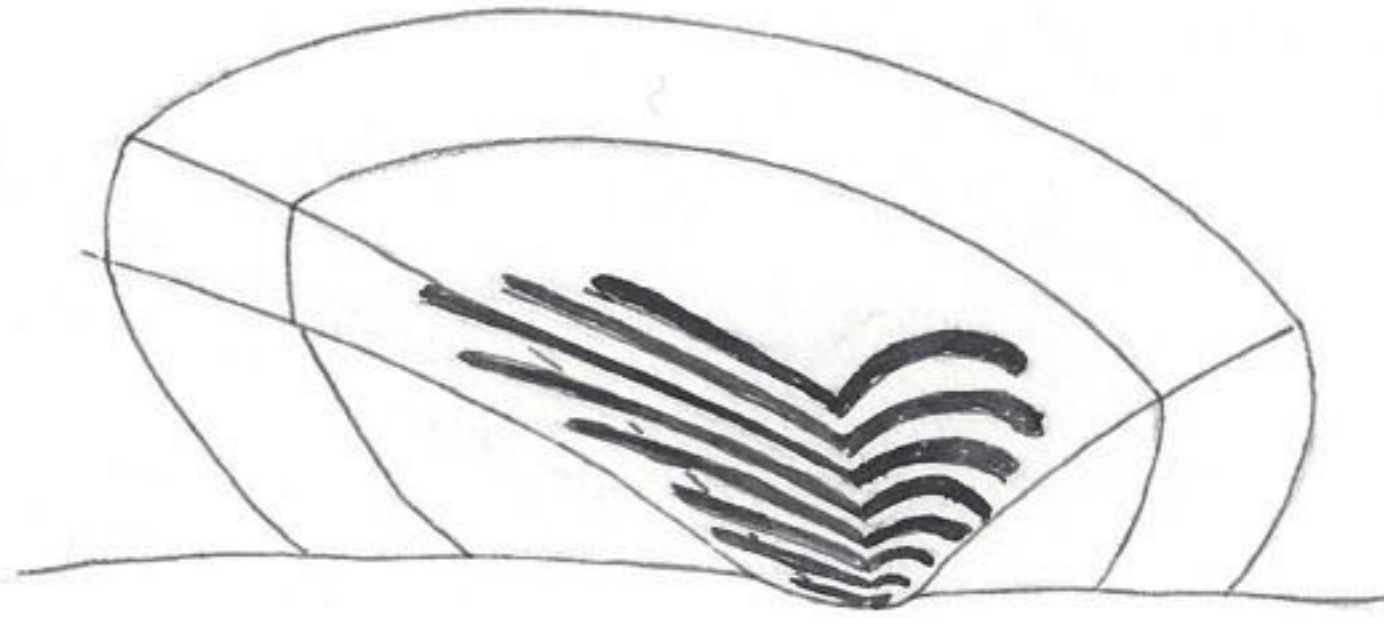
P. teeth 1.5

av. adductor 8.5

ratio height to length = .47



LIGUMIA SUBROSTRATA



ANTERIOR

SCULPTURE OF UMBO

NO 660723-25

surface of rest of shell smooth

159
13

PROPTERA ALATA

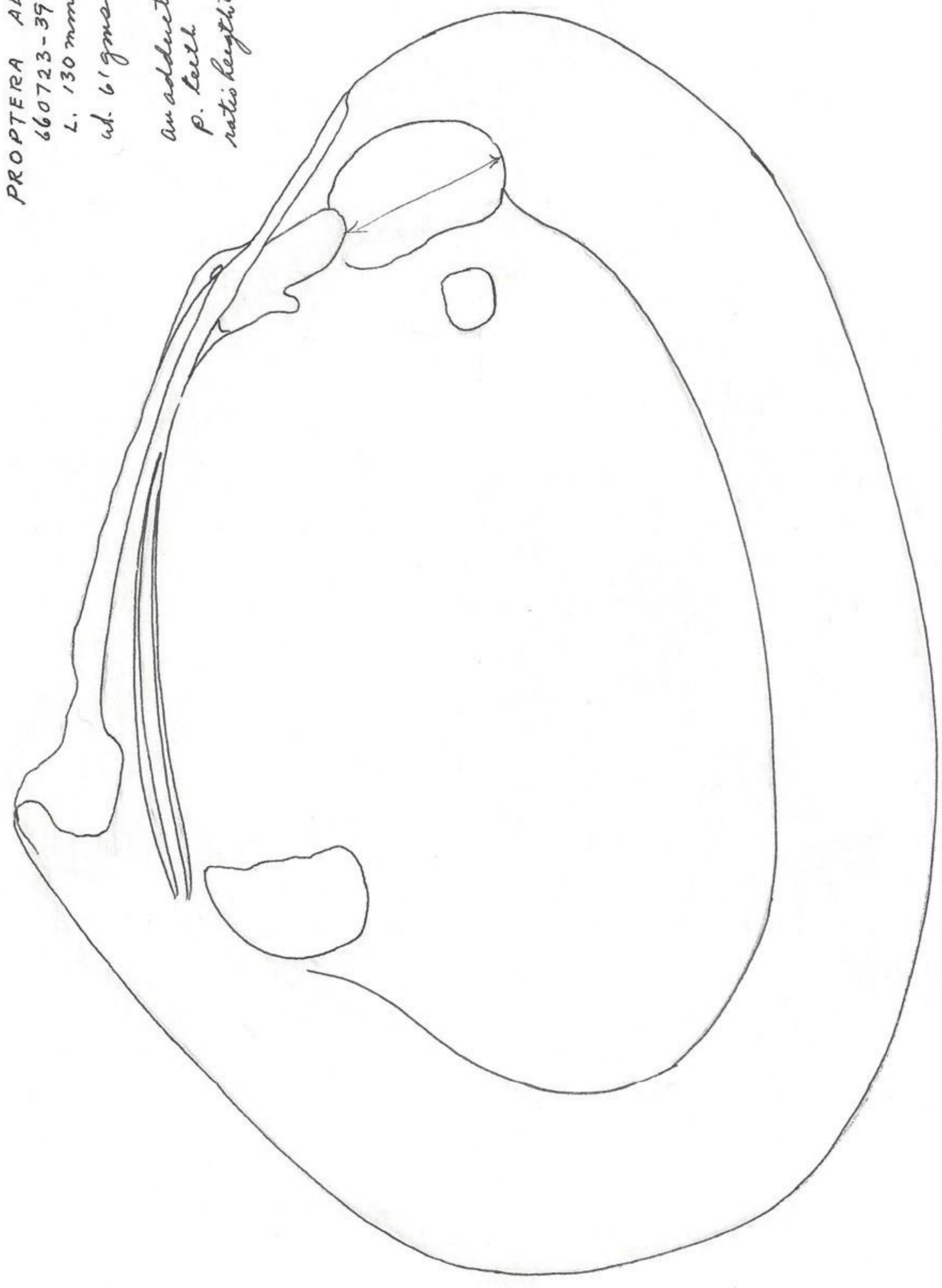
660723-39

L. 130 mm; height 84 (not
from wing);
wt. 61 gms
width 20.

An adductor 17

P. teeth 6.5

ratio length to length = 72



PROPTERA ALATA

Interdentum absent.

QUADRULA PUSTULOSA

660723-4a

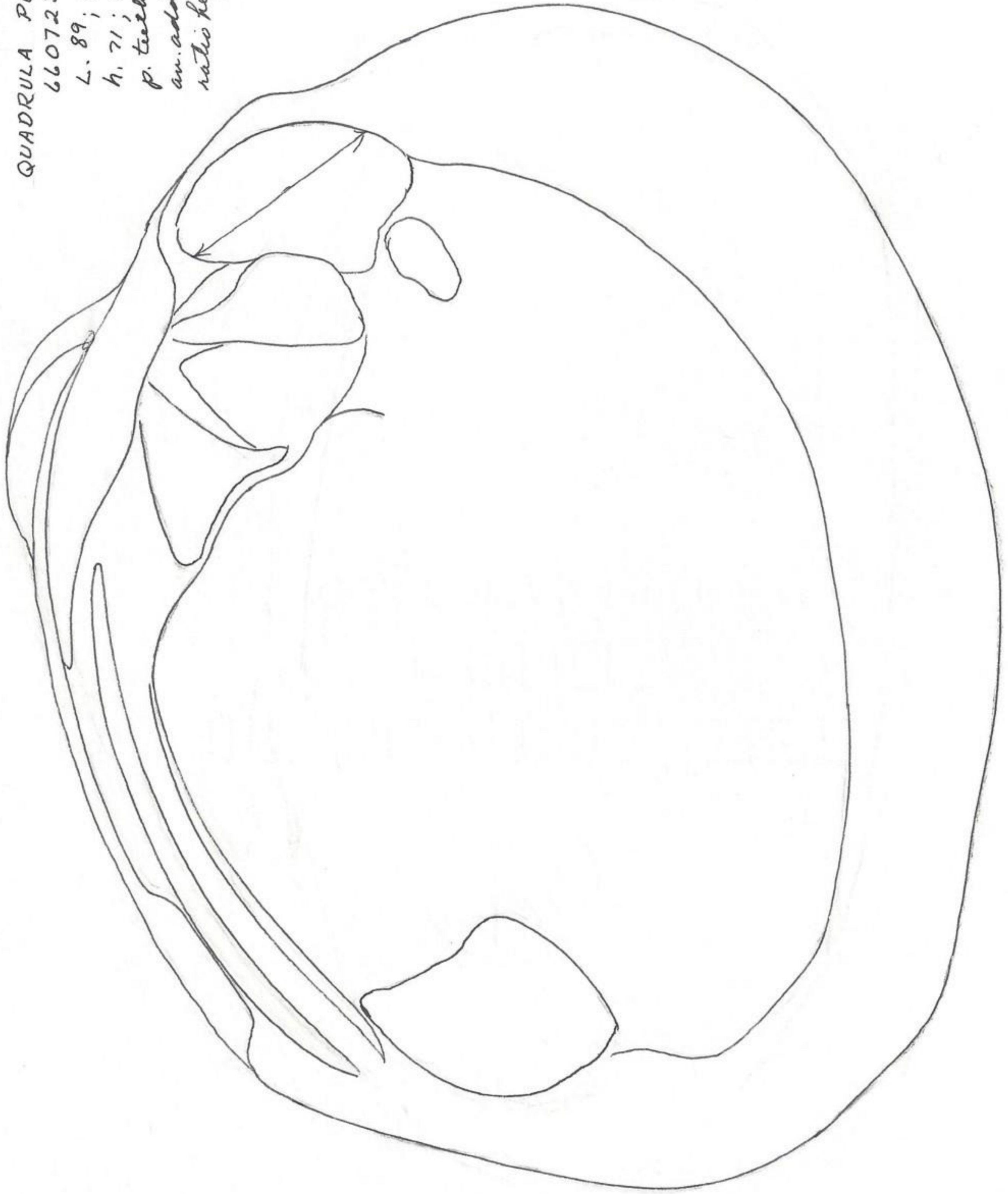
L. 89; wt 103gms

h. 71; w. 25

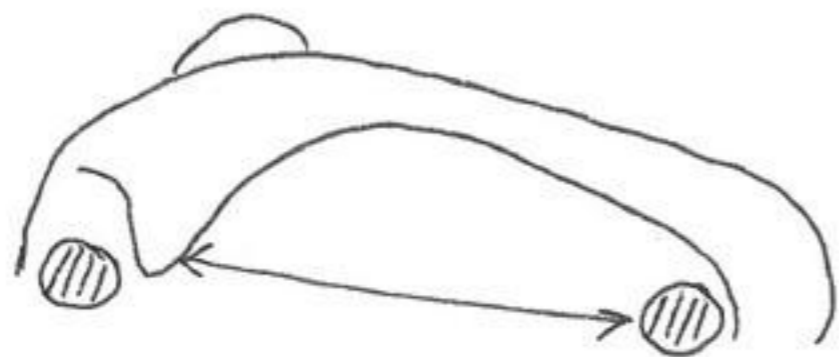
p. teeth 14mm

an. adductor 17.3

ratio height to length 79



QUADRULA PUSTULOSA



The height of the shell is 2 to 2 1/2 times the distance between the posterior pseudocardinal tooth and the anterior side of the posterior adductor muscle scar. The anterior adductor muscle is not enclosed by pseudocardinal teeth as is in *Q. quadrula*. Cardinal teeth larger.

than in *Q. quadrula*.
lateral ridge and ^{shell} more rounded than *Q. quadrula*.
a metallic silver.

Umbo more prominent. Lacks nacre

QUADRULA QUADRULA

660723-33

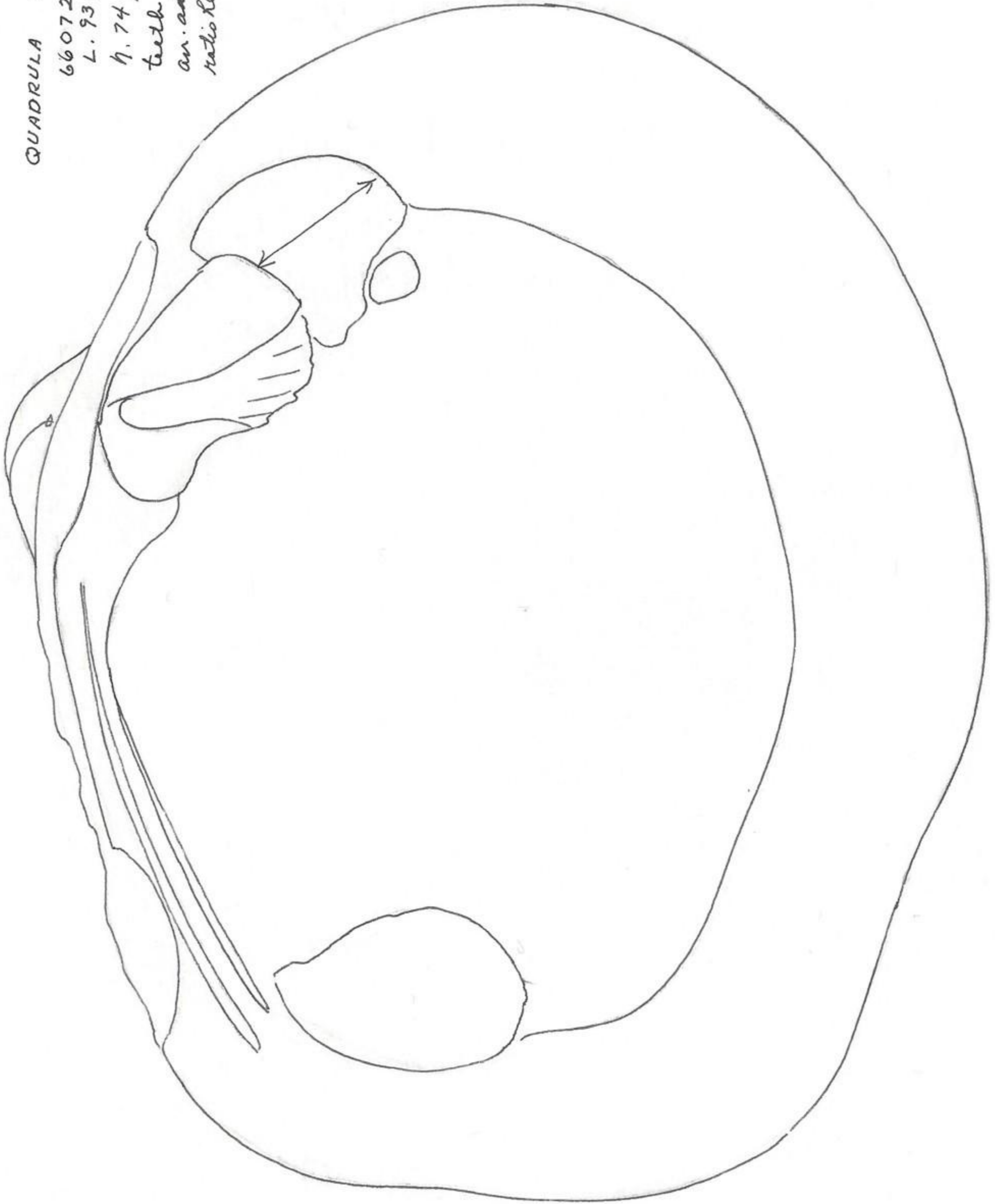
L. 93mm; 57gm wt.

H. 74; 20 width

teeth 13.7

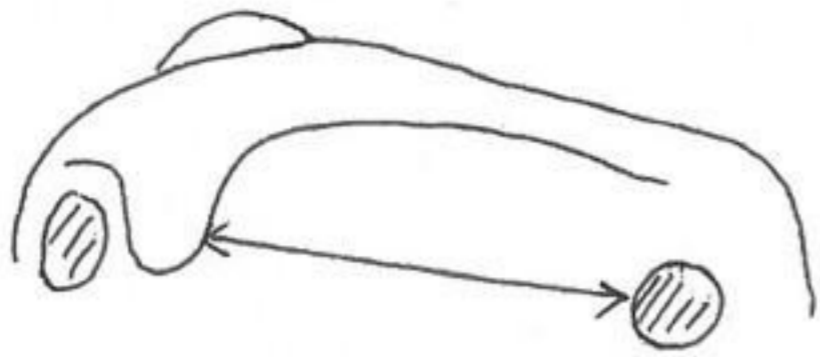
an. adductor 13mm

ratio length to length 76



164

QUADRULA QUADRULA



The distance between the posterior pseudocardinal tooth and the anterior side of the posterior ~~base~~ adductor muscle scar ^{is} ~~is~~ ^{goes} $1\frac{1}{2}$ to 2 times the height of the shell. The anterior adductor muscle scar is fitted into pseudocardinal tooth. Shell more

elongate than *Q. pustulosa*. Umbo smaller than in *Q. pustulosa*. Has well developed lateral ridge.

TRITOGONIA VERRUCOSA

660723-37

L. 163; 92h; 25w.

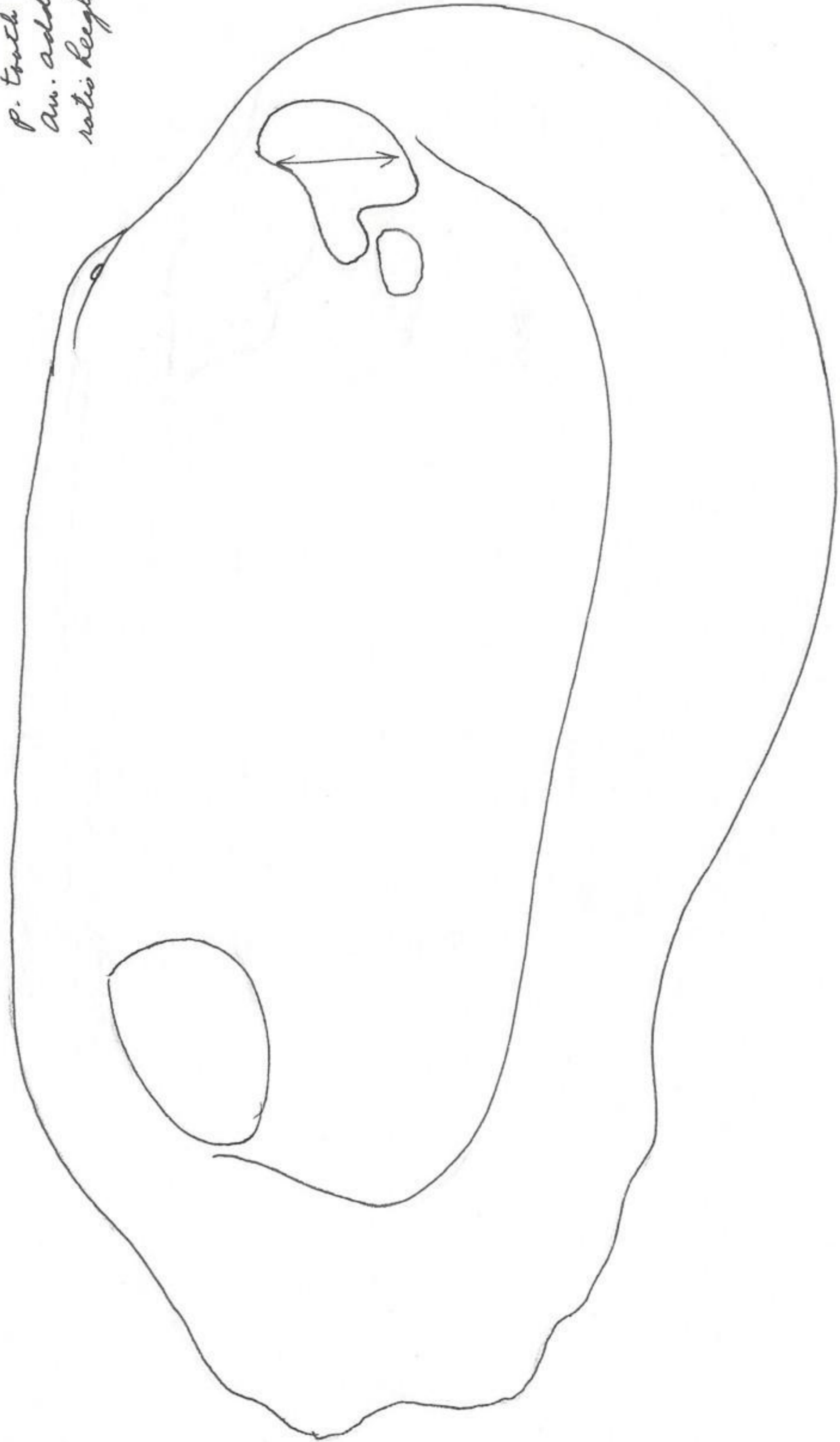
(SHELL REVERSED.)

wt. 186 gms

P. tooth 14.5

Am. adductor 17.5

ratio length to length = 53



TRUNCILLA DONACIFORMIS

660723-28

Length 51 mm; h. 33; w. 10.

wt. 5 gms.

teeth 2.5

a. retractor 5 mm

ratio height to length = 59
(segment base line + greatest
height)



UNIOMERUS TETRALASMUS

660723-36

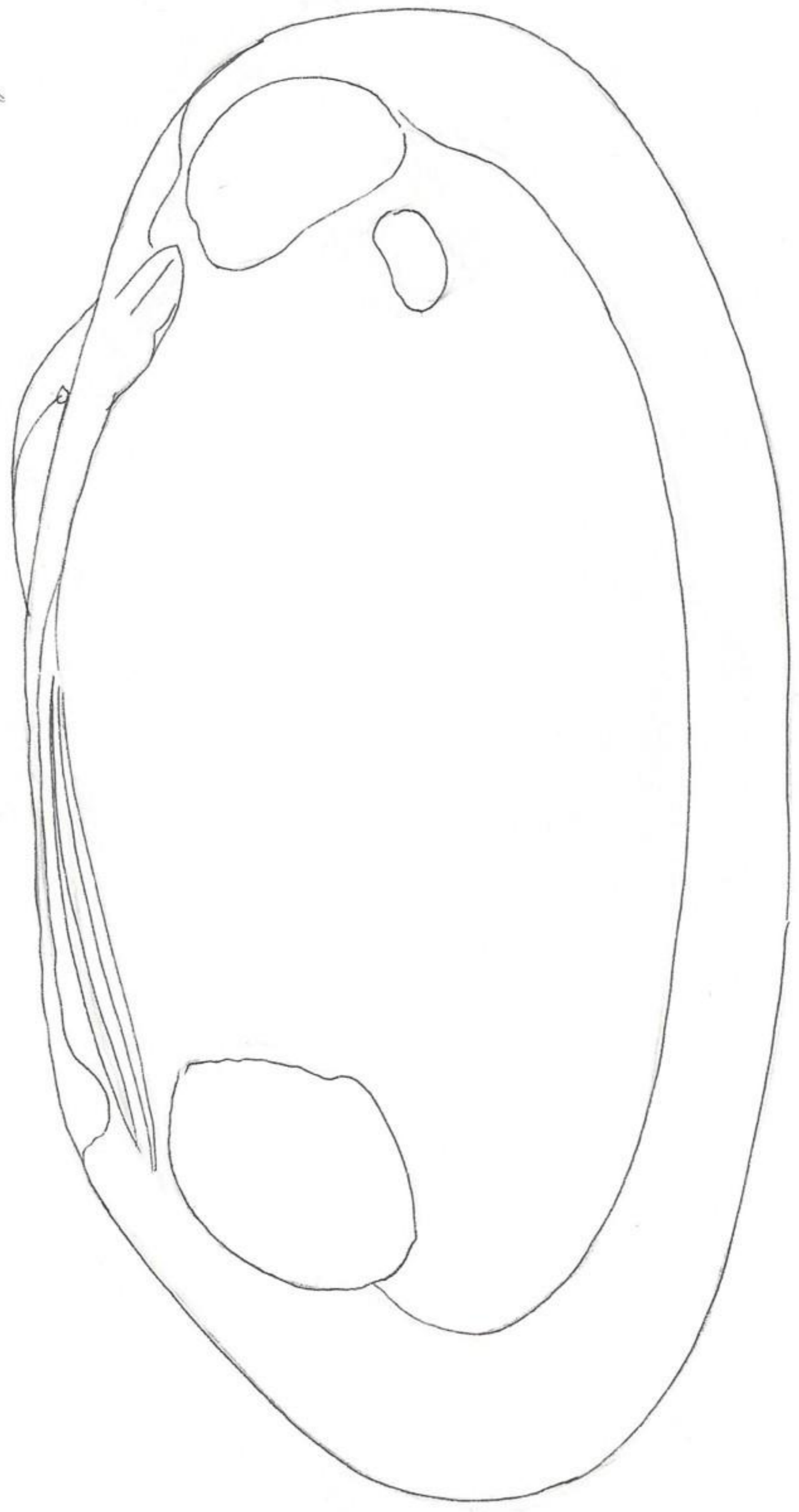
L. 92 mm ; h. 47, 14 w.

wt. 19 gms

p. teeth 3 mm

an. adductor 14

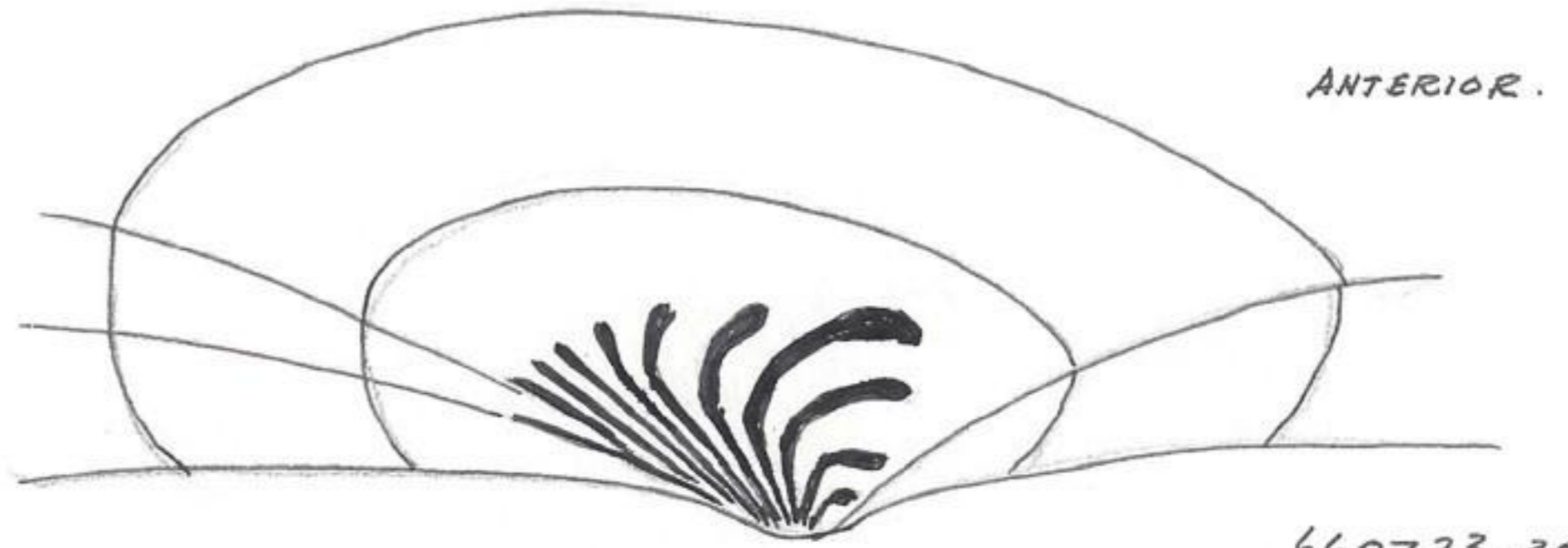
ratio height to length = 50



175
168

660723-168

UNIOMERUS TETRALASMUS



660723-30

SCULPTURE OF UMBO.
(drawing reversed)

THIS IS A REPORT WRITTEN BY ANNETTE C. BEE (DEC, 1970) ON PART OF THE COLLECTION OF UNIONIDS COLLECTED NW OF CLINTON. (SEE NOTES JULY 23, 1966.)

ABSTRACT: A study was made of the unionid mussel shells found on the surface of the stream bed of the Wakarusa River, northwest of Clinton, Kansas. Deduction of how closely the assemblage of specimens found relates to the actual live population at this location is attempted with little result.

INTRODUCTION: One of the greatest problems in paleontology is the correlation of fossil assemblages with their initial living biomes. It is possible only to infer from the preserved material what the living assemblage was. The probability that an organism will be preserved as a fossil is slight, due to transportation of its remains out of its biome, physical and chemical breakdown of the remains, and chance for burial. These factors are most important in the stream environment where current is the major control of position of organisms in the stream channel. This study encompasses a population of both live and dead unionids found on the surface of a stream bed, before the burial process has preserved a few individual remains as fossils.

Unionids are a family of the class Pelecypoda of the Mollusca phylum. They are mussels found in both marine and fresh water (Kansas). They have two calcareous shells (valves) which are symmetrical to each other. Unionids are totally or partially buried in mud throughout their life. Predation by muskrats is heaviest on adult mussels and by fishes on juveniles.

MATERIALS AND METHODS: The material studied was collected on July 23, 1966 from the Wakarusa River northwest of Clinton, NE corner of section 15, T. 13 S., R. 18 E., Douglas County, Kansas. This 460 foot stretch of the river lies between two permanent, deep pools and is itself shallow and rippled, with alternately rapidly flowing water in constricted areas and slower moving

shallow water between. A thorough collection of the shells on the surface was made along the sand and gravel bars lining the channel and in the water across the constricted areas as well as 2-3 feet from the shore along the entire length. Live as well as dead unionids were picked up. 1880 shells and shell fragments of 18 species were taken from this location at that time.

Three measurements of each shell, when possible, were taken. These were length - measured parallel to the base line, height - measured perpendicular to the base line, and width - measured on the outside from a plane formed by the hinge line and the opposite edge to the deepest part of the shell. A glass plate was propped up and gridded into 5 mm lines with two perpendicular clear plastic metric scales taped onto the plate. The specimen was then placed against the bottom of the glass, inner side upward, and the base line, a line extending from the umbo to the anterior edge of a nick in the posterior wing, common to all the specimens, was aligned along the first grid line. The length measurement was the longest measurement that could be made parallel to the base line. The height was read off the grid as the longest measurement between the base line and the edge of the specimen perpendicular to the base line. Width was measured with a caliper.

RESULTS: Included are the actual measurements taken for each specimen in the Appendix. Each parameter for a given species was summed and averaged and is shown in ^{the} table, along with the number of specimens for each species, an approximation of the area of the shell (length x height), ratio of width to area, and minimum and maximum length measurements. Graphs 1-6 show age distribution for the six most abundant species, (excluding Anodonta grandis which, due to the time available, was not measured), assuming relative length is indicative of age. Plotted are the number of shells falling within 10 millimeter increments.

CONCLUSIONS: According to the close similarity in numbers of right and left valves of Anodonta grandis and Lampsilis radiata silequoidea taken, it can be assumed that the collected specimens represent a similar population of whole unionids, that is, two shells represent one unionid organism.

As can be seen in the table, length of shell has little to do with its relative abundance as have area or depth:area little importance in determination of abundance of^a species. There seems to be a trend toward greater variation in length as the number of a species increases, but this may simply be a sampling phenomenon.

The age distribution curves for the six most abundant, measured species are skewed to the right, indicating more older members of the population than young. The curve for Quadrula quadrula is fairly well centered, perhaps because more live specimens were collected for this species than the others. However, Ligumia subrostrata's curve is almost perfectly centered, but no live specimens were collected. Either these first four curves indicate a normal distribution for the live population or, more probably, the sampling factor -- the character of the shell (resistance to erosion, availability for transportation by the stream and depositional characteristics). An absence of young members in the curve might also indicate that the young unionids are more likely to bury themselves into the bottom of the stream bed, thus making themselves unavailable for surface studies.

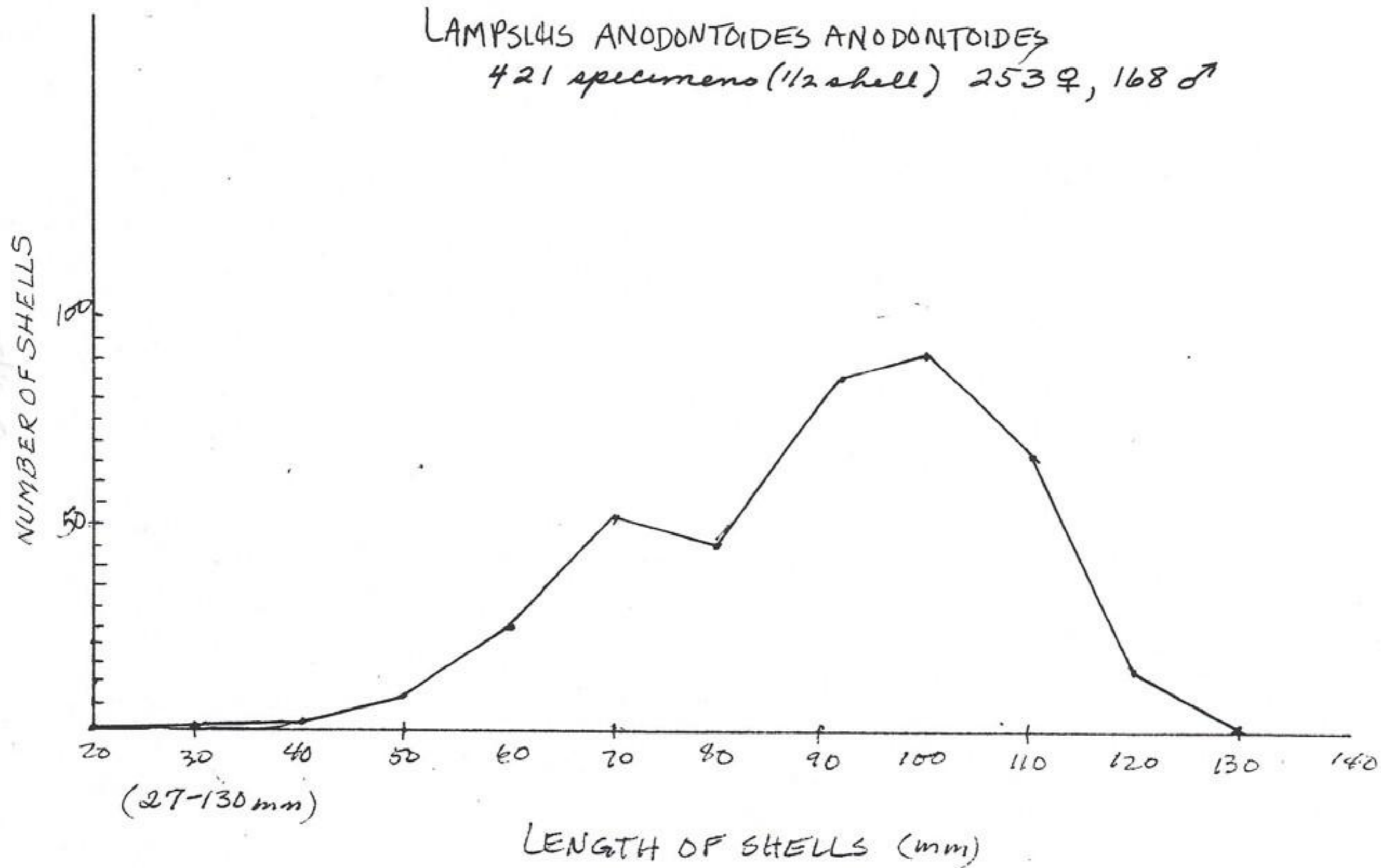
This was only the first step in correlating the actual living biome with the resulting fossil assemblage. Future studies would include digging into the stream bed to provide a complete collection of all the living unionids, having first compared this population with unionid populations at different points along the river course. Then a study of fossilized material in the Wakarusa Valley would be made. Such excavations are proceeding on the Wakarusa as the Army Corps of Engineers are straightening and diking the channel from

the proposed Clinton Reservoir dam site east of Clinton to the river's mouth on the Kaw River, north of Eudora, Kansas. If definite relationships between populations living and fossilized could be determined, a greater understanding of the possibilities for the original construction of a biome could be inferred from the fossil assemblage found in the geologic record.

AGE CURVES

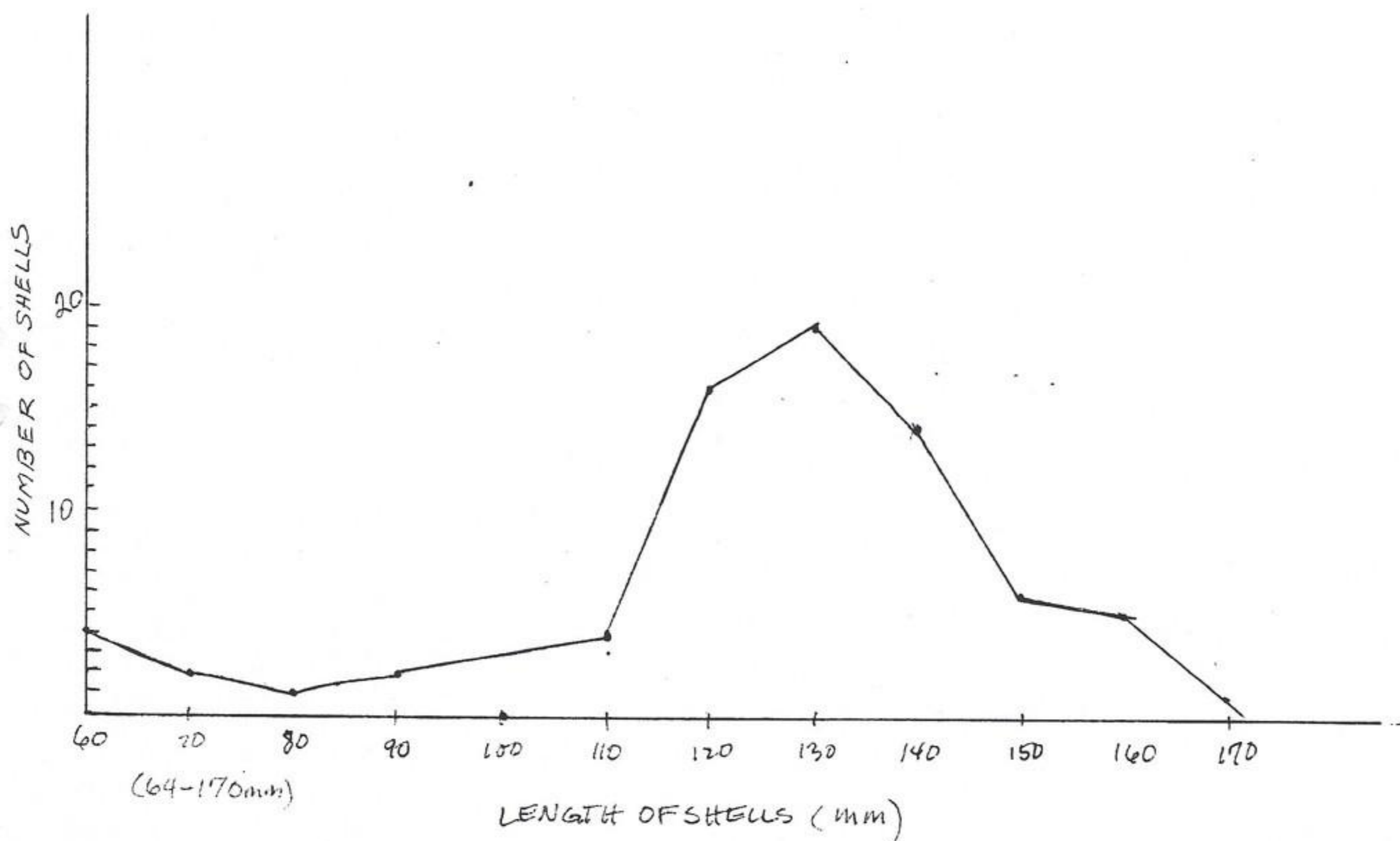
1.

LAMPUS ANODONTOIDES ANODONTOIDES
 421 specimens (1/2 shell) 253 ♀, 168 ♂



2.

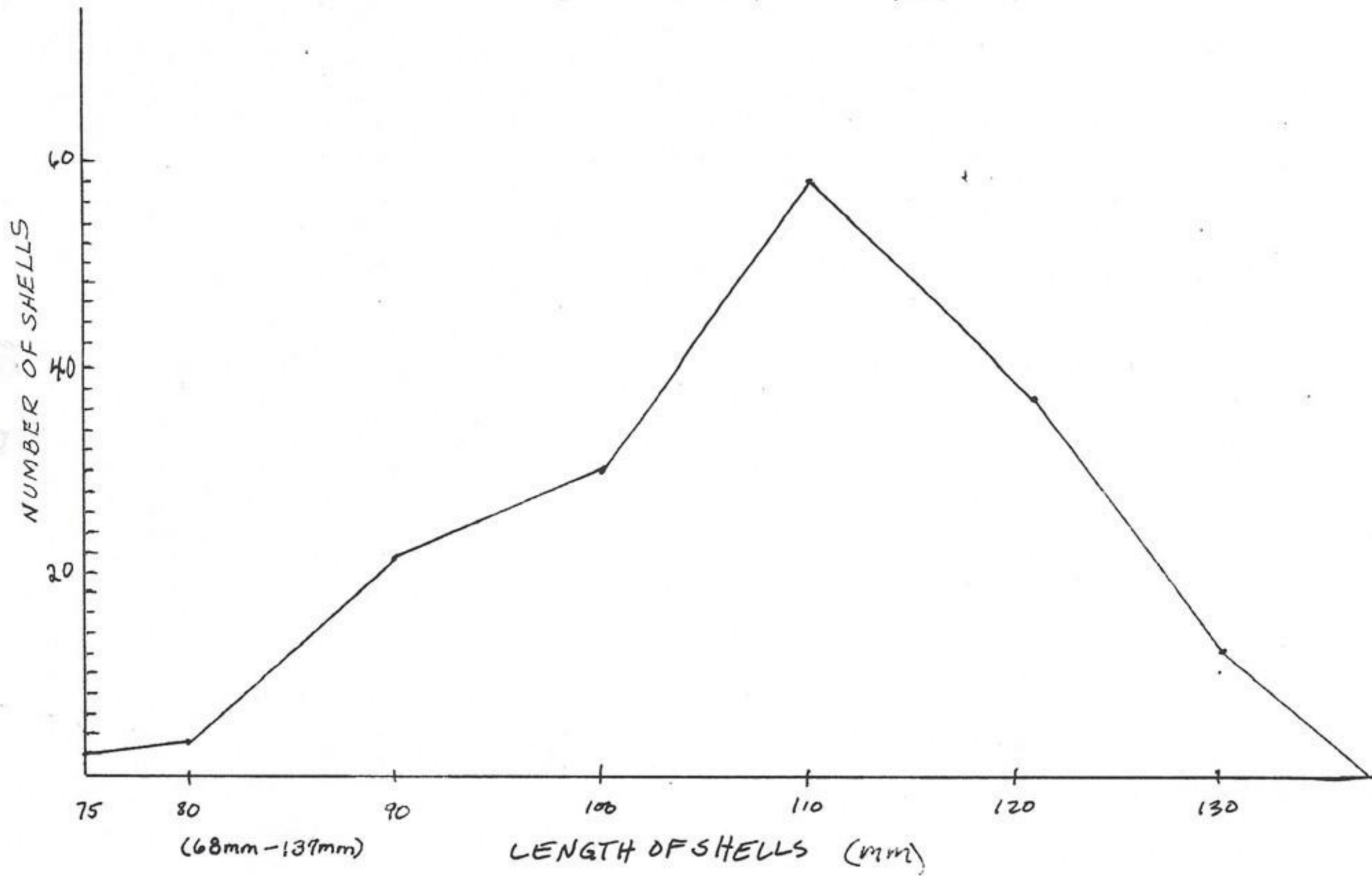
LASMIGONA COMPLANATA



AGE CURVES

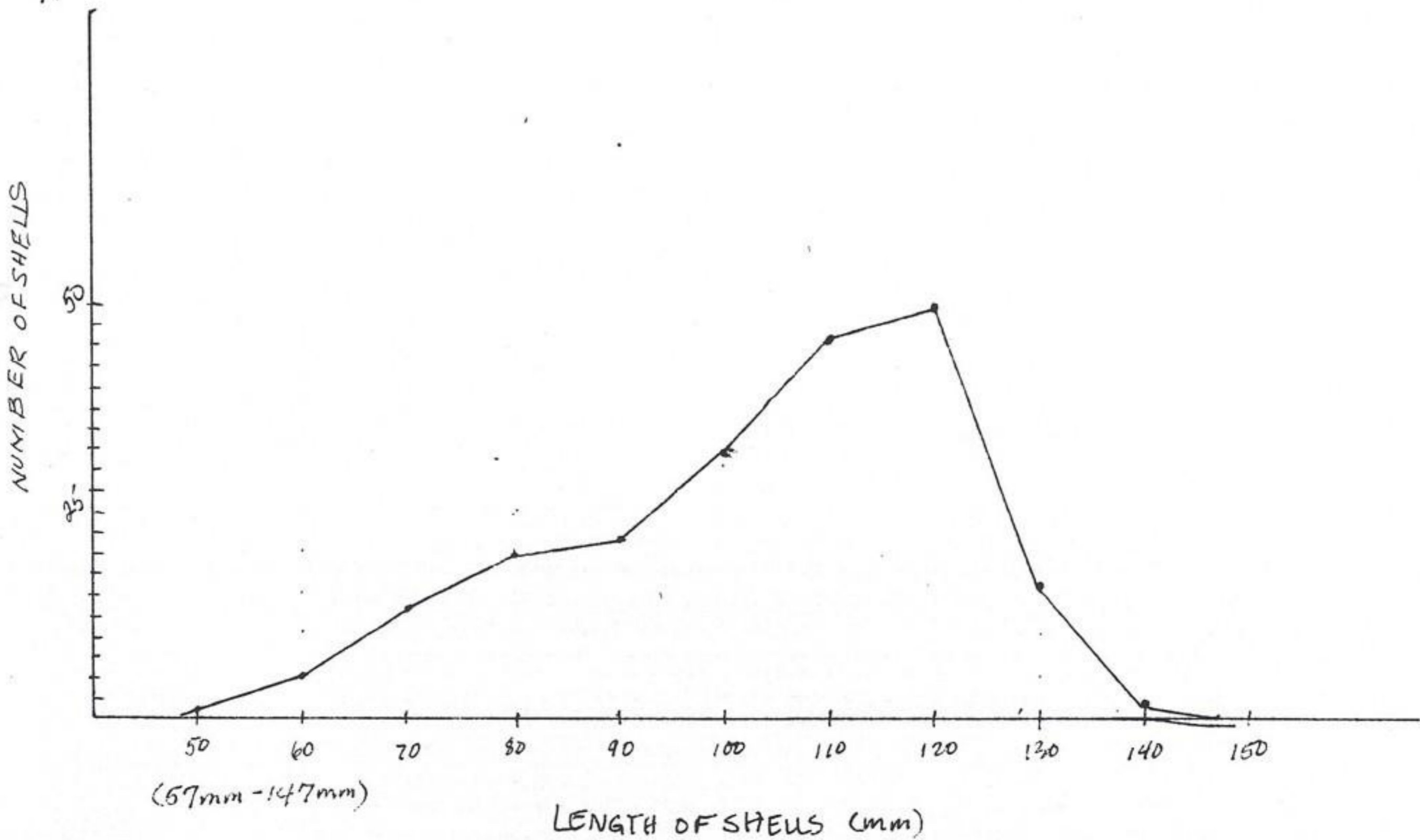
3.

LAMPUSILIS RADIATA SILEQUOIDEA

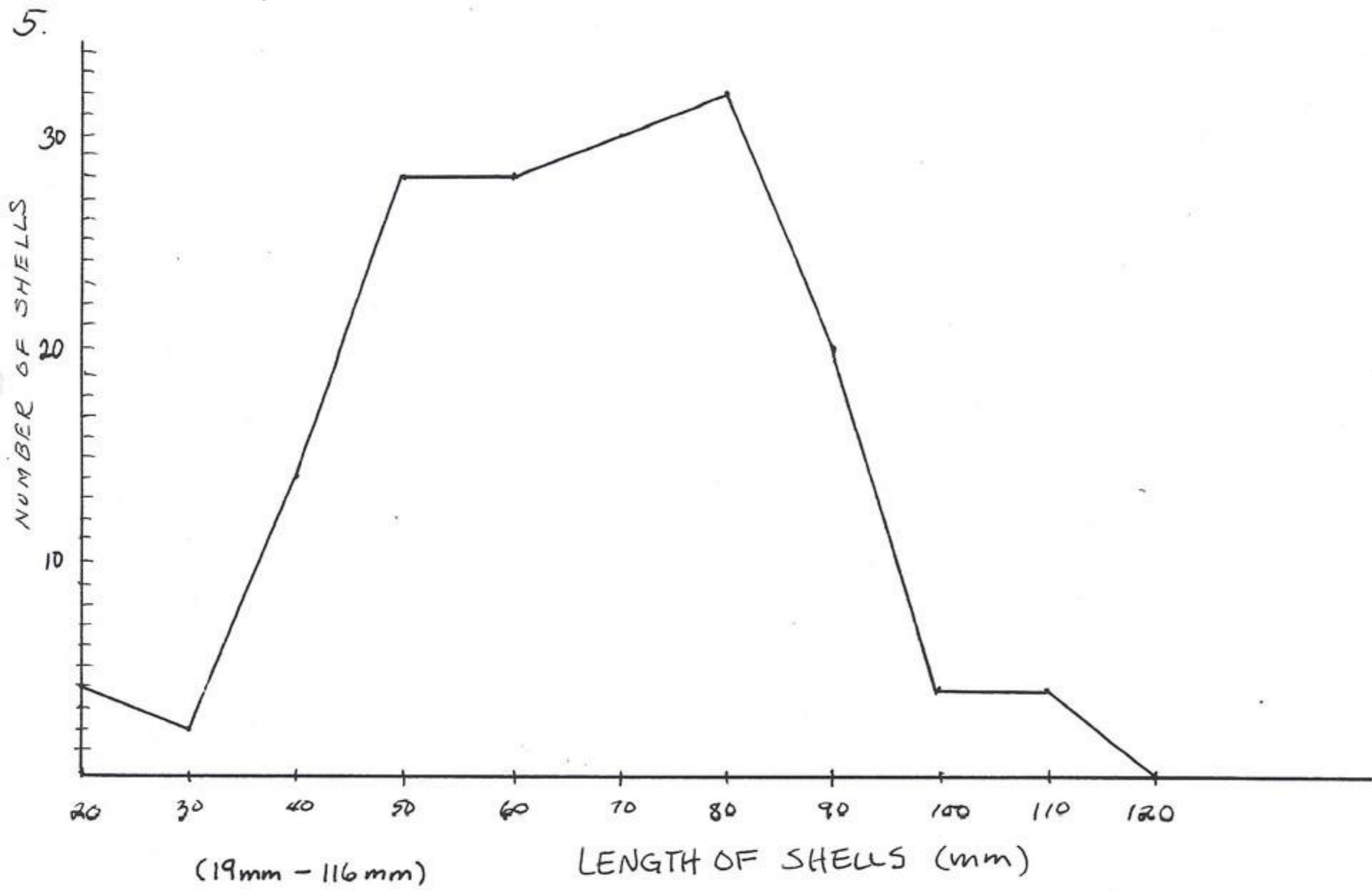


LEPTODEA FRAGILIS

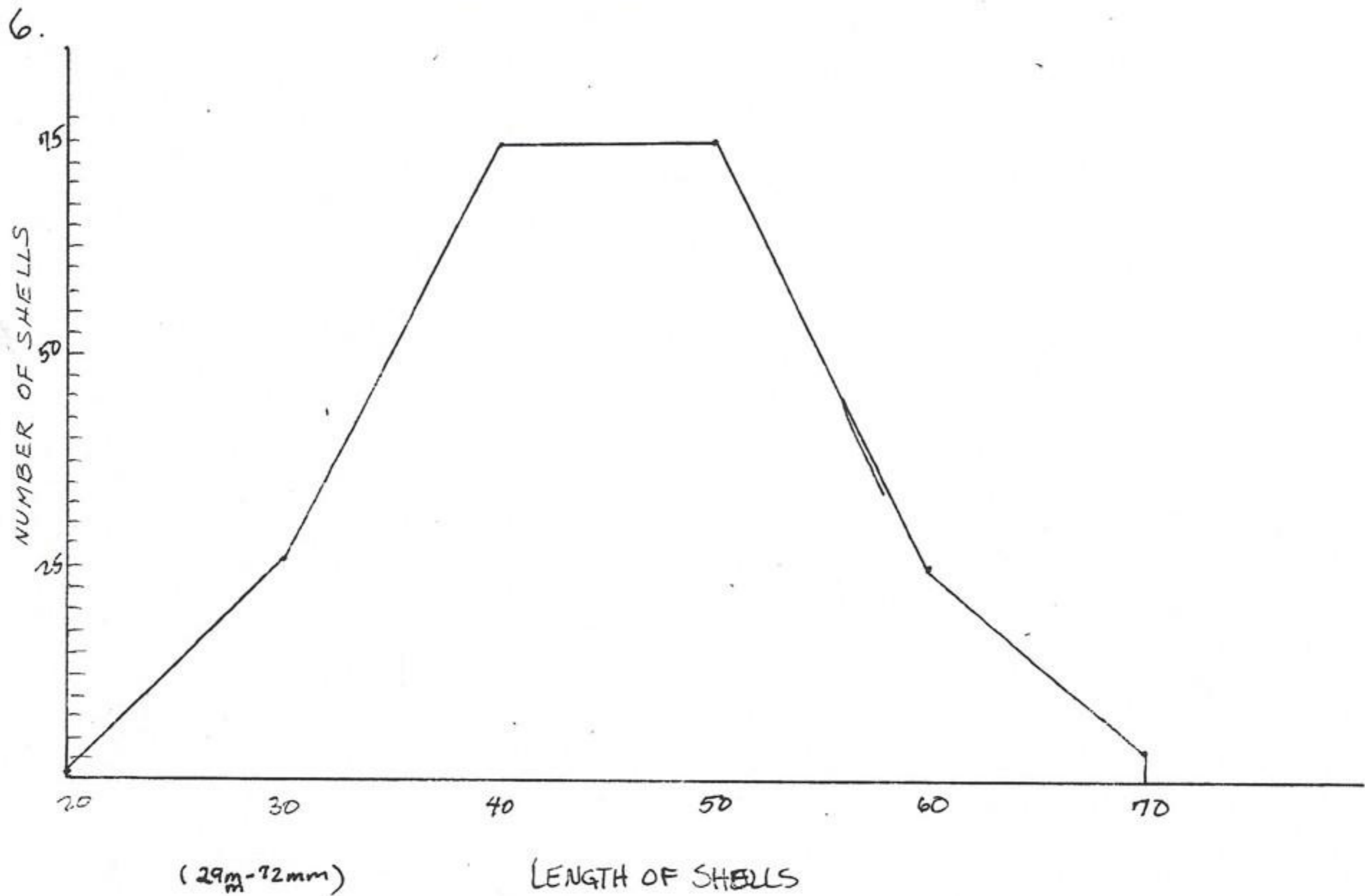
4.



AGE CURVES
 QUADRULA QUADRULA



LEGUMIA SUBROSTRATA



Measurements of this population of shells from NW of Clinton include 17 of the 18 species collected. The species *Anodonta grandis* of 299 specimens (including 154 right valves and 145 left valves) was not measured. The three measurements are length, height and depth (see Annette's report for definition of these measurements). James W Bee assisted Annette in recording the following measurements.

Lampsilis anodontoides anodontoides: (females) 82, 39, 15; 68, 31, 12; 88, 39, 18; 98, 47, 22; 89, 40, 16; 109, 51, 25; 100, 49, 19; 124, 51, 27; 85, 40, 14; 79, 39, 16; 112, 47, 25; 77, 34, 14; 108, 45, 19; 130, 58, 21; 63, 23, 10; 96, 42, 19; 38, 27, 5; 78, 36, 13; 106, 47, 23; 92, 46, 19; 88, 38, 14; 75, 34, 12; 78, 34, 15; 86, 34, 17; 89, 41, 16; 106, 46, 20; 116, 50, 25; 101, 45, 20; 98, 43, 19; 109, 45, 24; 90, 39, 16; 102, 48, 20; 93, 40, 18; 96, 41, 18; 98, 46, 17; 83, 48, 16; 107, 48, 22; 109, 47, 23; 98, 46, 18; 75, 35, 16; 104, 45, 24; 86, 36, 15; 66, 29, 11; 103, 45, 21; 94, 42, 19; 105, 47, 22; 97, 49, 18; 98, 45, 20; 78, 39, 16; 104, 46, 20; 90, 38, 16; 80, 36, 15; 73, 33, 13; 77, 34, 13; 85, 38, 15; 92, 39, 18; 67, 30, 13; 67, 33, 14; 108, 52, 22; 102, 46, 22; 86, 39, 15; 101, 55, 20; 97, 41, 16; 75, 34, 15; 83, 36, 15; 119, 62, 21; 123, 62, 21; 88, 39, 16; 88, 38, 18; 90, 40, 16; 65, 29, 11; 94, 40, 15; 78, 34, 14; 81, 35, 19; 92, 41, 19; 94, 42, 19; 113, 47, 20; 50, 23, 8; 97, 35, 14; 94, 42, 19; 112, 47, 21; 79, 36, 14; 90, 45, 19; 100, 41, 21; 75, 32, 13; 47, 24, 8; 113, 47, 23; 112, 47, 15; 130, 57, 26; 73, 36, 13; 94, 41, 18; 110, 41, 22; 104, 47, 22; 79, 32, 12; 52, 26, 11; 68, 32, 13; 95, 42, 18; 48, 34, 13; 60, 28, 10; 63, 29, 18; 79, 37, 13; 94, 40, 18; 116, 49, 29; 107, 45, 22; 51, 26, 8; 109, 51, 23; 102, 48, 20; 112, 51, 23; 112, 52, 20; 94, 40, 19; 102, 51, 21; 104, 47, 21; 77, 34, 13; 94, 42, 19; 93, 41, 18; 103, 46, 22; 109, 48, 23; 109, 40, 18; 59, 27, 11; 66, 30, 11; 105, 49, 19; 77, 33, 14; 94, 45, 17; 76, 36, 13; 115, 47, 25; 112, 53, 22; 93, 43, 18; 112, 52, 21; 114, 51, 23; 81, 35, 16; 75, 35, 14; 65, 32, 11; 89, 34, 15; 109, 48, 23; 88, 40, 18; 97, 44, 17; 92, 42, 19; 76, 37, 15; 76, 36, 14; 91, 41, 19; 77, 36, 13; 74, 33, 12; 101, 43, 19; 100, 44, 19; 68, 30, 12; 92, 40, 19; 93, 43, 20; 88, 38, 14; 94, 41, 18; 77, 34, 13; 108, 50, 21; 78, 34-12; 96, 43, 18; 108, 46, 22; 98, 43, 19; 92, 40, 19; 70, 32, 11; 67, 31, 11; 71, 31, 14; 105, 49, 20; 106, 48, 22; 81, 36, 14; 101, 46, 21; 97, 43, 18; 86, 37, 15; 96, 41, 19; 101, 42, 21; 99, 43, 19; 94, 40, 18; 91, 42, 17; 99, 46, 20; 110, 47, 22; 101, 46, 21; 103, 47, 20; 92, 42, 18; 94, 40, 19; 81, 36, 14; 56, 29, 10; 57, 28, 10; 112, 49, 25; 87, 38, 17; 66, 28, 10; 89, 39, 16; 92, 40, 19; 70, 30, 11; 99, 43, 20; 60, 29, 11; 74, 33, 13; 68, 35, 13; 101, 47, 20; 84, 38, 18; 98, 46, 18; 82, 36, 14; 87, 40, 18; 111, 55, 20; 83, 37, 14; 115, 50, 23; 107, 46, 20; 120, 52, 23; 81, 35, 15; 76, 35, 14; 106, 48, 21; 93, 41, 18; 89, 39, 19; 76, 35, 14; 75, 32, 13; 94, 40, 15; 98, 42, 18; 107, 48, 22; 82, 36, 17; 98, 46, 18; 94, 43, 18; 106, 46, 21; 96, 44, 19; 80, 36, 15; 74, 33, 13; 75, 32, 13; 76, 36, 14; 104, 44, 19; 70, 33, 11; 100, 40, 22; 79, 34, 15; 96, 41, 19; 78, 35, 14; 93, 41, 20; 95, 40, 18; 93, 40, 19; 90, 41, 16; 79, 36, 13; 83, 38, 15; 79, 35, 15; 75, 33, 12; 97, 45, 21; 109, 46, 23; 105, 47, 22; 74, 33, 13; 93, 38, 18; 86, 39, 15; 117-50-27; 78, 35, 19; 76, 32, 15; 76, 32, 12; 115, 47, 20; 69, 30, 11; 86, 39, 17; 112, 53, 21;

102, 49, 20; 107, 53, 20; 120, 58, 22; 106, 47, 23; 98, 41, 17; 70, 31, 13; 93, 44, 20;
 47, 21, 8; 27, 14, 5. (males): 92, 39, 15; 106, 43, 21; 102, 44, 18; 108, 46, 22;
 110, 50, 22; 100, 45, 19; 106, 49, 21; 116, 52, 22; 111, 49, 22; 116, 52, 21; 90, 40, 17;
 112, 49, 20; 114, 48, 23; 120, 49, 25; 109, 46, 21; 120, 50, 22; 106, 47, 17; 125, 54, 24;
 100, 40, 16; 123, 54, 24; 94, 38, 17; 116, 47, 23; 90, 35, 16; 109, 45, 19; 69, 30, 12;
 93, 39, 16; 102, 46, 18; 114, 49, 20; 119, 49, 25; 90, 38, 16; 113, 47, 20; 98, 40, 16;
 114, 50, 21; 106, 48, 20; 67, 30, 12; 112, 48, 22; 110, 45, 21; 111, 49, 21; 112, 50, 21;
 113, 50, 23; 122, 51, 24; 118, 51, 24; 111, 49, 20; 86, 37, 13; 88, 39, 16; 127, 50, 24;
 122, 52, 25; 125, 51, 26; 100, 40, 18; 112, 40, 21; 123, 52, 23; 108, 47, 19; 93,
 41, 16; 112, 41, 21; 108, 47, 20; 106, 46, 20; 111, 45, 20; 111, 47, 21; 106, 46, 19;
 123, 50, 27; 101, 45, 18; 109, 46, 20; 96, 40, 19; 76, 31, 13; 106, 48, 20; 107, 49, 20;
 96, 40, 18; 109, 42, 22; 100, 44, 19; 108, 51, 21; 110, 48, 20; 114, 47, 21; 113, 47, 21;
 110, 48, 21; 109, 47, 20; 123, 52, 25; 93, 38, 15; 96, 42, 18; 89, 43, 16; 98, 40, 18; 85, 34, 15;
 114, 53, 20; 96, 40, 18; 110, 48, 20; 102, 43, 18; 107, 46, 20; 111, 47, 23; 128, 54, 23;
 101, 42, 20; 102, 43, 19; 114, 48, 23; 115, 50, 25; 108, 50, 21; 78, 34, 13; 93, 39, 15; 107
 47, 19; 102, 47, 18; 71, 31, 13; 69, 31, 11; 75, 32, 13; 108, 49, 20; 97, 40, 17; 113, 46, 20; 109,
 46, 20; 109, 46, 21; 101, 45, 20; 102, 43, 18; 98, 42, 19; 89, 40, 16; 95, 40, 17; 76, 32, 13;
 112, 47, 20; 92, 40, 16; 58, 28, 10; 97, 40, 17; 102, 44, 18; 96, 41, 15; 108, 44, 22; 89, 36, 15;
 113, 47, 22; 106, 45, 21; 41, 27, 10; 76, 33, 12; 106, 45, 20; 86, 36, 15; 103, 43, 17;
 88, 39, 15; 59, 29, 11; 113, 47, 22; 59, 24, 9; 51, 23, 8; 96, 40, 16; 114, 46, 23; 67, 30, 12;
 110, 46, 19; 115, 48, 23; 111, 50, 23; 97, 41, 18; 114, 52, 21; 119, 52, 22; 108, 45, 20; 72, 33, 12;
 116, 52, 20; 112, 50, 19; 115, 51, 24; 73, 31, 14; 71, 31, 11; 107, 47, 19; 108, 46, 20; 62, 30, 11;
 112, 48, 19; 112, 46, 21; 120, 52, 23; 109, 46, 23; 97, 38, 16; 98, 39, 17; 68, 30, 10; 69, 31, 12;
 68, 31, 12; 67, 29, 11; 93, 38, 18; 82, 38, 14; 112, 48, 24; 124, 53, 26; 89, 37, 14; 109, 47,
 20; 108, 46, 21; 103, 46, 17.

Anodonta grandis: Total number of specimens 299. (154 right valves, 145 left valves). No measurements taken.

Leptodea fragilis: 114, 69, 18; 124, 71, 19; 129, 75, 22; 134, 81, 25; 121, 67, 19;
 103, 62, 18; 131, 78, 21; 115, 70, 18; 116, 67, 18; 123, 70, 20; 128, 76, 23; 125, 77, 21;
 116, 70, 18; 146, 83, 23; 124, 72, 20; 113, 68, 18; 121, 70, 19; 110, 67, 20; 113, 66, 18; 100,
 55, 16; 111, 74, 21; 90, 46, 14; 75, 47, 13; 103, 59, 15; 87, 47, 13; 83, 53, 15; 76, 49, 13;
 75, 47, 12; 105, 61, 17; 123, 68, 21; 134, 76, 21; 113, 70, 20; 85, 49, 14; 116, 67, 19; 124, 72, 22;
 114, 66, 19; 135, 75, 22; 130, 81, 22; 109, 59, 19; 102, 60, 19; 112, 65, 18; 74, 44, 12; 89, 49, 14;
 95, 54, 15; 91, 47, 13; -, 53, 13; -, 40, 11; - 47, 12; -, 42, 13; -, -, 12; -, -, 13; -, 45, 14;
 -, 45, 11; 69, 40, 10; 73, 41, 13; 90, -, 15; 75, 48, 12; 106, 60, 19; 70, 43, 12; -, 45, 10; 75, 48, 12;
 -, 56, 15; 80, 48, 14; -, 46, 13; -, -, 12; -, 53, 13; 86, -, 12; -, -, -; 80, 43, 12; -, -, -; -, -, -;
 -, 38, 11; 124, 65, 20; 21, 71, 19; 133, 27, 23; 129, 73, 22; 99, 61, 17; 123, 70, 19; 117, 68, 19; 113,
 66, 18; 115, 68, 18; 129, 79, 22; 98, 55, 16; 116, 67, 19; 128, 77, 18; 118, 71, 18; 98, 65, 16; 112, 65,
 18; 119, 66, 18; 89, 59, 18; 104, 62, 17; 135, 80, 23; 135, 80, 22; 118, 69, 19; 121, 70, 19;

123,70,19; 109,62,19; 117,66,18; 128,74,19; 132,76,21; 130,79,20; 131,78,21; 90,57,15;
 123,68,20; 120,68,18; 113,66,18; 96,53,16; 106,62,18; 104,58,15; 85,47,14; 106,61,17;
 83,52,14; 97,50,15; 102,57,16; 74,41,12; 99,56,15.6; 110,70,18; -,46,12; 68,40,11;
 90,53,15; 72,43,11; 47,-,11; 72,-,11; 67,-,11; 72,-,11; 40,32,9; 70,42,12; 57,37,9;
 110,64,18; 76,41,13; 102,60,16; 85,47,13; 83,54,15; 128,70,20; 107,62,17;
 89,56,17; 89,48,13; 123,69,20; 127,78,21; 116,68,17; 127,72,20; 85,46,12; 89,51,12;
 94,52,17; 109,71,21; 107,61,17; 117,66,21; 113,66,18; 118,66,19; 124,70,21; 133,79,23;
 135,77,25; 124,71,19; 124,75,22; 129,72,22; 118,66,18; 125,70,19; 117,68,20; 111,60,19;
 119,66,19; 99,67,19; 247,74,21; 84,50,12; 111,67,18; 129,79,22; 127,72,22; 119,68,21;
 109,62,21; 127,78,21; 121,73,21; 144,78,24; 124,71,22; 67,41,11; 116,68,18; 122,76,22;
 113,67,21; 109,64,19; 110,65,20; 129,78,22; 109,62,20; 118,70,20; 105,58,17; 104,60,16;
 77,44,13; 136,82,21; 126,75,21; 128,74,22; 114,68,18; 125,69,20; 126,73,21; 122,70,21;
 103,59,14; 120,70,20; 90,48,13; 89,55,15; 94,54,16; 106,56,17; 104,62,16; 128,71,20;
 70,40,10; 71,40,10; 91,58,16; 105,60,18; 120,70,19; 91,52,14; 95,58,16; 98,60,16;
 106,59,18; 103,58,26; 103,59,15; 100,60,17; 94,56,16; 95,56,16; 100,61,18; 109,63,19;
 128,74,22; 121,69,18; 114,67,19; 119,69,18; 122,70,20; 122,72,21; 97,54,16; 126,78,
 21; 129,73,22; 109,64,20; 87,53,13; 112,69,19; 106,58,17; 130,78,22; 115,68,19;
 116,69,18; 115,68,18; 130,76,24; -52,16; -,55,15; -, -,13.

Ligumia subrastrata. 63,29,10.8; 48,27,8.7; 53,26,9.4; 51,29,10.6;
 44,24,10.0; 59,27,11.2; 58,28,9.6; 63,30,10.8; 68,30,11.6; 58,30,10.0; 60,30,10.0
 59,27,9.8; 58,32,11.6; 62,31,9.3; 57,28,9.6; 50,25,9.8; 56,26,8.6; 61,34,13.3; 44,
 23,8.0; 52,29,10.2; 51,27,9.3; 54,30,11.3; 50,24,9.0; 46,25,9.0; 49,26,9.6; 62,30,10.1;
 52,24,8.6; 52,25,8.3; 52,28,11.0; 58,33,11.8; 51,28,10.7; 53,26,9.0; 65,29,11.4; 56,
 28,10.9; 60,28,10.1; 52,28,10.5; 65,32,11.8; 70,32,11.1; 43,22,7.3; 46,24,8.5; 49,
 26,9.7; 36,19,6.8; 50,28,10.7; 61,34,12.6; 52,27,11.8; 63,27,10.1; 56,28,12.0; 63,29,10.2;
 43,23,8.4; 52,29,9.2; 53,29,12.3; 66,33,11.8; 48,27,10.7; 66,32,11.9; 54,29,11.3; 67,
 33,11.8; 70,34,12.3; 55,26,9.4; 53,28,9.7; 54,30,9.5; 62,28,10.6; 50,28,10.5; 67,
 35,14.2; 55,31,10.0; 51,26,9.0; 65,30,11.0; 58,27,9.5; 53,25,8.6; 66,31,11.5;
 57,29,10.5; 72,33,11.8; 56,26,10.4; 47,26,9.7; 62,32,11.2; 50,23,8.4; 51,27,9.0;
 54,29,10.5; 52,24,8.5; 64,30,10.5; 54,29,11.8; 54,29,10.1; 61,29,10.6; 49,25,9.2;
 52,28,11.1; 50,27,11.3; 64,31,11.3; 45,25,9.3; 56,29,10.4; 53,27,10.9; 48,27,9.0;
 50,27,9.2; 54,30,11.2; 49,24,7.7; 50,28,10.1; 50,26,9.4; 51,30,10.3; 54,29,11.0;
 53,25,9.1; 53,30,10.0; 50,28,11.0; 52,31,10.6; 52,27,9.9; 67,32,11.7; 58,32,12.0;
 55,28,10.8; 57,27,10.0; 55,28,9.0; 47,22,7.5; 58,27,10.8; 41,27,6.9; 53,28,8.6; 53,28,8.5;
 51,24,9.4; 50,30,10.8; 48,28,10.1; 47,24,8.5; 43,24,8.2; 46,26,8.8; 46,23,9.0; 47,
 26,9.8; 46,25,9.6; 41,23,7.8; 48,27,10.2; 48,26,10.3; 56,27,9.3; 52,29,11.4; 58,33,13.4;
 46,25,9.8; 46,24,8.8; 48,25,8.1; 43,23,8.1; 48,20,6.3; 51,28,9.2; 48,26,10.0; 49,27,9.7;
 48,23,7.5; 48,24,8.1; 46,25,9.7; 50,26,9.2; 49,25,8.9; 42,20,8.3; 56,26,8.6;
 55,30,10.4; 38,20,6.2; 47,23,7.5; 52,26,9.4; 38,20,7.8; 49,26,10.6; 47,25,9.0;
 48,25,8.8; 46,24,9.2; 42,20,8.0; 45,22,7.9; 48,27,9.7; 49,27,11.0; 49,27,10.5

45,22,8.0; 39,21,7.8; 41,22,7.0; 43,26,9.4; 45,23,8.6; 46,24,7.7; 44,24,7.7; 39,21,7.2;
 44,24,8.8; 39,20,7.0; 38,19,7.3; 41,22,7.2; 47,24,8.0; —, 27, 9.1; 42,22,7.0; 43,23,8.1;
 43,24,8.4; 38,21,6.4; 43,21,6.0; 40,21,7.2; 34,17,6.2; 33,18,6.0; 39,19,6.4; 39,18,6.0;
 42,20,7.2; 40,22,7.9; 43,25,8.9; 46,24,9.6; 37,20,6.8; 42,24,8.4; 42,22,7.5; 39,21,
 7.3; 41,22,7.8; 39,20,6.9, 39,20,7.1; 39,20,6.7; 37,18,5.4; 38,18,6.8; 41,19,6.6; 41,20,7.0;
 38,19,6.4; 38,18,6.7; 42,19,6.6; 35,18,6.3; 35,17,6.0; 36,18,6.3; 30,14,4.6; 31,16,5.3;
 29,15,5.0; 40,20,6.4; —, 22, 6.8.

Lampsilis radiata silegoidea: (♂, left shell). 126,60,26; 122,59,23;
 130,65,26; 118,54,22; 129,63,24; 122,60,27; 91,45,13; 114,57,24; 113,62,30; 93,47,
 18; 114,54,20; 129,69,27; 116,59,23; 136,65,26; 105,51,23; —, 57,21; 106,52,19; 116,61,
 23; 117,59,22; —, 58,22; 109,52,20; —, 45,14; 115,55,18; —, 60,29; 114,57,24; 107,
 58,20; 122,55,21; 116,60,24; 125,59,25, 123,63,22; 114,60,22; 130,66,25; 116,58,20; 117,
 57,23; 113,55,26; 132,64,27; 114,60,24; 111,54,19; 106,58,20; 137,60,27; 115,62,27; 117,57,
 21; 128,56,25; 124,61,21; 116,58,22; 113,56,24; 100,55,22; 116,55,22, 126,60,25; 116,56,22; 114,
 59,23; 114,59,23; 117,57,23; 108,60,22; 117,59,21; 123,61,25; 106,52,20; 102,59,27; 114,54,21;
 111,55,25; 98,53,16; 134,64,26; 105,54,19; 81,40,15; —, 54,20; —, 64,25; —, 58,23; (♂ right
 shell), 114,59,25; 112,57,23; 123,60,25; 119,60,26; 123,66,26; 119,61,27; 99,53,19; 122,60,
 26; 119,61,23; 128,63,31; 132,67,28; 110,56,23; 93,56,23; 93,47,17; 116,60,25; 125,60,22;
 120,60,25; 132,66,27; 122,57,23; 127,63,25; 109,61,21; 126,62,25; 130,66,28; 123,56,26;
 124,61,26; 110,53,19; 133,65,23; 102,50,19; 113,51,26; 111,58,21; 127,60,24; 120,57,22;
 118,60,24; 102,52,20; 114,55,24; 124,59,25; 123,62,24; 121,59,24; 120,61,29; 94,50,17;
 124,62,25; 125,60,25; 110,57,21; 115,57,20; 117,57,22; 117,59,23; 108,59,25; 112,58,22;
 120,61,28; —, 51,18; —, 60,25; —, 55,20; 131,63,26; 133,64,24; 119,57,23; 122,58,22;
 110,55,20; —, 67,23; 112,55,22; 124,61,24; 101,50,18; —, 39,13; —, 55,22; —, 53,21; 68,
 34,12; —, 50,20. (♀, left shell). 102,58,18; 127,73,28; 129,70,26; 113,65,28; 117,62,25;
 112,65,28; 108,65,25; 114,59,25; 109,64,26; 99,56,24; 101,55,19; 106,55,22; 104,59,27;
 111,60,25; 91,50,27; 104,55,20; 99,55,18; 99,54,17; 76,41,13; —, 55,22; (♀, right shell).
 —, 58,27; 107,60,22; 99,56,20; 107,55,24; 108,59,23; 95,54,23; 102,58,22; 104,55,20; 101,
 56,23; 105,59,24; 91,59,21; 96,54,21; 121,59,26; 104,57,25; 105,59,21; 119,65,25; 97,56,
 18; 117,63,24; 118,70,26; 103,58,22; 111,57,26; 114,70,28; 108,60,23; 81,47,15; 98,56,26;
 97,55,22; 90,50,17; 95,55,21; 124,74,29; 111,64,25; 98,55,22; 88,49,19; 98,55,18; 116,
 61,27; 96,55,21; 86,48,18; 90,51,20; 129,65-33.

Quadrula quadrula: 92,64,22; 92,62,22; 86,64,19; 74,53,18; 73,54,18; 116,
 80,27; 78,55,17; 116,81,32; 107,73,26; 105,74,25; 25,18,6; 73,52,18; 106,78,24; 98,68,23;
 91,69,21; 94,72,23; 91,69,24; 114,77,27; 94,66,23; 78,54,20; 66,50,14; 79,58,17; 112,80,29;
 75,55,19; 56,42,12; 24,18,5; 67,47,14; 87,60,21; 68,46,15; 91,67,19; 79,58,21; 86,63,19;
 74,53,18; 68,51,15; 92,63,22; 58,43,13; —, 65,—; 79,59,15; 91,66,21; 66,53,15; 67,50,16;
 73,55,16; 85,62,20; 93,63,22; 61,48,14; 79,58,19; 96,63,23; 87,61,24; 100,67,23; 82,
 62,21; 57,41,12; 70,53,18; 81,62,20; 92,63,22; 80,59,19; 78,57,19; 86,67,19; 85,60,22

56,41,11; 57,42,14; 28,22,6; 51,37,10; 68,48,14; 92,65,24; 66,46,18; 46,32,10; 69,47,15;
 67,48,15; 64,46,16; 63,44,14; 87,60,19; 86,60,17; 88,62,21; 72,52,16; 83,59,19; 42,28,8;
 42,30,9; 53,37,11; 66,49,14; 90,62,22; 84,57,21; 86,58,20; 59,44,14; 76,54,18; 73,58,20;
 86,59,18; 47,37,11; 56,40,13; 81,58,19; 98,70,21; 85,58,21; 53,40,13; 90,63,23; 41,
 43,13; 41,28,8; 51,38,11; 62,48,17; 43,29,9; 66,47,14; 81,61,19; 47,42,9; 77,56,16; 47,
 36,11; 75,53,19; 61,45,16; 80,59,20; 76,55,18; 50,42,11; 70,50,16; 66,52,18; 68,51,16; 91,
 60,24; 69,50,16; 59,42,13; 58,42,12; 79,57,20; 89,58,11; 52,42,13; 80,58,18; 64,48,13; 84,
 62,19; 70,53,17; 97,65,21; 89,63,23; 53,41,12; 85,62,21; 73,58,20; 82,60,18; 53,38,10; 58,
 41,13; 69,53,18; 43,29,9; 30,22,6; 47,35,12; 19,24,5; 39,28,8; 88,62,18; 87,60,22; 76,54,16;
 84,59,19; 48,35,19; 76,54,16; 59,43,17; 91,67,20; 78,44,17; 62,44,13; 67,50,15; 53,43,15;
 61,47,13; 52,37,11; 59,41,12; 49,37,11; 77,54,18; 55,42,12; 82,59,18; 64,46,14; 63,46,14; 64,
 46,14; 59,47,16; 53,37,10; 77,54,18; 70,52,18; 50,36,10; 47,31,10; 51,39,11; 52,37,11;
 43,32,9; 29,22,7. The unusual sized pustules measured: 6x5mm, 7x3, 6x3,
 12x5, 7x4, 10x3, 9x3, 7x3, 6x4, 9x3, 11x3, 10x3, 8x5, 9x4, 7x5, 8x3, 8x4, 8x5, 9x4,
 5x3, 5x3, 8x3, 11x5, 10x3. The measurement of 13 line uniconid of this
 species measured, length = 97, 115, 110, 105, 95, 100, 97, 91, 95, 93, 95, 80, 78.
 The biomass of this species is 17 1/2 lbs.

Laemigona complanata: 169,103,28; 169,104,25; 149,92,20; 69,46,9; 127,84,20;
 114,79,15; 154,92,23; 111,75,15; 129,80,17; 142,87,20; 142,95,21; 131,87,22, 170,102;
 28; 121,88,16; 120,80,18; 99,65,14; 140,90,21; 146,93,22; 153,97,21; 119,78,18;
 141,93,21; 87,63,12; 161,106,32; 127,86,22; 65,40,8; 134,93,20; 133,92,19; 130,83,21;
 139,95,22; 140,93,22; 110,81,16; 133,88,19; 139,93,19; 123,78,16; 124,80,17; 124,84,22;
 131,85,20; 134,84,19; 153,94,23; 137,93,24; 142,98,23; 161,106,25; 143,93,21;
 123,81,17; 132,82,22; 125,83,17; 64,45,10; 122,85,17; 123,81,17; 139,91,19; 142,98,23;
 125,84,19; 138,91,21; 98,64,13; 122,89,17; 131,88,19; 146,100,20; 140,89,22; 146,95,23;
 137,97,20; 64,43,7, 165,105,27; 165,101,27; 125,84,19; 77,58,10; 130,83,23; 121,80,
 17; 130,97,25; 130,84,18; 109,73,15; 131,85,20; 148,95,28; —, 100,25; 78,55,11;
 154,92,24; 153,96,23; 155,100,26.

Orenodonta peruviana. 121,79,24; 97,64,21; 116,76,24; 125,78,24; 94,65,20;
 125,84,28; 120,70,24; 116,65,22; 110,75,24; 109,75,23; 107,71,25; 95,64,20; 115,79,
 27; 136,87,29; 137,79,30; 131,92,22; 102,67,20; 81,58,16; 118,69,24; 117,73,22; 80,57,14;
 110,65,19; 87,65,18; 134,85,25; 111,68,20; 110,69,20; 109,66,20, 110,66,22; 115,71,22;
 93,65,18; 52,38,10; 102,70,21; 135,87,25; 90,60,21; 105,68,22; 106,70,20; 112,73,22; 106,69,
 22; 126,79,26; 81,55,16; 116,75,22; 106,70,21; 106,71,21; —, —, —; 102,69,20; 88,55,17; 97,66,23;
 77,53,15; 92,64,18; 118,72,22; 91,63,20; 119,79,25; 76,51,13; 100,69,20; 86,62,20; 111,72,23;
 98,68,20; 75,52,17; 98,67,20; 117,71,24; 59,41,12; 98,66,23; 88,54,19; 102,68,22; 67,53,15
 Biomass 16 lbs, no live specimens.

Quadrula pustulosa: 78,62,23, 34,22,9; 42,32,11; 74,57,22; 53,43,15; 33,25,8;

42,32,10; 60,47,17; 26,22,7; 42,31,12; 76,58,23; 68,57,22; 34,27,9; 39,31,9; 49,42,12;
 52,43,14; 48,39,12; 29,25,8; 48,37,13; 43,34,11; 36,28,9; 58,64,16; 33,25,9; 33,27,
 8; 65,49,15; 19,16,4; 24,20,6; 72,58,15; 59,43,15; 56,48,15; 64,51,18; 72,57,20;
 73,58,20; 57,45,14; 60,46,16; 36,28,10; 35,28,10; 45,36,12; 52,42,14; 57,47,18;
 57,45,15; 49,38,13; 52,42,14; 73,59,21; 34,25,8; 68,50,18; 52,41,14; 52,40,12;
 80,62,24; 55,41,15; 42,34,12; 54,42,16; 44,34,11; 41,33,10; 59,39,12; 58,45,15;
 69,56,20; 52,43,14; 34,26,9; 43,33,11; 38,31,9; 39,31,10. Biomass 260 grams
 no live specimens.

Proptera alata: 138, 94, 26; 137, 94, 27; 88, 60, 15; 148, 100, 22; 145, 95, 23;
 —, 48, 12; 92, 57, 14; 75, 46, 12; 118, 83, 18; 116, 77, 21; 70, 47, 11; 75, 55, 13; 75, 53,
 12; 78, 52, 13; 121, 83, 17; 170, 100, 17; 114, 78, 22; 59, 41, 9; 90, 58, 14; 90, 56, 13; 135,
 83, 23; 134, 88, 22; 148, 98, 25; 118, 82, 19; 135, 85, 22; 147, 89, 16; 73, 51, 13; 52, 34, 8;
 77, 54, 12; 72, 46, 12; 59, 40, 11.

Fuseonina flava: 70, 43, 15; 55, 35, 10; 48, 33, 9; 46, 32, 9; 48, 33, 9; 48, 32, 8;
 42, 28, 8; 47, 32, 9; 36, 20, 7; 45, 30, 9; 59, 40, 11; 53, 32, 10; 37, 25, 7; 23, 19, 5;
 29, 14, 6; 28, 18, 7; 61, 38, 11; 22, 16, 4; 46, 31, 9; 34, 20, 7; 36, 21, 6; 60, 35, 10; 54,
 36, 9.

Legumia recta latissima: 69, 30, 11; 58, 25, 9; 57, 28, 9; 44, 22, 7;
 56, 23, 8; 125, 50, 15; 55, 23, 8; 69, 30, 12; 64, 25, 9; 47, 19, 7; 48, 24, 8; 60, 29, 10;
 63, 27, 10; 57, 27, 9; 51, 23, 8; 52, 23, 7; 58, 25, 9; 48, 20, 7; 31, 16, 5; 31, 17, 7.

Leptodea laevissima: 106, 67, 17; 65, 40, 8; 141, 85, 20; 136, 91, 21; 150, 99, 24;
 139, 86, 20; 124, 82, 19; 123, 84, 18; 138, 87, 21; 123, 83, 21; 90, 62, 16; 124, 84, 22; 149, 97, 23;
 140, 96, 22; 148, 97, 23; 128, 86, 20; 98, 62, 15; 140, 88, 21; 117, 76, 20.

Uniomereus tetralasmus: 82, 40, 12; 91, 45, 16; 82, 40, 13; 67, 33, 14; 90, 45, 11;
 54, 27, 15; 70, 34, 9; 76, 38, 11; 71, 34, 10; 37, 18, 5; 49, 25, 9; 68, 34, 10; 92, 46, 15; 82, 39, 11;
 70, 35, 11; 73, 35, 10; 53, 26, 8; 65, 33, 11.

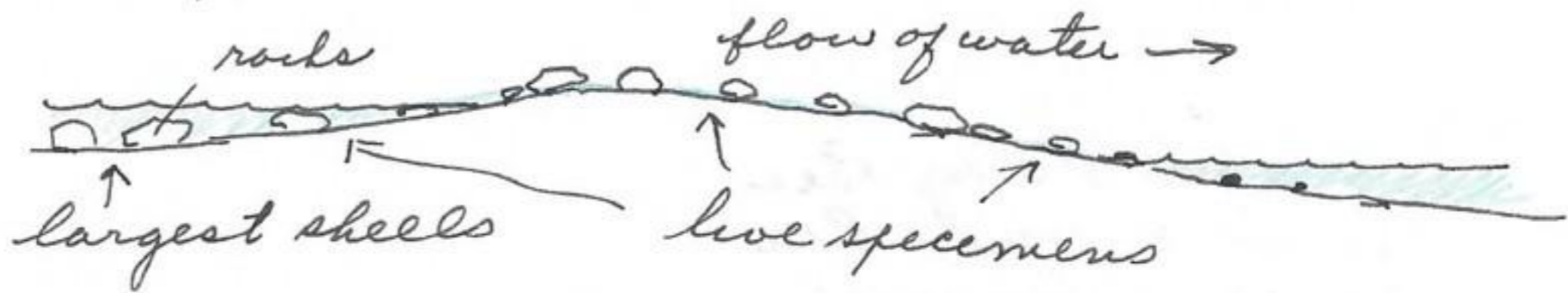
Carunculina parva: 23, 13, 5.8; 25, 14, 7.3; 24, 14, 6.0; 22, 12, 4.8; 26, 14, 6.0;
 23, 13, 5.0; 24, 15, 6.0; 22, 13, 5.0; 27, 14, 6.1; 24, 14, 5.9; 22, 13, 5.0; 25, 14, 5.6; 27, 15, 6.2;
 20, 12, 4.6; 26, 16, 5.9; 21, 11, 4.3; 19, 11, 3.8.

Truncella donaciformis: 38, 23, 8; 42, 25, 9; 43, 24, 8; 37, 22, 8; 45, 27, 8; 31, 18, 7;
 52, 28, 9; 38, 21, 8; 47, 28, 8; 41, 25, 8; 49, 29, 9; 37, 18, 7; 37, 23, 8; 52, 28, 9.

Lampsilis ovata ventricosa: 122, 69, 26; 146, 90, 27; 146, 88, 35; 129, 78, 34;
 100, 71, 29; 91, 64, 25; 93, 61, 21; 102, 70, 27; 103, 64, 24.

Tritogonia verrucosa: 130, 74, 20; 112, 55, 12; 93, 50, 13; 109, 61, 18. no live specimens

was generally 2 or 3 feet from the edge of the stream. In shallow places, especially at ripples, specimens were taken from the full breadth of the stream. Visibility was generally about to a depth of 10 to 14 inches in the water. The first debris accumulation below 2 foot cascade beyond ^{deep} circulating pool was sand and coarse gravel and supported mainly light weight shells (see listing of these). Beyond this point the character of the stream bed was similar in being bordered by rocks with hard bottom stream ^{bed} covered with larger rocks and a base of mud veneer. The deepest mud ^(1 1/2') was on shore in areas not lined with rocks. In general the smallest and light-weight shells were from sandy bars; the largest and heaviest from stream channel just above ripple and rock barrier in channels.



Intermediate sizes along edge of stream bed in rocks. It is a question whether these shells are in place in the stream bed or have been wash, during high water, from the deep permanent part of drainage above the upper cascade barrier. Live specimens from just above, in and immediately below rock barriers across stream in rather rocky positions or substrates. I would estimate that 40 per cent of the stream bed was inspected and all shell collected. Other 60% of stream bed was not available because of depth of water or bottom invisible because of turbidity of the water (visibility approx 1 foot).

Analysis of population of uniads from this section of the river is as follows (all individuals collected representing live specimens to those perhaps several years old); including per cent frequency of each species, growth range, biomass; and individual variation. This analysis will be compared with a similar one ~~for~~ from a sample from Richland, one from near Eudora, one from Rock Creek and one from Deer Creek to determine distribution and population com- position within a single drainage system.

- 660729-8 Larry Bee
- 660729-9 Hazel Bee
- 660729-10 Lawrence
- 660729-11 Lawrence + instruments of boat
- 660729-12 Hazel
- 660729-13 radar (depth)
- 660729-14 Larry & Mary Pauline at helm.
- 660729-15 " in swimming
- 660729-16 Captain's hat
- 660729-17 Hazel
- 660729-18 Hazel & Larry at boat dock
- 660729-19 Compass of boat.

Enroute to area made complete census from S end of proposed Clinton Reservoir down at mileage 36.2 (1:30 P.M.).
 36.3 dickcissel; 36.5 meadowlark; 36.8 Eng sparrow; 37.2 dickcissel; 37.4 dickcissel; 37.5 Rock Creek; 37.6 dickcissel; Cardinal; 37.9 dickcissel, meadowlark; 38.5 Cardinal, Eng sparrow; 39.1 Eng. Sparrows; 39.7 mourning dove, Eng sp; 40.1 Clinton (main store or center of town); 40.4 mourning dove, meadowlark; 40.6 meadowlark; 40.7 barn swallow; 40.9 meadowlark; 41.0 blue bird (eastern); 41.2 turn N at Cemetery; 41.3 cardinal; 41.4 Cuckoo; 41.8 leaving main road and now to right; 42.1 collecting station on Wakarusa.

On return from collecting area did not keep complete census but noted 2 mockingbirds together and 8 mourning doves at the first curve east of Clinton. At S end of proposed dam noted 3 crows.

Pomona Reservoir, Kansas

July 29, 1966

Lawrence and Hazel Bee invited us to Pomona Reservoir for boating in the new 18' motor boat recently acquired by Larry. Made a set of slides for Larry and selected a set of our family which include:

- 660729-1 Annette Christine with large sun glasses
- 660729-2 Annette with sun hat, Hazel in background.
- 660729-3 Mary Pauline
- 660729-4 Mary in water at edge of boat. Show some facial resemblance to Mary Bjensen.
- 660729-5 Annette at wheel of boat. Original German hat.
- 660729-6 Family and Hazel. Receiving spray from boat.
- 660729-7 Sail boat

This reservoir is already overpopulated with boats. Access roads are (except to main marina) not paved and dust is spread far & wide. Campers near roads are enveloped in a continuous atmosphere of dust with equipment and tents covered. Areas of concentration can be identified for miles around the lake. If these roads are county they should be paved at once rather than allow them to go unpaved as was the history of Lone Star Lake. Collected one water plant with leaves & flower that had a stem 25 feet in length extending down thru the water to the lake floor where it was anchored in mud. Black tern in area and not too uncommon.

Lawrence, Douglas Co., Kansas

July 31, 1966

Prepared for vacation which will start Aug 2, 1966. Plan to visit St. Louis, Chicago, & Michigan Lake, Canada, International Falls, Ely, Consering to N & E, then Lawrence. Started the following check list: (X = canoe trip)

- | | | | |
|---|--|---|------------------------------------|
| X | waterproof tent ✓ | X | collecting material |
| X | make tent pegs ✓ | | scissors, scalpel, ✓ |
| X | ground cloth (cut ^{13 ft dia.} 20 x 30) ✓ | | forceps (2); ruler, wire ✓ |
| | center pole. ✓ | | cutters, pliers, 2 sizes wire, ✓ |
| | gas stove ✓ | | tags, scales, needles & ✓ |
| | gas can ✓ | | thread, cotton, corn meal, ✓ |
| X | reflector oven and pan (12x6x1) ✓ | | skinning tray, specimens ✓ |
| | 1 gal. can for water ✓ | | bones, pins, traps, stove ✓ |
| | 3 1/2 cans for water ✓ | | Higgins ink, rapids - ✓ |
| | table ✓ | | graph pens, gun, shells. ✓ |
| X | carrier & tarp, suction cups (2) ✓ | | |
| | mosquito nets for car, ^{tape} ✓ | X | journal. |
| X | " repellent ✓ | | recorder - batteries, tapes ✓ |
| X | stove ✓ | X | camera - film, Tel, exposure ✓ |
| X | stone pipe ✓ | | meter |
| X | stove hood ✓ | X | binoculars ✓ |
| X | hatchet (1) ✓ | X | bird - mammal, trees |
| X | saw (2) ✓ | X | watch (2) (one a waterproof one) ✓ |
| X | fishing gear | | counter no |
| | 4 fly poles ✓ | | stop watch no |
| | 1 cast pole ✓ | X | emergency kit ✓ |
| | 2 reels ✓ | | saw, nails, wire, grommets, ✓ |
| | lures & flies ✓ | | matches, tweezers for splinters, ✓ |
| | leader ✓ | | syringe for ear, candles, ✓ |
| | sinkers ✓ | | reading glasses, signal ✓ |
| | hooks - bobber ✓ | | mirror, file |
| | swivels ✓ | X | knife. ✓ |
| | pans for front seat ✓ | X | sunglasses ✓ |
| | altimeter ✓ | X | sleeping bags & mattresses ✓ |
| X | Compass | X | repair kit |
| X | humidity ✓ | X | hand pumps & tubes ✓ |
| X | flashlights (3) & batteries | | pillows |
| X | shower with battery | X | plastic bags |
| | car shower ✓ | X | extra rope ✓ |
| | knee boots ✓ | X | canoe - paddles no |
| | car bed ✓ | X | umbrella |
| X | awning for car. | X | whistle ✓ |

x maps. ✓

x shovel ✓

medical kit

aspirin, sun lotion
burn salve, benzedryl
ophthalmic salve,
bandage.

Food & cooking equipment

- x reflector oven ✓
- x matches
- x large fry pan - lid ✓
- x spatula
- x large pan with handle - lids ✓
- x small " " " ✓
- x spoon, knife, fork, cups, plates.
- x dish pan
- x butcher knife
- x 505 pads & soap ✓
- x rags - paper towels
- x dish cloth
- x Zee
- x can opener

Cloths

- 2 pair shoes
- 2 " pants
- 2 shirts (long sleeve)
- undercloths
- sweater (warm)
- wind jacket
- rain coat
- hat
- gloves

- 2 Duluth bags ✓
- 3 large water proof bags ✓
- ✓ 1 plastic to cover canoe in rain ✓
can table and chairs
- ✓ 3 life preservers
sparkle

Food dry eggs & milk

salt pepper, cocoa
coffee, sugar, salt
~~dry milk~~, ~~cream~~
canned bacon, potatoes,
meats, dry fruit, cereals,
rice, butter in jar,
peanut butter, jam, sandy,
cheese, box soups, ~~baked~~
~~beans~~, tang, carnation
breakfast, hams, crisco
for fish frying, omlets,
fresh fruit, fresh eggs
preme, bread, metrasa,

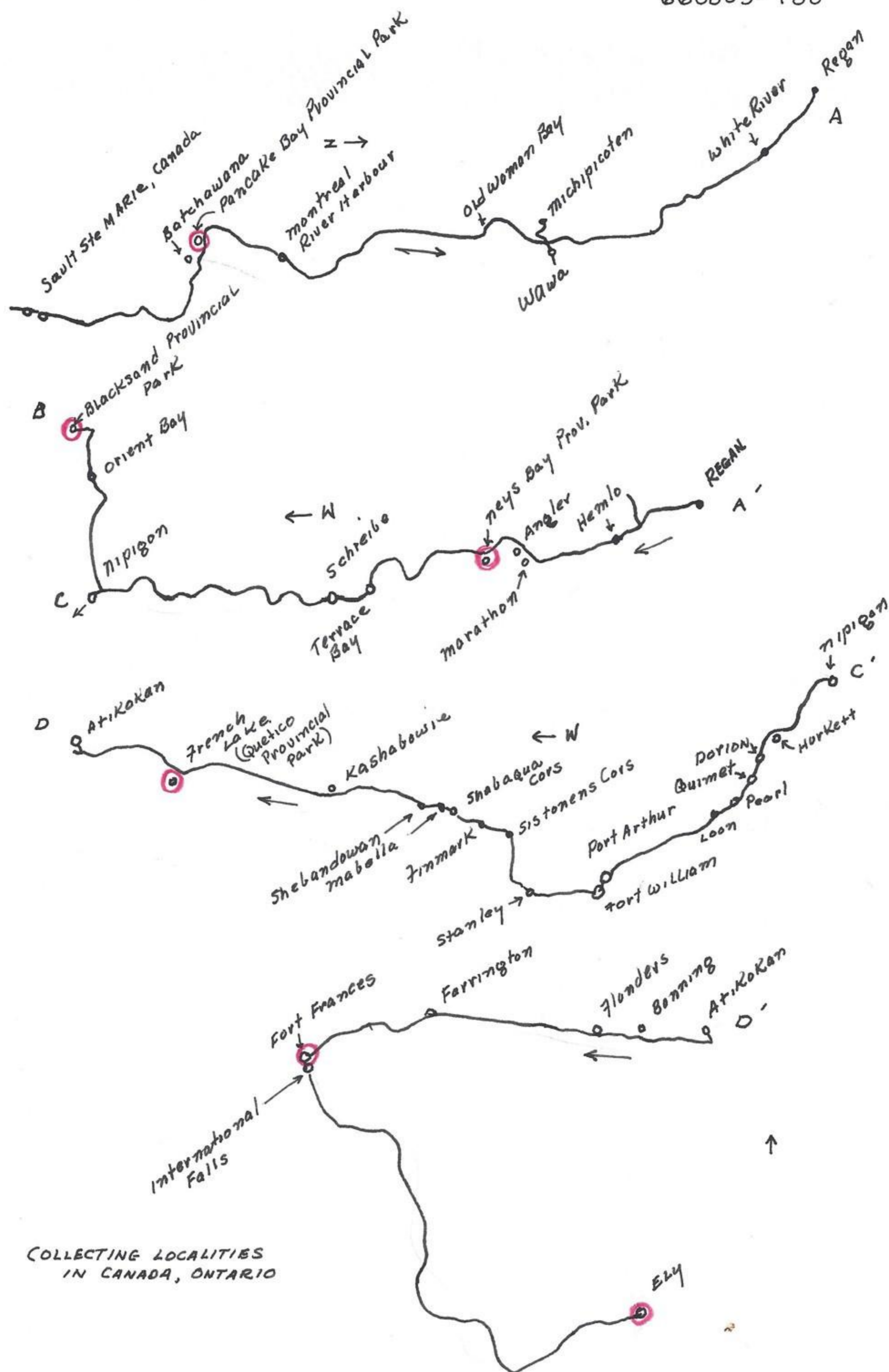
Items to buy

- 12 x 6 x 1 boke pan
- batteries
- Duluth pack
- large water proof bags

ITINERARY

AUG. 3 - AUG. 28, 1966





COLLECTING LOCALITIES IN CANADA, ONTARIO

Lawrence, Douglas Co., Kansas

Aug. 3, 1966

Annette, Pally and I left Lawrence for vacation at 9:00 A.M. mileage 78443. Chris is to participate in scout activities and James R is to work and then meet us in Ely. Minn. Kansas City 10:15 AM. One Redheaded Woodpecker between Kansas City and Lawrence. First good and continuous deciduous forest beyond Blockwater River on highway 70. First red-tail since Lawrence at junction of Houstonia, also a second red-head woodpecker in same area. That is second one since Lawrence. Arrived O'Fallon 4:30 P.M. and camped at Zumwalt State Park at mileage, 78721. Another red-headed woodpecker near here, bring total to two across Missouri.

Zumwalt State Park, Missouri

Aug 4, 1966.

This park supports an old ^{log} building now almost completely raised of about the 1790 period. Logs oak and fragile; chimney rebuilt but no attempt in reforming to old style and quality of workmanship, that is, it is too well formed for that period. Noted an Eastern Kingbird chase a sparrow hawk 300 feet and then return to isolated nesting tree or perch tree. Indigo bunting, chipping sparrow, grackle, robin and barn swallow in area. Adjoining land sells for \$3,000 per acre. Dew heavy last night, temp 55°F and cool. At 9:30 temp 65°F. Left camp at 9:40 A.M. for St. Louis. Visited the zoological gardens and Pally took the following pictures.

- 660804-1 3 otter 660804-9 and 10 Polar bear
- 660804-2 Trumpeters swan
- 660804-3 Gibbons at edge of water
- 660804-4 Blue and snow geese
- 660804-5 ~~swan~~ polar bear
- 660804-6 Kamchatka bear
- 660804-7 and 8 Grizzly bear

At the Show Gardens or Missouri Botanical Gardens took photos

- 660804-11 Three species water lilies
- 660804-12 water falls in Climatron with Annette + myself red flower
- 660804-13 Annette + I from Climatron
- At old Cathedral at base of Jefferson arch took photo 660804-14 of late sunlight reflected from N leg

Before leaving St. Louis visited ^{waterfront} at the zoo
observed the following with recommendations:

Revise rock walls between large mammal runs to eliminate artificial appearance. Wire fences or rock barriers at random would be better.

Floor of pen area could be brought to better surface than weeds and dry soil. Rotate vegetation and water plant growth.

Eliminate all bars of cages and replace with glass.

Light exhibits.

Place objects in cages for animals to manipulate and have soft surface areas rather than hard surfaces.

Update old buildings and decide on a decor rather than a hodgepodge of architecture and ill-fitted exhibit.

Reduce odors

Eliminate pigeons, starling and sparrows.

Install natural water courses in bear and other exhibits rather than fountain types.


Eliminate railroad trains or any other recreation facilities. Keep refreshment stands at periphery.

Get all animals out of cages into natural areas but small ones.

Keep some types of exhibits high so that 2 and 3 lines of people to rear can see at same time.

Close door and darken wall in front of Great Ope mount.

Reduce annoyance of animals (Great Ope) by children.

Continued E across River to Cahokia Mounds State Park where we camped. Mounds of Central American influence  and consist of 40-50 in group. Three cultures from Pre-woodland on. Mileage 78799.

Cahokia Mounds, Illinois Aug 5, 1966

Left 8:20 A M Mockingbird song all night and stopped at daybreak. Song sparrow & night heron in area as well as other birds. No dew in contrast to E St. Louis at Springfield visited Lincoln Home Photos 660 805-1 and 2 of this area including mother & dad and one of Pooley.

- 660807-1 to 660807-13 various classes of sail boats,
660807-14 to 660807-18 " " motor boats
660807-19 Annette & Mary
660807-20 Annette
660807-21 " at marina, Chicago in background,
660807-22 " " " near Field Museum.
660807-23 Annette and Polly pointing to dent in bumper
placed there by operators of Sherman Hotel parking
attendants
660807-24 Fountain in Chicago.
660807-25 Lucy, a large yacht.

Illinois State Museum for a few minutes. Art too detailed for background work and too tight. More exhibits should be lifelike. Do not mix natural history with modern art and culture. (Continued n to Channahon State Park at mileage 79088, ^{5:30 P.M.}) One of the canal locks are located here but have not been in operation for many years. Bats started to fly at 8:20 P.M. and tréadas or some other type of insect (mechanical noise of 5-6 notes per call & repeated after 2 second pause) started at 8:35 P.M. Am. Egret feeding in canal area. One marmot noted in median strip between interstate 55 just S of Springfield. Crows started to increase somewhere between Springfield and this camp tonight. No raptors have been noted.

Channahon State Park, Illinois
Aug 6, 1966

Left 9:00 A.M. Kingfisher, pewee, grackle, catbird, song sparrow in area. Arrive Chicago. At Field Museum noted lack of interest in the natural history section and considerable improvisation as satisfaction of work less than perfection. Many cases are obsolete. Too much emphasis on cultural exhibit and related fields which are taking over the natural history section. Other areas visited were n Lakeview drive, Marshall - Field store and other places. In evening drove some 40 or so miles to Indiana Dunes State Park where we camped. Provisions should be made for campers nearer Chicago.

Indiana Dunes State Park, Indiana
Aug. 7, 1966

Spent day in Chicago and spent most of our time at the marines. Took photos 660807-1 to ~~25~~²⁵ of various ^{fountain} classes of boats. Also visited Planetarium, Aquarium, and other sections of Chicago. The older interests of man's culture are being replaced by the newer interests such as boating. Returned Dunes via Skyline drive. At Dunes noted grackles, Tameaucurus, tanager, red-eyed vireo,

raccoon, fletcher, chickadee.

Rained this afternoon, rain is absorbed in ground except roadways.

Indiana Dunes State Park, Indiana

Aug. 8, 1966

Left 12:00 A.M. at mileage #9339. Camped Holland State Park. Photo 660808-1 of Lake St. Clair at South Bend.

Holland State Park, Michigan

Aug. 9, 1966

At shore noted gulls only. Photos 660809-1 and 2 of shad (smallest) from salt water via St. Lawrence Waterway. Carp & sucker also represented. Photo 660809-4 of Annette & Pally along beach N of Park. Left area 10:30 A.M. for N Michigan. Grackles in larger flocks than in Lawrence area. visited Baker Furniture Museum at Holland and then continued to Seattville and camped in canoe camp along river. This river is approx 100 miles long and is organized for canoeing. Set traps.

Seattville, Michigan

Aug 10, 1966

Photo 660810-1 of camp and Pere Marquette River. Last night caught 2 *Peromyscus maniculatus*, 2 *Microtus pennsylvanicus* and 1 *Zapus*. Prepared the following:

660810-2 *Microtus pennsylv.* 162-45-21-48 - gms ♂ testes 16mm

660810-3 *Zapus* 225-135-31-22gms ♀ 2x2 plac. scars suckling.

Left 10:30 A.M. and will drive along coast to Frankfort.

The dominant bird along east coast of Lake Michigan on highway is the Eastern Kingbird as singles and groups up to 5. Travelled coast route to Carp Lake and the route is unimproved, being narrow road thru virgin forests with view over Lake. Arrived Carp Lake and camped at Glouca Morra Camp 1 mi. S Carp Lake.

Carp Lake, Emmet Co., Michigan

Aug 11, 1966

Last night caught 3 *Zapus* and 1 *Sorex*. Prepared:

660811-1 *Blarina* 118-26-14-()-15gms ♀

660811-2 *Zapus* 245-155-32-16gms ♀

Photos 660811-3 of brood based flower, 660811-4 of camp at
 Carp Lake, drainage of lake to right. Continued to Sault
 Ste Marie and visited both Am. & Canadian locks at (500 Locks)
 Photo 660811-4 of muddy bridge from N side, dead in foreground.
 Photo 660811-5 ~~Chippewagon River, Annetts mill & bridge~~
 Photo 660811-8 ship in Am. Lock. Continued N to Pauvake Bay
 Provincial Park. Pileated woodpecker at N end camp.

Pauvake Bay Provincial Park, Ontario, Canada

~~660811~~ Aug. 12, 1966

Collected 6 mammals last night!

660812-1	Sorex	109-41-13-6	gms ♀ ut. normal
660812-2	Microtus pennsylv.	168-41-20-16	gms ♂ testes 16 mm
660812-3	"	188-58-23-16	gms ♀ 7x1 emb 10 mm

Other 3 were younger Microtus pennsylv. Slate colored juncos,
 Cooper hawk, song sparrows, gulls also noted here, both
 Herring and ringed bill gulls and common loon (1).
 Continued N. At Superior Provincial Park found area
 of many lakes, good stands of conifers and all in all having
 qualities of the Park. In this area noted 1 great blue heron,
 roven about 1 per 4 miles, general in pairs or groups of 3,
 crows in the minority but more common than in lower
 regions of Canada or U.S. At Michipicoten (lower falls)
 took photos 660812-4 of general view beyond falls to lakeward,
 660812-5 of Polly & falls, 660812-6 of Polly & falls. Photo
 660812-7 at top of falls just before water leaves smooth surface
 and starts to cascade down falls. At approx 6 mi. W of
 Regan photo 660812-8 of a glaciated rock. These glaciers
 seem to have come from NE. Continued N & W to Neys
 Bay Provincial Park for camping. It is surprising that
 one does not see either large or small mammals (or birds)
 along these relatively wilderness areas; no chipmunks, squirrels,
 deer, bear, moose etc.

Neys Bay Provincial Park, Ontario, Canada

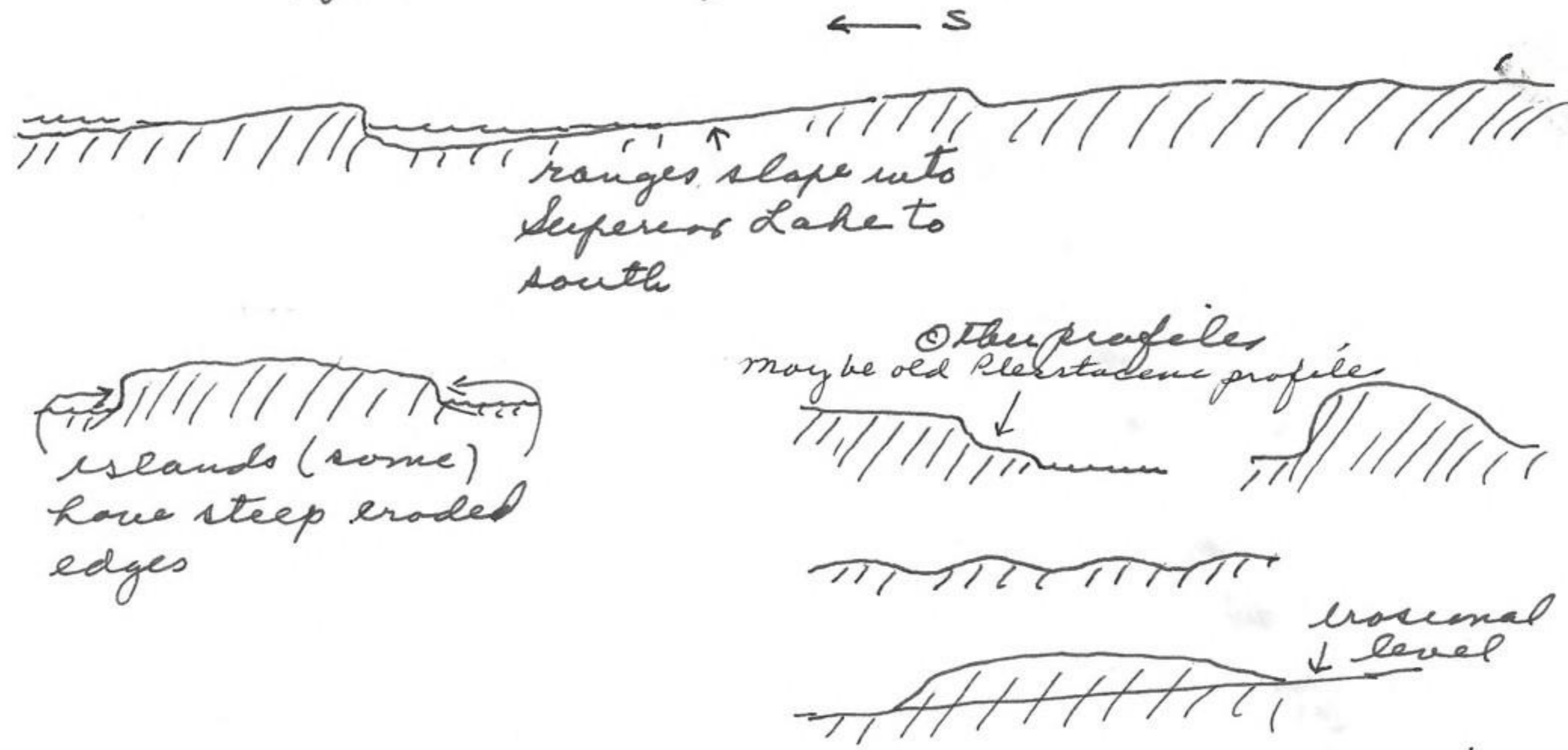
Aug. 13, 1966

Gulls in bay and 40 Herring to 10 ring billed. They rested
 in water and occasionally come to shore. Adults segregated
 from 1st & 2nd year young. One loon only in bay. also one
 Killdeer. Photo 660813-1 of tent, Annetts & Polly. 660813-2 of
 Annetts. Left at 11:00 AM. along route photographed beaver
 dam with great height. at the east side of Terrace Bay
 made 2 photographs 660813-4 and 660813-5 of the

These residues are called sulphite waste liquors and result from pulping of wood and compress fiber bonding substances such as lignin, pectin, hemicellulose, sulfur dioxide, sulfites, polythionates, ^{benzene, phenol,} organic acids, calcium or magnesium and other organic + inorganic substances. They have a persistent pungent odor and a tendency to foam on surfaces of streams. Residues cause oxygen depletion. Sugars cause accelerated growth of Sphaerotilus in streams, deletions of 1:100,000 damage organs of fish.

residue from the Kimberly-Clark paper pulp mill. The mill and chimney of the plant, as far as I could ascertain this material was being emptied into streams that enter the Superior Lake. This material should be filtered. Some large rivers we have passed are brown with silt or mill residue. One river will be clear, the next brown. This Trans. Canada highway is presently a scene road. It should be kept this way by eliminating commercialization, signs and lodges. Canada has a going natural feature. It is best that she keep it so before it is too late. Recommendations for Parks are: 1) reduce speed to 5 mph in park to reduce dust and hitting children; 2) isolate individual camps; 3) distribute wood to Corps, otherwise camp trees will finally disappear; 4) reduce charge; 5) educate personnel to be less militant.

The geology in area n of Isle St Ignace is as follows.



at Nipigon, turned right and camped at Black Sand Provincial Park on Nipigon Lake.

Nipigon Lake, Black Sand Provincial Park, Ontario, Canada
 Aug. 14, 1966

Collected the following from 25 traps set in deciduous - Coniferous forest. Understory brushy with some ground hemlock, fallen logs, mt maple, aspen, herb etc.

660814-1	Eutamias	205-90-30-15-48gms.	♀	ut. normal
660814-2	Eutamias	208-90-30-15-49gms.	♂	testis 6mm
660814-3	Tamias	258-115-35-18-88gms.	♀	ut. normal

660814-4 *Tamias* 242-108-36-18-73gms ♀ ut. normal
 660814-5 *Clethrionomys* 127-39-19-12-22gms ♀ ut. normal.

Also caught 1 *Peromyscus leucopus* and 1 *Zapus*. Birds in area include: blue jay, common loon, raven, crow, rook, Herring gull, song sparrow.

Plants include: large leafed aster, white cedar, white spruce, blue ^{head} lily, balsam poplar, white fern, red osier dogwood, white birch, brooker fern, hazelnut, mt. maple, red man's beard, ground hemlock, Virginia bluebell, rattlesnake fern, mt ash.

In the early morning note 1 fish to surface ^{appear} every 4 minutes. It appeared to me that fish were scarce. Left camp and stopped at Macdormid, a fish village and largest on lake. Informants report: no wolverine, clear around caribou, moose numerous, wolf not uncommon, white fish have worms in S end of lake but not north end, all fish taken, some fishermen now moving S, fish population decreasing and fluctuate from season to season & year to year, paper mills damage fish, they are not interested in taking visitors on boat while fishing, until last 2 years area gained by permit only, now campers are allowed, no research or check by Canadian government, in winter fish by specialized vehicle and thru ice. ^(Common loon noted here) Continued S to Port Arthur and Fort Williams. Some mts here with elevated erosional levels.

Continued W to Quetico Provincial Park and Camped. The sparrow hawk has been noted along route at an average of 1 per 30 miles. Rook and crow of about equal numbers and about 1 per 5 miles. Bats at Camp in Park.

Quetico Provincial Park, French Lake, Ontario, Canada

Aug. 15, 1966

Collected the following last night:

660815-1 *Zapus* 210-130-30-15-14gms ♀ ut. normal
 660815-2 *Clethrionomys* 127-32-17-13-26gms ♀ 6x1 emb 11mm
 660815-3 *Clethrionomys* 128-35-18-13-19gms ♂ testes 11mm

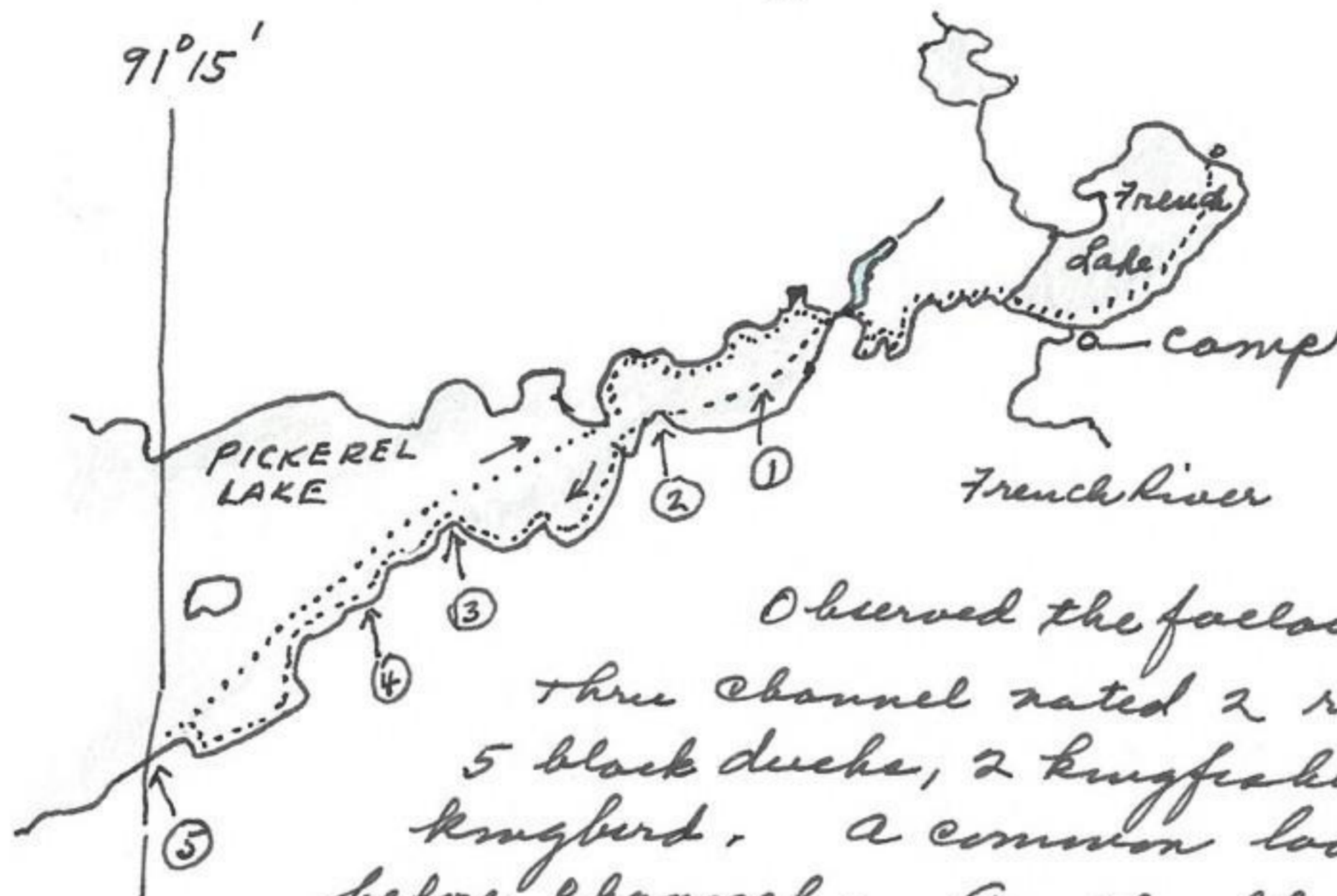
These mammals from E edge of French River as it enters the lake. Typical wet sedges, grasses, wren etc. Birds noted in area are: common loon, Canada jay, rook, crow, red-necked grebe, black duck, chipping sparrow, brown creeper, red-eyed vireo, song sparrow, grobe, kingfisher, pewee, spruce grouse, nuthatch, worm-eating warbler, golden-crowned kinglet,

196
192
Rusty woodpecker, pileolated woodpecker, robin, Eastern Kingbird, great blue heron, yellow-shafted flicker, ring-billed gull, Herring gull, Photo 660815-5 Pally at French Falls.

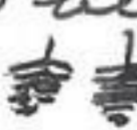
French Lake, Quetico Provincial Park, Ontario, Canada

Aug. 16, 1966

made canoe trip to Pickeral Lake and return. Left about 9:00 A.M. and returned at about 7:00 P.M.



Observed the following birds:

Three channel noted 2 red-necked grebes, 5 black ducks, 2 Kingfishers, 1 Eastern Kingbird. A common loon in main lake before channel. Another flew E about 200' high. Other birds in channel between French and Pickeral are 6 blue jays in 2 groups of 3, black-capped chickadee, 2 ♀♀ American golden eye ducks, Herring gull, 2 Kingfishers, 2 red-necked grebes all allow me to pass within 100 feet. Roots of jack pine are dead and exposed, either from previous inundation or washing by motor boat wave action. Also river birch (not white but with  seeds and circular bark) are dead and inundated as if growing large at one time but now dead and still basally inundated. This condition does not exist at present along edge of lake. The birch are fewer and smaller. There must have been a period when water was lower. From mouth of river into Pickeral Lake to no. 1 on map noted 3 beaver houses, roven calling; great blue heron. From Point 2 a Herring gull in tree, one over water, spotted sandpiper, 1 solitary sandpiper, 2 beaver houses, 1 common loon. Point 4

One common loon dove and ^{simultaneously} came up to surface with another one 50' away indicating some vision underwater. Chickadees along shore, 2 chickadees, ^{just} deer tracks on most sandy beaches, beaver cuttings (twigs 1' to 2' long and cleared in water along shore, houses evenly spaced along edge of lake, some 30' wide and 8' high, great blue heron tracks frequently on sands, minnows up to 3 inches in total length, many pin heads which do not react to foreign items such as canoe paddles, one group 3 sandpipers. Photo 660816-1 of deer tracks on sand among old roots of conifers. Photo 660816-2 of fallow in cove with old stumps in foreground. Large beaver house in cove just west of this area at the mouth of the river. At area 5 acted 2 common loon, 3 spotted sandpipers, 8 small birds in one flock, at about 9:15' longitudinal returned, using umbrella with wind, white caps on lake. On N side at a point beyond 2 took 2 photos 660816-3 of sand and gravel bar that extends out into lake for some distance. Just beyond observed a broad winged hawk capture a mouse (microtus) and carry it back to a point where it originally left trees on the edge of the lake. Would estimate the following numbers observed on trip (one way).

Kingfisher	5	great blue heron	1	raven	6
red-necked grebe	7	E. Kingbird	2	crow	2
black ducks	6	Am. Golden eye	2	Chickadees	6
spotted sandpiper	10	small birds?	8	Common loon	5
solitary sandpiper	1	blue jays	10	broad wing hawk	1
Herring gull	9	Canada jays	2		
ring-billed gull	2	black capped chickadees	3		

One large gull without white marks in wing seemed larger than the Herring gull. Beaver occupying all favorable areas. Fresh water sponges common. Unnid as many as 5 per sq. yard in favorable places. Dead shells common in water but less so on beach. Green of submerged delta of French river is mainly horsetail and meadow river lined with therioplants. It is interesting that the open channel can be controlled by these plants. Surface feeding of large fish rare in these waters but some are present. These lakes are used less than those S in U.S. The lack of fish may be due to previous commercial

fishing, motor boats of all classes and speeds use these lakes. They should be removed from lakes and only canoes without motor propulsion should be permitted. Fish should be reintroduced and limits set for use the field consumption only.

Mouth French River, French Lake, Quebec Provincial Park, Ontario Canada

Aug. 17, 1966

Collected the following mammals in old forest among glaciated mass of granite. Floor of large leaved aster, Clatonia, sphagnum, bunchberry, blue head, etc.

660817-1 *Clethrionomys* 153-44-18-16-36gms ♀ 5x4 emb 8 mm
 660817-2 " 147-41-18-14-31gms ♀ 4x3 emb 6 mm
 660817-3 " 130-38-18-15-27gms ♀ 3x2 plad. scars,
 660817-4 *Peromyscus leucopus* 175-85-20-19-25gms ♀ 3x2 emb 22 mm

Another *Clethrionomys* partly eaten by large ants. Not as much cannibalism as in wet sedge associations. Also caught a woodland frog (Photo 660817-5) and a large brown toad.

Road across from French Lake to Fort Frances should be kept free of commercialization. Counted crows & rovers across this relatively new road (between 12:00 and 1:00 P.M. and 6:00 P.M. to 7:30 P.M. the interval being car repair at Atikokan).

French Lake to Atikokan: roven, 2-2-1-2-1-1-1-1-2-1
 Crow 2-1

Up to 40 mile marker (to Fort Frances): roven 1

up to 30 mile marker (" " "): no roven or crow

up to 20 mile marker (" " "): roven 1-1-2

Crow 1

up to 10 mile marker (" " "): no roven or crow.

between 10 mile marker & Fort Frances: 3 roven, 2 crow near City outskirts

Set traps at a camp NE Fort Frances along golf course (in dark) and did not catch anything

only 1 marmot observed along route. no squirrels or chipmunks and a decided scarcity of small bird life! No mouse, no deer. The roven is the dominant bird as observed from car.

Fort Frances, Ontario Province, Canada

Aug 18, 1966

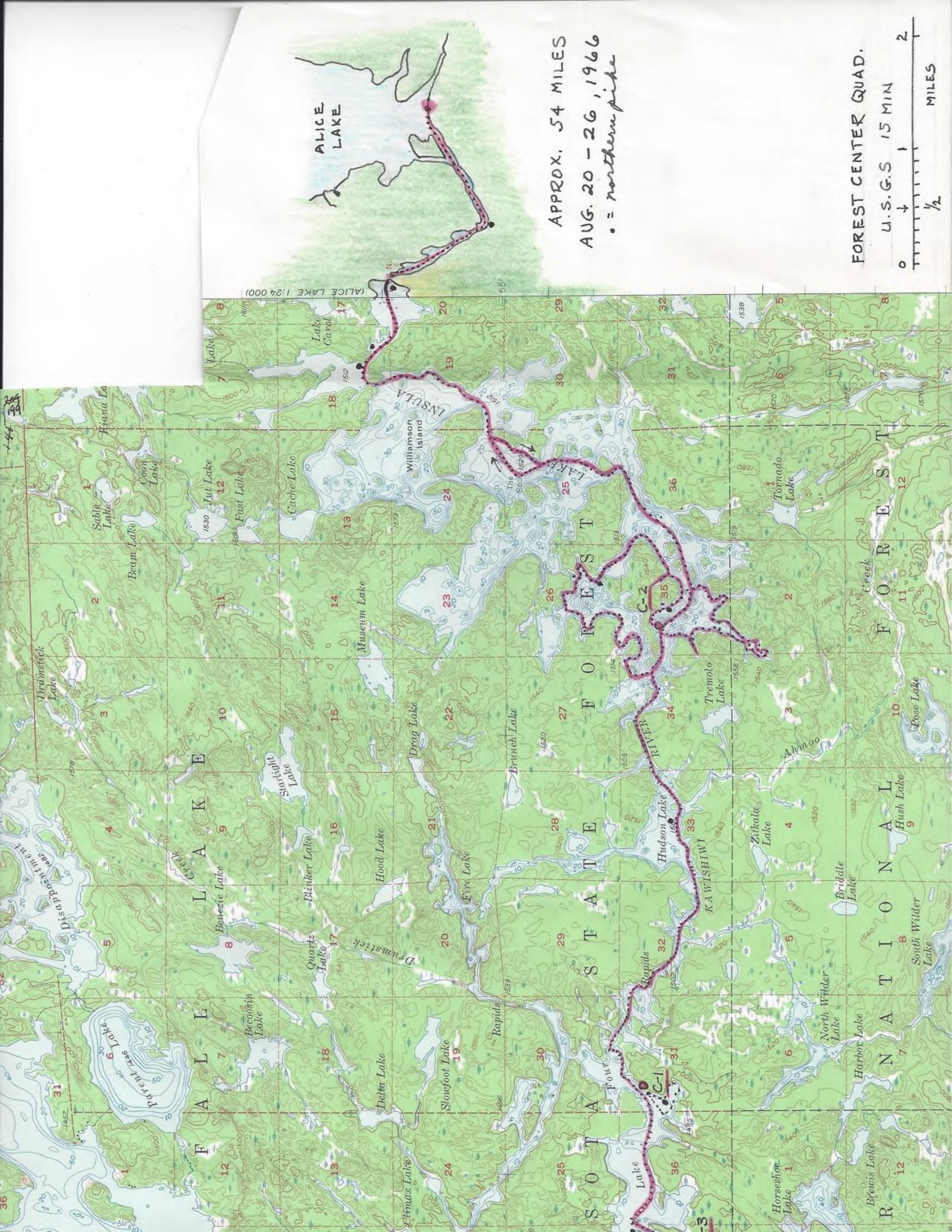
Between here and Ely Minnesota noted only 3 roven and 1 crow.

Ely, Minnesota

Aug 19, 1966

Arranged for canoe and drove to Lake 1 where we set up camp. Photos 660819-1 and 2 at Ely. Sagawa Lake of Mow & Cassina pontoon plane
 " 660819-3 of bus that brought Christ & girl seals to Ely.

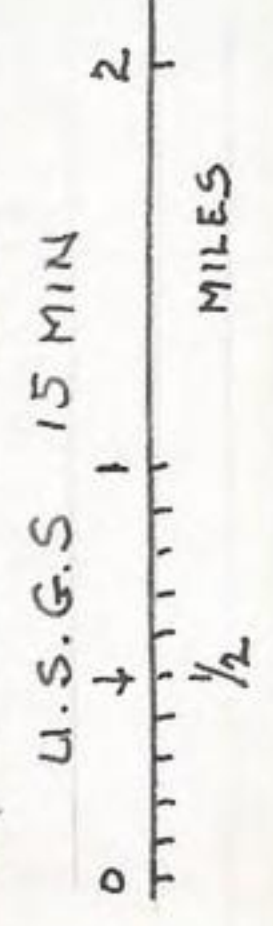


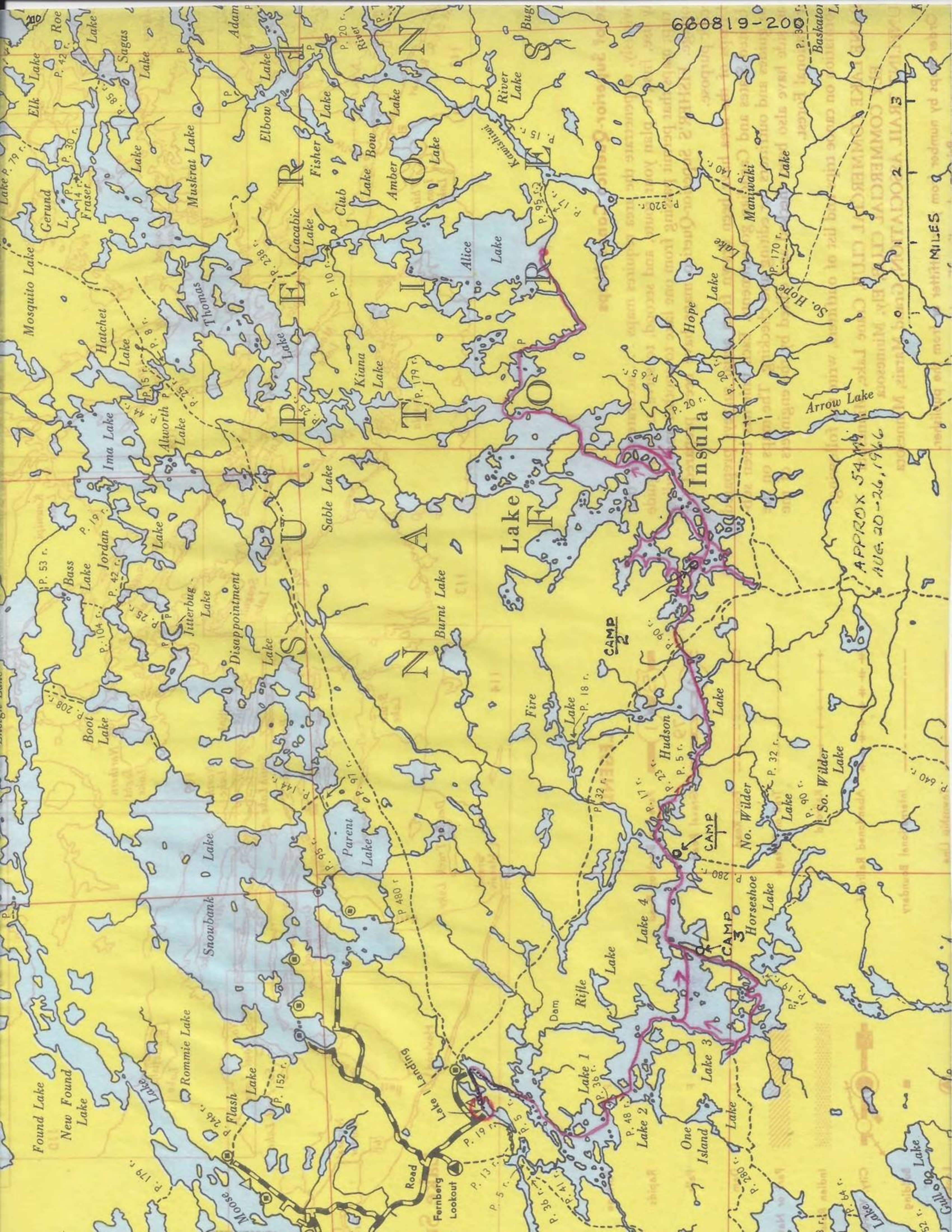


ALICE LAKE

APPROX. 54 MILES
 AUG. 20 - 26, 1966
 . = northern pike

FOREST CENTER QUAD.





APPROX 54 MI
AUG. 20-26, 1966

660819-20

MILES

0

1

2

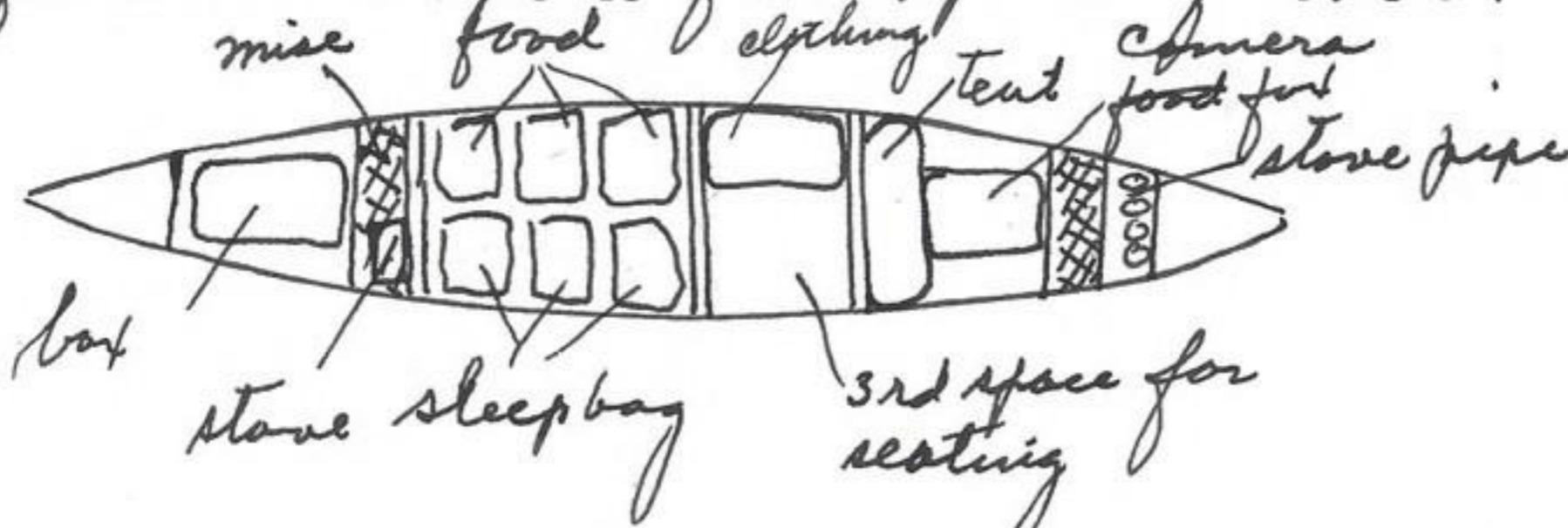
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This evening noted a pileated woodpecker fly from S to N side of the Kawishwi River at camp. Chickaree & Eastern chipmunk at camp.
(pronounced KASHAWA)

Lake 1, Kawishwi River, Minnesota

Aug 20, 1966

Left for canoe trip this A.M. (11:00), from Lake 1 landing. One ^{young} Tamiasciurus would feed from hand. Caught one small northern pike from landing. Used one 17' canoe, lightweight. Gear filled in complete floor space of canoe.



11:03 narrow channel with rocks submerged. Beaver house.

just to right into next small lake.

11:10 Kawishwi

35 canoes and 7 boats, canoes with square stern. This

Resort. Counted

Resort caters to those who like a cabin and nearby trips although can equip for more distant places. 11:34 Capsize bay (bay where Jay, Chir & I capsized a year or so ago while attempting to strike a bot out of the air). Air temp 65°F, cloudy sky, slight wind, no water birds so far. 12:20

Our old camp island just before portage. 2 Herring gulls, 6 crows, 3 Herring gulls on rocks (islands) to W. Caught 1 northern pike here along partly exposed rock W of island.

Arrived first portage 12:30 Solitary sandpiper? here. Completed the 2 short portages by 1:45 P.M. Arrived Lake III 2:45.

3:15 Lake 4 where we had lunch on island with single conifer tree. At 4:00 temp 62°F + 44 humidity, and left lunch area. Arrived portage channel at 5:30 where we made camp.

Caught 1 northern pike. 2 black ducks flew by at sun-down. Along route today noted 6 gulls, exclusive of those in Lake 1, but no loon or ducks except the 2 mentioned above.

Camp 1
Portage Lake, Minnesota

Aug 21, 1966

At camp noted several scattered piles of *Quodonta unionoids* along shoreline. The largest measured 100 mm. These shells are generally in piles of 10 to 40 shells as if collected and eaten by small mink, or some other kind of ~~small~~ mammal. These aggregates of shells are all along the

shoreline wherever conditions are favorable for these animals. In some areas the remains of these shells would average every 50' of shoreline. The live shells are on bottom of lake from almost shoreline to as deep as one can see in the water, generally from 1/2 foot depth to 6 feet. Some areas are common as 6 to 10 per sq. yard of lake bottom. The position of some of these aggregates of eaten shells would ~~probably~~ exclude ~~the~~ man as the factor in their collection and deposition on the shoreline. Most of the shells were adult or larger shells. At this camp noted a² Canada jays, ^{Herring} 2 gulls, *Eutamias consobrinus*. Temp 54°F this morning and 66°F at 1:30 P.M. Left camp at 1:30. Over first portage at 2:00, over second at 3:00. The third portage is short. These portages are picturesque and most interesting of the trip because of the rapids, falls, forest trails and more variety of scenery. Arrived camp on sand spit in Insula Lake at 8:00 P.M. As we approached this large island noted 2 white tailed deer in willows & white cedar at edge of water. At the previous ⁴ 3rd portage ^(of 105 sides) noted 2 pairs of American golden-eye ducks associated with rapids, 1 pr of black ducks, 1 Kingfisher, 1 spotted sandpiper. The ducks were the first ones noted today. Two other Kingfishers and 3 spotted sandpipers were previously noted today. In this part of Insula Lake noted 8 Herring gulls which indicates (gull-man index) the presence of campers and fish cleaning operations. Have noted beaver activity and house construction all along the way and compared to areas in Kansas would say that the population is considerably higher here. Small limbs cleaned of bark are most frequently seen along shore (in water). In areas of houses are trails leading into forests. White cedar high lined by groggy deer. Rained slightly this afternoon. Camp on pure sand and gravel and when wet sticks to everything that comes into contact with it. The least desirable (in wet weather) of any camp sites. It has the advantage in that water from rains passes immediately into sands and gravel and there is no sloppy conditions. Two dead trees in camp that were balanced and presented a hazard to the tent if a high wind were to develop. Deer tracks on all the sandy areas. 2 loons in area and remained in the main lake to E and S.

Camp 2, Inoula Lake, Minnesota

Aug. 22, 1966

Rained hard all last night and all today with no sign of let-up. All water absorbed into sandy spit, some being absorbed in sands under tent floor. No signs of variation of solid grey sky. Water in lake raised and covered rocks (stepping stones) in lake that the previous day were above water level. Used camp stove and burned equivalent to $1\frac{1}{2}$ bushel of wood. Moved camp 40' to N to eliminate danger of two dead trees. Now well protected from wind. The amount of dry wood used for outside fire & camp stove is greater than a camp site can tolerate. Fuel should be brought in from outside source. One small (30') dead tree can be consumed in one day for cooking & general heating purposes. All dead wood from ground & low branches can be consumed in 3 days. Then (I have noticed) trees are cut down to $\frac{3}{4}$ of original stand. Some islands are almost denuded of trees and are completely trampled of ground vegetation down to native silt and rock. No gulls were flying today in rain. Loon active (2). The cold wet day pointed up the need for waterproof gear & clothing for canoe travelling.

Camp 2, Inoula Lake, Minnesota

Aug. 23, 1966

This A.M. clearing and made ^{canoe} sidetrip canoe ~~to~~ to lake to the NW. following shorelines and trawling with popper. Caught one northern pike 680 mm and 4 $\frac{1}{2}$ lbs. Annette caught a second one slightly smaller. These were the only two caught. Noted near camp an adult red-breasted merganser and seven smaller young in one group. They spent some time on land in early morning. Also noted 2 Herring gulls (all gulls ^{in plumage} adults), 1 white tailed deer, 1 common loon and six painted turtle (all about 8 inches in length). This P.M. made evening side trip to main lake & bay to E. In favorable areas beaver house approx 1 per every $\frac{3}{10}$ miles. Other area separated by a $\frac{1}{2}$ to 1 mile. Many large (6' x 40') and a few just starting construction. Three live ^{beaver} ~~ones~~ noted, one allowing us to within 40' as it swam across a small bay. These houses are mainly on soils but some against bare rock or cliff and some wedged between large boulders. Three young red-breasted mergansers were noted. They were not accompanied

by adults. One great blue heron fed in S end of long bay and remained in area, alighting at one time on cliff about 15' above the edge of the water. Also noted 1 rook, 2 Herring gulls, ^{2 young spotted flycatchers} and relatively few small birds otherwise. Two Canada jays and 2 blue jays were associated together. At Camp made several photographs

660823-1 Mary Pauline painting in water colors

660823-2 Drying out airing out sleeping bags

660823-3 Annette & Mary at camp

660823-3a Herring gull eating fish.

660823-4

660823-5 Evening color shots and 660823-7 Evening sunset.

660823-6 and 660823-7 Evening sunset. 660823-3b Mary painting with water colors

On rocks about 2 feet from edge of water noted a species of fish that apparently has the capacity to leave water on rainy days and move across wet surfaces. These fish are about 2 inches or so long and remind one of bullheads or catfish. ribs show plainly



feeler → spine pectoral fin

Camp 2, Inouea Lake, Minnesota

Aug 24, 1966

Prepared to make all day trip to Alice Lake. At seven o'clock ^{air} temp 48°F, water 58°F, humidity 54. In tent can control any temp up to 110°F or so. 3 common loons at lake east of camp. They seem to remain in this general area. Left at 7:00 A.M. for Alice Lake. Will keep record of larger conspicuous birds. 9:40 point into second lake. Between camp and this point noted 3 blue jays, 1 common loon, 2 Herring gulls, 2 (heard) Tamearcus. Arrived at 'The Rock' at 10:05. An adult bald eagle left a tree on main land to W and circled twice and then sailed W beyond. Only one Herring gull since 9:40. Took several photographs here.

660824-1 From top of The Rock looking S.

660824-2 Mary from top of The Rock

660824-3 Mary from The Rock

660824-4

660824-5

Left The Rock at 10:20 and arrived at 3rd lake at 10:30. One adult and 11 young red-breasted mergansers here. 11:00 across lake and now at beginning of narrow channel. 2 turkey vultures noted for first time on canoe trip. Spruce grouse on right.

11:08 out of Insula. 2 Broadwinged hawks caught fish and started again at 11:30. Took four photos of fish.

660824-6 Mary + fish

660824-7 " " "

660824-8 " " "

660824-9 fish (northern pike) in water.

at the beginning of conclusion of this Channel were beaver houses.

12:00 portage and several photos of island + rapids

660824-10 Rapids

660824-11 portage thru conifers

~~660824-12~~

~~660824-13~~

Left this area at 12:30. Blue jay at portage.

Arrived at Alice Lake at 1:15 and consoed to point of high rocks to east for lunch arriving there at 1:20. Took several photos of family and general shots. Horned grebe on lake, 70 loons.

660824-14 Annette + Mary preparing lunch from top of cliff. Alice Lake to N

660824-15 Annette and bay to east

660824-16 birch + Alice Lake to N. Alice Lake does not have

660824-17 the character of the smaller bodies of water where there are many islands + bold shore relief

660824-18

660824-19

Alice Lake is too large for general consoing and does not have the character that other lakes have with their small islands and narrow channels.

Left 1:55 and ~~passed~~^{entered} mouth of channel to SW at 2:00. at a point where channel makes an abrupt 90° turn from its SW alignment to a NW alignment, Mary caught a northern pike that measured $39\frac{3}{4}$ inches in total length and weighed 15 lbs. Photos 660824-20 and 660824-21 are of Mary and this large fish. This fish planed water for 20' at one time.

Arrived portage at 3:40 where we caught a small pike and took several photographs. yellow shafted flicker.

660824-20 Mary and her 15 lb northern pike

660824-21 " " " " " "

Returned to camp 2 at 6:45 P.M. Windy to white caps in some areas all the way. In summary of return trip: spotted sand-piper⁽⁸⁾ generally in channels + near rapids areas. One osprey in second lake of Insula. Blue jays most common bird⁽¹⁶⁾. A family of red-breasted merganser moved in

over white-caps in their water planing & flapping of wings. These birds make considerable noise and commotion when moving as a unit over the water. This is probably an adaptation to disturb fish below or could be merely an escape mechanism. Covered approx 17 miles.

Camp 2, Insula Lake, Minnesota.

Aug 25, 1966

Windy last night but clear this A.M. with only slight wind from W. At 7:00 temp 58°F, water (^{at} 2 inches deep) 58°F. Left on return trip at 10:40 A.M. Deer tracks of last night up to 8' of camp. Several photos this A.M. before breaking camp.

660825-1 red-breasted merganser & family of 8 young.

660825-2 Mary on split rock

660825-3 eating table (rock)

660825-4 family

660825-5 Cup (gold) of sophistication

660825-5a close-up of golf cup. 660825-5b.

660825-6 drying ~~of~~ drying sleeping bags. Mary & Camp and Split Rock

660825-7 early morning lights on water. Just N of Camp.

660825-8 Annette washing dishes. note willow-white cedar-yellow pine sequence along shore.

Noted the following birds (complete) between camp and portage: 2 blue jays, 2 song sparrows, 1 Herring gull, 2 Canada jays, 1 kingfisher. Arrived at 155 road portage at 12:45. Several photos taken:

660825-9 east end of portage. many frog in shallow parts of channel

660825-10 same as above.

660825-11 east end of portage just before rapids

660825-12 same as above. Sedges to left.

660825-13 lower end portage

660825-14 large leaf aster (Aster macrophyllus)

660825-14a bet fly and flower

Left portage at 1:00 P.M. Photo from canoe in Hudson Lake

660825-14b The NW corner of this lake has many high cliffs that add to the character of this, otherwise, open lake.

Arrived first of 3 portages at 2:15. 2 Am golden eye ducks swam down a rather rapid water course (first in rock barrier) which indicated their association with rapids and moving stream water. Much the same habit as the bufflehead.

660825-15 short rapid channel of portage. Canoes can be guided over water course

660825-16 Annette at portage

660825-17 lateral water course at portage. The golden eyes swam down this water channel

660825-18

- Arrived at second portage in series. This is the most picturesque of all portages. Took several photographs.
- 660825-19 east or upper end of portage. Am golden eye fed in water beyond crutch of white cedar
- 660825-20 east end portage showing water lily & submerged birch.
- 660825-21 east end portage. Many frogs along edge. Area between ripple & smooth water used by golden eye.
- 660825-22 same as above.
- 660825-23 same as above but looking to W. Many frogs here
- 660825-24 same areas as above. Many in foreground.
- 660825-25 just as water begins rapids. Many in foreground
- 660825-26 rapids about 1/2 way thru portage.
- 660825-27 west end of portage. Trail a high water river course
- 660825-28 west end of portage. Many & equipment in foreground
- ~~660825-29~~
- ~~660825-30~~

At this portage noted 1 pr of Am. golden-eyed ducks feeding in areas of rapid moving water, and 1 spotted sandpiper. Two turkey vultures flew by. Left at 3:45 for 3rd portage. Small garter snake and many frogs associated with rapid areas, especially before & after rapids.

Arrived 3rd portage at 4:20. Photos here:

- 660825-31 half way thru portage to S
- 660825-32 rapids of portage

Left 3rd portage 4:50. a small boreal (light brown) from trail. Took several photographs

- 660825-33 rapids of portage of above
- 660825-34 along rapids of above portage
- 660825-35 west end of portage. Jack Pine (*Pinus banksiana*)
- 660825-36 " " " " and Annette

~~660825-37~~

~~660825-38~~

~~660825-39~~

~~660825-40~~

Arrived 3rd base camp on ^{east side} upper Lake 3. Camped among white pines on promontory overlooking Lake 3 to the west. Just before camp at head of channel caught a northern pike (3 lbs). At camp measured the white pines associated with the campsite. as 108 inches, 86 1/2, 45 1/2, 58, 24 1/2, 46, 53, 48, 74. The largest in circumference is considered a large second growth pine.

In the evening made a few observations and took several photographs

- 660825-41 from Camp to W across Lake III. Eagle perch among white pine
- 660825-42 same as above on opposite side of Lake.

- 660825-43 from camp on Lake 3 to SW across Lake III. Birch bog
 660825-44 Camp site with white pine in background (see measurements
 of these trees. Annette band in center of picture)
 660825-45 Annette + Mary at Camp 3. Bear in foreground.
 660825-46 same as no. 44.
 660825-47 Mary with tent no in position.
 660825-48 Annette getting ready to prepare evening meal.
 660825-49 Camp III from water edge. many frogs among rocks at water
 (Parus ~~strabus~~ ^{striatus})
 660825-50 Camp with white pine as background. 660825-51 same as 50
 660825-52 Evening fire at camp.

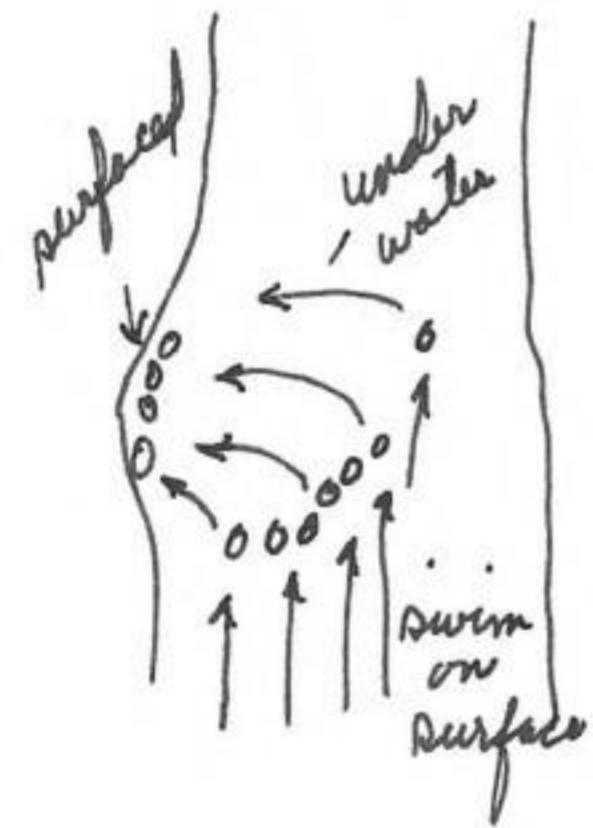
At sundown two beaver swam by from bay to SW to island or beyond to N, passing just E of the linear rock island directly W of camp. They swam together. Sunset at 8:00 P.M. A spotted sandpiper left rock island and flew half way to island to S and picked up a white moth-like insect from the water and then continued S to island. It did not alight on water. 3 Night hawks foraged over water & forests. Later bats made their appearance in the colored sky. A chipmunk, (*Eutamias consobrinus*) commended the camp until the light faded. At twilight 2 black ducks entered the channel below and started to feed. They called several times. On the lake beyond the water boatmen (*Corixidae*) completely covered the water in all situations. These insects seem more common than I have ever seen. They form dense groups at times with surrounding waters free of them. At other times generally distributed and at random. Small fish were feeding at approx 10 per 100' x 100'. Large ones 1 per 500' x 800'. There seemed to be more surface feeding here than in other lakes we have visited. Today has been perfect as far as weather.

Camp 3, Lake 3, Minnesota

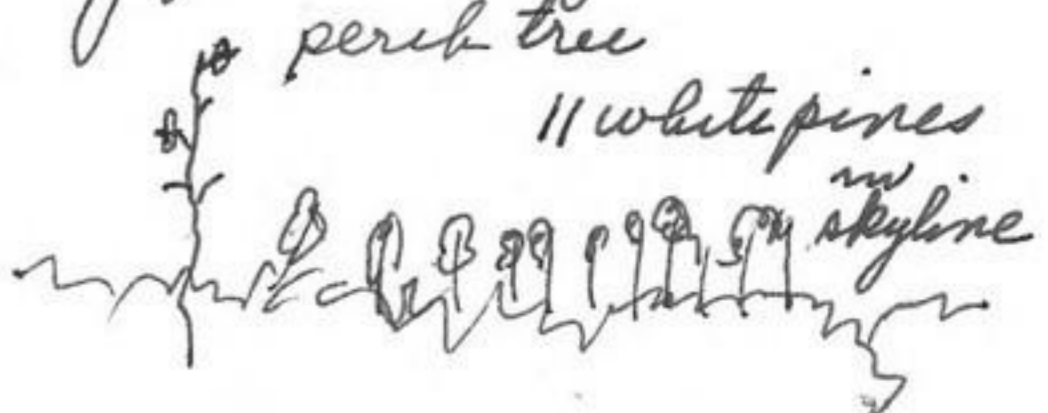
Aug. 26, 1966

Up at 6:00 A.M. Temp 54°F, 58 humidity. Day clear and promise of a beautiful day. Made some early morning observation correlated with time from 6:00 A.M. Common loon called several times last night and more frequently after daybreak. Lake calm and *Corixidae* generally distributed with both small and large fish feeding. One loon in lake to west and 1 calling to S in either channel or lake beyond. Crows started to call in 6 different areas of the lake. 6 am. golden-eye ducks flew past to S and 2 others flying in lake, one circling several

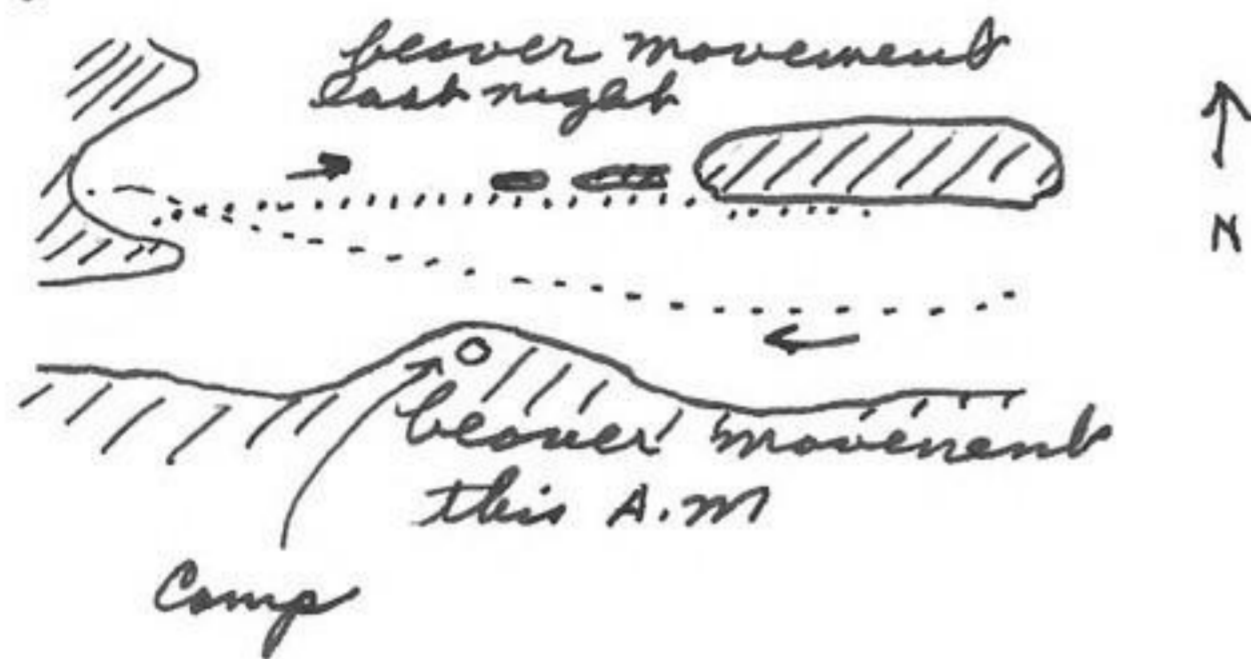
times the common loon but not alighting. Spotted sandpiper in same general area as last night. Fewer fish feeding this A.M. than at twilight last night. 3 black-capped chickadees calling at camp. The chevron active. Other warblers in area but not identifiable. There are no gulls at this time of morning (6:00-6:30). First gull at 6:45. 6:50 25 young and 1 adult red-breasted merganser swam from N to S past camp. As they entered small shallow bay or along shore at rock island to W, they placed their bill and part of head directly down into the water as if to attract the fish to the bill or to see the action below ~~surface~~. Local descent was indicated by bills thrust upward generally involving 3 or 4 birds at a time. They crossed to channel to S and at a precise moment the entire group of birds dove into the water and turned, underwater, toward the cliffs where they surfaced with splash-
ing action at the base of the cliff, obviously driving the fish against the rock barrier. In all their surface or underwater action indicates a close group cooperation. In moving on the surface they frequently go in single file. Fewer larger fish feeding after 6:45 A.M. Blue jay called several



times this A.M. from different locations. At 7:05 5 black ducks flew S to channel, one left group and flew to W. Raven called for first time. A beaver swam S in front of camp to bay to SW where they were noted to leave last night on their movement to the N. It swam 100' and then dove for 20-30 feet, alternating across the lake. A mottled called at camp (red-breasted?). 7:10 Canada jay flew into camp and alighted on a branch 3 feet from where I was standing before the open fire. It had an insect (3/4" long) in its body and about every 10 seconds would thrust it out toward the end of its bill and then swallow it again. Crows have called almost continuously this A.M. from the time they started. 7:30 2 adult bald eagles were noted in top of tall dead pine on west side of lake 3. ~~west~~ This sunning perch is just SW of channel that leads to N out of Lake 3. They remained for about 10 min. Then left and returned again & then left again in a period of about 20 minutes.



They seemed to be using this dead tree as a place to sun in the early morning hours with direct sun above and reflected sun below. 7:30 first breeze to ruffle water and to reach camp. 8:05 second beaver swam 5 m front of camp & arrived same place as one noted earlier this A.M. These two beaver may be the ones that passed by together last evening. An investigation of the bay they entered proved to not support a beaver house. 8:00 booby eagles left perch and after about 5 minutes one was ~~was~~ noted flying S directly over camp. Concluded complete observations at this time and prepared to break camp. Took several photos of camp



8:00 booby eagles left perch and after about 5 minutes one was ~~was~~ noted flying S directly over camp. Concluded complete observations at this time and prepared to break camp. Took several photos of camp

660826-1 telephoto of bay to SW where beaver left last night & returned this A.M.

660826-2 shore line SW camp showing one tree killed by blister rust?

660826-3 Promontory NE camp where red-breasted mergansers nested small cove

660826-4 many preparing breakfast over open fire.

Left area at 10:10 A.M. Between here and old camp of 2 years ago noted 2 jays (Canada), 2 blue jays, 1 buck white tail deer along edge of water to E., 1 Eutamias and 4 painted turtles. All turtles have backs toward sun and back legs extended. Arrived camp at 11:00 A.M.

All ground floor gone and all immediate available timber used for fire. Found good fish knife at our old fire place. Tent sites had changed but fire in same position. Lillies & grass in channel seemed to be about the same. From this old camp site a young bald eagle called in same place in trees as of 2 years ago. It flew to another tree 50' away, called several times and then flew to SW. In a high line tree with dead limbs below canopy of the crown were 2 adult bald eagles resting in the shade of the tree and not over 100' from where the young eagle was first noted. Made several photos here at camp.

660826-4

660826-5 from old camp site of 1964. Red pine. Bald eagles on W side of this bay.

660826-6 water lily and grass in small channel directly below

660826-7 old camp of 1964 showing the old camp site

660826-7 original forest surface five eroded ground surface of the found in our first camp of 1964

Heard a nutcracker, and observed a large painted on a rock just below the old camp in the bay or channel. At this camp just 4 hours and 10 minutes after observed at Camp 3 were 25 young and 1 adult red-breasted mergansers. These birds had travelled ^{by swimming} one mile in this time or less. Left the old camp ground at 11:20 and following around and between islands to the west shore of Lake 3, thence along shore to N. At about half way photographed a sand bar. These beaches are being completely eroded by man at camp sites

660826-8 Sand bar grading into boulders of an extension of beach
 660826-8a sands covered with water around large boulders at S end beach
 660826-9 Annette and Mary at beach.
 660826-9a same as above.

Caught a northern pike here. Arrived at mouth of channel leading N out of Lake 3 at 1:00 P.M. where we had lunch on the island. Took 10 photographs

660826-10 Lake III, birch, white pine + glaciated rocks.

660826-11 Lake III to S with 4 white pine in foreground.

660826-12 Mary with Lake III in distance.

660826-13 Annette at N end of island. Bald eagle perch tree on W side lake and can be seen in center of picture

660826-14 glacial surface on W side isl. 

660826-15 beaver house with young or adults in house.

660826-16 beaver house + house

660826-17 beaver house, old one on cliffs to left of new house on water level.

660826-18 house at beaver house.

~~660826-19~~

~~660826-20~~

Left 2:00 P.M. Caught N. pike just before portage at projection of rocks from island. Portage at 2:45. at lake between portages made 4 photos of beaver house, consisting of an old house high on slope at base of cliff, now used and animals eading and thumping beneath, and the new addition at present water level. Over portage at 4:00 P.M. Capsize bay at 5:00 P.M. Camp at Lake 1 landing at 5:45 P.M. Transferred equipment to car and at mileage 81017 left for Ely. Stayed at hotel.

Ely, Minnesota

Aug. 27, 1966

Left 8:45 at mileage 81044. Day clear & temp. 61. Followed highway 1 to Lake Superior. Only two rovee were observed; one at Birch Lake and one at Stewart River mileage 073. Some trees changing color along coast of Superior and noticeably so in comparison with any other area visited so far. Only rarely in Ely area or Lake area adjoining.

At Stewart River at 11:30 made several photographs of Superior Lake.

660827-1 To S along shore from mouth of river.

660827-2 To S " " " " " "

660827-3 along shore. not clear water

~~660827-4~~

Continued S to Duluth arriving 1:00 P.M. at a point in ^{minn} Iowa near Owatonna observed a definite increase in road kells and numbers of birds. For the first time observed pheasant kill, 4 red fox squirrels, raccoon. There was a decided increase in mourning doves, blackbirds, grackles, meadowlarks. Camped at Helmer Myre State Park E of Albert Lea.

Helmer Myre State Park, Minnesota

Aug 28, 1966

Family of red-headed woodpeckers making considerable racket this A.M. One red tail had caught a ^{red} fox squirrel and unable to carry it flew into a tree 20' above ground and 30' away where it remained until we left. ^{from Des Moines 12:00} continued S on ^{Inter} State 35 (where completed), arriving at Lawrence at 7:30 P.M. at mileage 81925. Trip of 3,482 miles.

In summary and recapitulation of equipment and wilderness policy the following thoughts are recorded:

Equipment too heavy, not portable and excessive amounts. would recommend for party of two: (*assume for subsequent trip)

* 2 Duluth bags with plastic inner liners and waterproof outside.

* 2 man light weight ^{fire resistant} tent, wood stove, pipe, pipe hood.

* 2 light but sleeping bags optional

food (previously planned per meal and so arranged)

Clothing.

light weight for hot summer temperatures (complete set) including tennis shoes + hat with brim.

* rain suit.

* hooded quilted jacket, wind proof + water resistant.

1 pr socks

1 pr gloves

reflector oven (light wt) (optional - aluminum foil could substitute)

axe, saw, pocket knife, matches

trail fish gear + standard lure.

- small
flashlight, extra bulb, 2 extra batteries
- * camera, film, binoculars, journal (optional) (all lightweight)
 - * waterproof watch
 - emergency kit - sewing, iron saw blade, ^{surgery scissors,} razor blade, mirror, thermometer, pliers, file, forceps for splinters, grommets, wire, repair kit for canoe, burn salve, aspirin, ophthalmic salve, compass
 - extra plastic sacks and rope, umbrella, whistle, insect rep.
 - maps (pinned to pocket of shirt) duplicate or one per person
 - 2 life preservers

Cooking equipment

- non-detergent soap, SOS.
- large fry pan, spatula, large fork
- large water bucket that can be used on fire
- 2 cups, 2 knives, 2 forks, 2 spoons, 2 plates.
- towel

Food staples

- | | |
|-----------------|--------------|
| bacon (canned) | candy |
| dried eggs | soups - rice |
| sliced potatoes | hisquack |
| kemo or ecco | |
| salt - pepper | |
| butter | |
| coffee | |
| dry milk | |

Personal

- tooth brush (optional)
- soap
- shower (electric battery) (optional)

The following photos record at home.

- 660828-1 misc shells from Carp Lake in N Michigan
- 660828-2 under side of above. Upper right the lakes Unionid (Onodonta)
- 660828-3 Onodonta and shell found in lake in N. Minnesota used by mammals as food.
- 660828-4 misc rocks from along E & N shore of Lake Superior.
- 660828-5 granite boulder from N shore Superior
- 660828-6 boulder from N shore Lake Superior.
- 660828-7 mica in granite
- 660828-8 Route of canoe trip along Kawishiwi. from Lake 1 to Alice
- 660828-9 same as above but on U.S.G.S map
- 660828-10 Close up of Lake IV
- 660828-11 " " " Insula Lake
- 660828-12 " " Alice Lake to E.
- 660828-13 Trip taken by Annette C with girl scouts Aug 17 to 27, 1966
- 660828-14 Annette C after canoe trip.

Some consideration on Wilderness Policy.

1. Change national and International laws to exclude commercial traffic between Canada & U.S in Wilderness area. Then return all Superior & Quetico area to wilderness status.
2. Exclude all roads, trails, lodges etc from area and bring wilderness area back to original demarcation. This would imply removal of lodges on Basswood, Moose Lake, etc and return of present roads to natural plant-animal ecosystems.
3. Exclude all motor driven boats and limit to conventional canoe only.
4. Localize camp sites to specific spots of stable base and restrict or limit trampling, cutting ^{or use} of wood. All items of equipment must be returned, including, cans, food wastes etc.
5. Do research on methods of human waste problem including field processing or methods of storage for return to outside limits of wilderness area.
6. Visitation by reservation
7. Reroute air traffic around area. Exclude pontoon planes and field representative of the governing body.
8. Educate wilderness appreciation in Universities, high schools and special installations outside area and require before entering wilderness
9. Exclude unnatural sounds such as road noises, adjacent factories, blasting in mining operations. Establish buffer areas to eliminate such annoyances. Control ^{human} noises in the wilderness areas by talking softly, reduce or eliminate canoe noises, axe or saw noises etc.
10. No firearms, hunting or fishing
11. Maintain natural conditions of plants and do not interfere with normal reactions of plants & mammals.
12. Restrict certain parts of each lake as inviolate, some ^{lakes} entirely inviolate.

Lawrence to Omaha and return.

Sept. 3, 1966

Will keep record of birds observed, arranged by intervals between cities (exclusive of cities proper). ^{Left 6:00 A.M. Skies cloudy.}
Lawrence: 7 flocks of 100-500 grackles, ^{red wings} flying w. thru Lawrence started out in rain. Baltimore Oriole 1-1; English sp 30-22
 meadow lark 2 mourning dove 2-2
 dickcissel 2-1-
 barn swallow 1
Perry Redwing 1-28-2-2-2-1-6-2-1; Eng sp. 40-6-2-2-1 ¹⁻¹⁻¹⁸ these birds are in large flocks; mourning doves 4-2-1-2-1; meadow lark 1-1
 dickcissel 2- crow 1- barn swallow 1 rock pigeons 4
 Stopped census at Topeka. 3 crows to state line to N.
 mourning doves localized. Eng. sparrows in large flocks of 20-50. Bird observed to line are Baltimore Oriole, mockingbird, loggerhead shrike, mourning dove, meadow lark, redwing, grackle, barn swallow. ^{no hawks. one flock ducks!} Arrived Omaha 10:30 A.M.
 Attended Bob Bee & Lesua Parkers wedding. Visited Florence and Dove at 33rd street off Dodge. Oct 3.

Omaha, Nebraska

Sept 3, 1966

Left 4:30 P.M.

Census from Offutt Air base - (highway 75 S) (census between cities)

starling 8-1-1-
 red-wing blackbird 1-4-

(constitutions of bird populations differ at various parts of the day)

Platte River

Eng sp. 2-1-2-1-6-1-8-1-1-9-4-6-
 mourning dove 1-2-2-1-1-1-1-1-

red tail hawk 1
 meadow lark 1-

robin 1-1
 E. Kingbird 1
 redwing 8

starling 4-1-
 dickcissel? 2-2-1-1-1-2-1-1-2-
 fox sq rd bill 1

red-headed woodpecker 1

Nebraska City

Eng sp 30-1-4-2-6-2-8-6-1-8-4
 redwing 1-18-1-150-
 E. Kingbird 1-1-1-

grackle 1
 mourning dove 2-2-3-1-1-2-1-1-
 b.b. Crows 1 Arrived Auburn 6:10 P.M.

Auburn

mourning dove 1-2-2-1-1-1-1-1-1-1-1-
 starling 1-3-1-3-

Eng Sparrow 6-10-4-2-1-
 E Kingbird 3- Arne Dawson 6:35 AM
 sun now behind evening clouds.

Dawson

m. dove 1-1-1-1-3-1-
 Eng sp. 2-1-2-

Redwing 1-1-2-
 State line (Kansas) and end of complete census. 6:50 P.M.

Wakarusa River, Douglas Co., Kansas

Sept. 5, 1966

Annette C and girl scouts made ^{condes} trip from bridge on highway 59 to Blue mounds bridge, starting at 1:00 P.M. and arriving bridge at 6:00 P.M. Water flowing approx. 8 gal per second. At Dingmans Crossing, previous to their scheduled arrival, which as things turned out was rescheduled for Blue mounds bridge, noted a green heron. While sitting on the cliffs of the Tongavorie sandstone, the heron fed out into a ripple from under the protection of the cliff. It immediately noticed me and while it ^{moved} fed 2 feet beyond it was conscious of my presence. It had an abrupt movement of its tail, up and down, as if a twitch. It gave several just audible calls before it flew when I adjusted the position of the binoculars. One spotted sandpiper & one solitary ^{sandpiper} fed ^(up river) along rapids (to S) at head of the cliffs where river takes a right-hand bend.

Lawrence, Douglas Co., Kansas

Sept 7, 1966

Larry Bancroft visited me today. Just completed a summer as naturalist at the Great Smoky National Park. He is of the opinion that the Wilderness Society will loose in the struggle to keep out the trans-ridge road and the establishment of continuous wilderness area. The national Park people are instructed to not enter into discussion and to support the N.P. policy of opening up the Park to people by building the road and keeping separate wilderness area small and easily approachable to the people. A former naturalist had kept yearly ^(35 years) diaries or journals of changing conditions in the Park but now the N.P. is concerned not with wilderness conditions or ecological problems but political and purely engineering problems of road building and establishing of accommodations in the Park. Larry covered approx. 10-15 miles of new trail thruout the summer. He described open grass islands within the deciduous & boreal forests. If these have been isolated they may support distinct species of mammals and should be investigated. Other formerly open areas are now grown to a shrub-tree community which is quite different than the climax forests and may also support relict populations. Deer are moving out of the park because of the change of forests to climax. There is management of

streams for propagation of fish but no basic research. He gave trail lectured to approx 15,000 of the 6,000,000 individuals that visited the Park this year. Larry is now applying for the manager position of the Arctic Wildlife Range in NE Alaska in the Brooks Range, and has also accepted graduate school offer at Univ of Colorado. His Kansas ^{home} address is:

1913 W 15th Apt 14. K
Loveland, Colorado 80537

Wakarusa River Valley, Clinton area, Douglas Co., Kansas
Sept. 17, 1966

Temp. 9:30 A.M. 64°F. Sky clearing to blue although showers forecasted. Will make road census of the proposed Clinton Reservoir area. Left Lawrence. 82.6 78.3 Left 10:00 A.M. Different kinds of birds noted from Lawrence to Segal School House. Eng sparrow, monarch butterfly's young 5, mourning dove, meadow-lark, flycatcher sp.?, no r. dunnings along Soldier Creek where they are usually 1 per 200' or so, preceding only birds. ^(start of complete census) Segal, 84.7 meadow-lark, 84.6 logghead shrike, numerous butterfly's today; 85.5 2 blue jays; 85.8 "Y" in road, considerable yellow ^{50% (no birds)} in deciduous trees. 86.5 N end old N end dam; Cardinal, blue jay; 87.3 turkey vulture on hill to N; tree along river 20% yellow; 87.8 road turnoff to Peterson. 88.3 bridge over Wakarusa. water low, relatively clear, 2 blue jays 88.9 mourning dove. 89.6 passing bridge now to W; 89.9 now to S 90.4 2 white tail deer (at cascades in Wakarusa); stopped to check water got sample water and 2 unionids, Catbird, & Chickadee only birds here, left 11:00 A.M. water flowing about 4 gal per second. 90.6 mourning dove, bog wren 1 per 50'. 90.8 main Clinton Rd, now to W. 2 jays, 2 Chickadees; 91.2 now to S. 92.2 bare hill, 3 blue jays, Baltimore Oriole, 92.8 turned around, 1 crow, 1 turkey vulture chased by red-tail; 92.9 yellowthroated; 93.4 bare hill again. Inspected ponds & spring but all dry, some barely damp. 2 jays, 4 goldfinch only birds. Cattail where pond used to be. Cicadas active. yellow in trees may be due to lack of moisture rather than fall color change. 94.5 now to W. 94.8 Belvoir bridge, downy woodpecker; 95.4 sparrow hawk. 95.5 now to S, standing water at corner, 96.2 drainage dry, Chickadee; redtail; 96.5 now to W. 96.7 2 mourning dove, 96.9 1 mourning dove; 97.0 to S at 4 corners; 97.7 bridge over Wakarusa. 5 painted turtles in group to N of bridge; 98.9 turn along river, 2 jays, hairy woodpecker, 99.0 now to S, 99.5 to W; old field heavily grazed, no water; 00.0 bridge, water flowing approx 1 gal per second, not navigatable, water clear in shallow areas; Catbird, now north; 00.7 drainage dry but damp. Phoebe;

01.0 2 sparrow hawks together; 01.1 four corners now to E.
 02.7 drainage dry, cardinal; 02.5 mouth loke canyon. To lake
 and spring & return. Cardinal, redbellied, 13 eastern bluebirds,
 meadowlark noted. Pellet block snake collected for
 measurements no 660917-1 (1350 body, tail 250, 420 gm wt) ^{10 painted turtles}
 1 egg fresh 15".
 Left 1:30. 03.0 2 blue jays; 03.3 4 corners now to N.
 03.4 2 killdeer at pond (down low); 03.6 5 eastern kingbird,
 9 mourning doves, 2 starling (starling have been rare); 2 barn
 swallows; 04.4 now to E. pond full at corner; 05.0 to N;
 05.2 2 sparrows hawk; mourning dove; 05.3 mourning dove;
 05.8 Dry Creek, dry; 05.9 sparrow hawk; 06.2 loggerhead shrike;
 06.6 4 corners now E, mourning dove. It seems unusual that
 there are not more starling or blackbirds-grackle flocks; 06.8 Crow;
 07.2 5 mourning doves, 2 blue jays; 07.6 Deer Creek, water
 continuous here; 08.1 sparrow hawk; 08.3 sparrow hawk; bobwhite;
 08.5 meadowlark; 08.7 Coon Creek, intermittent and bed damp;
 09.2 sparrowhawk + mourning dove on line 10 feet apart; 10.2
 old house on top hill; 10.4 now to S past Petersons, mourning dove;
 11.3 barn rattlesnake point; 11.8 now to E.; 14.2 cardinal; 14.4
 now to E, phoebe; 14.8 Segal School House, 2 barn swallows.
 end of complete census 2:15, sky overcast and lower stratus.
 and shaded cumulus. Summary of birds noted: (in
 Clinton area):

loggerhead shrike 1-1-	white-tailed deer 2
blue jay 2-1-2-2-3-2-2-2-2-	catbird 1-1-
cardinal 1-1-1-1-	black-capped chickadee 1-2-
turkey vulture 1-1-	Baltimore oriole 1-1-
mourning dove 1-1-2-1-4-1-1-1-5-1-1-	crow 1-1-
red-tail 1-1-	goldfinch 4
yellow shafted flicker 1-	painted turtle 5
downy woodpecker 1-	phoebe 1-1-
sparrow hawk 1-2-2-1-1-1-1-	red-bellied woodpecker 1-
hairy woodpecker 1-	meadowlark 1-1-
eastern bluebird 13-	eastern kingbird 5-
killdeer 2	barn swallows 2-2
starling 2	fox squirrel (ruger) 1-1 (not listed above)
bobwhite 1-	one of these squirrels was on the river bed near water.

There was a noticeable lack of blackbirds & grackles and starling -
 Total number birds 107 which is an unusually small number
 for 30 miles of road census.

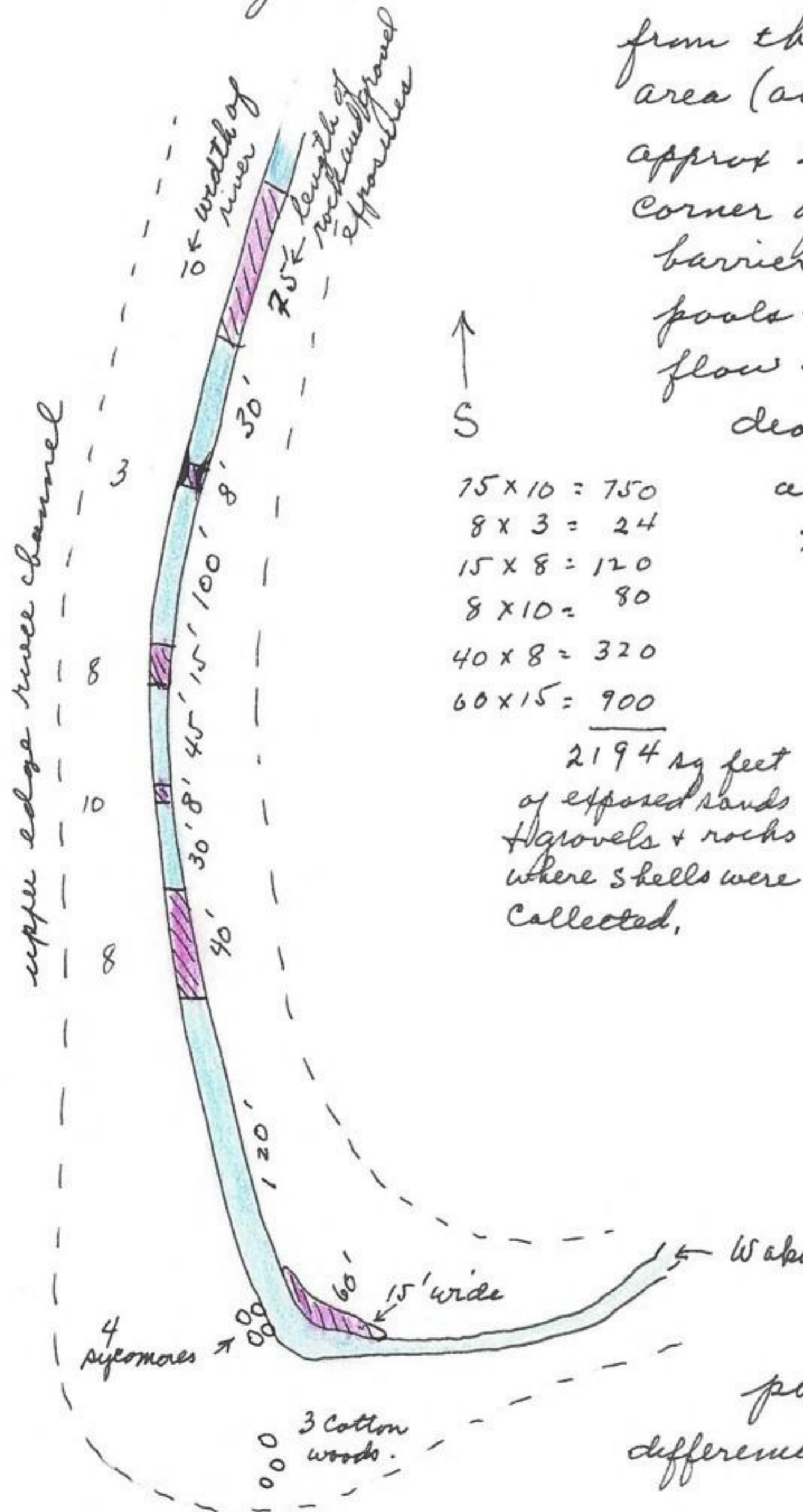
Wakarusa River, NE Clinton, Douglas Co., Kansas

Sept 18, 1966

Collected population of uniconid molluscs on Wakarusa River this ^{3:00} P.M. Enroute observed the following: mileage at S end of proposed dam of Clinton Reservoir 39.0. Red-tail hawk circling above point to S; 29.8 2 meadow larks; 29.9 *Sigmodon* ran across road (Public Health Official claims that *Sigmodon* most numerous this year than at any other time, more children have been bitten this year by these mice than ever recorded from Lawrence); 29.9 meadowlark; 40.2 Rock Creek; 40.6 now to N at Collins corners; 40.8 meadowlark; 42.0 bridge over Wakarusa River, now to W; 42.4 meadowlark; 43.0 English sparrows (8); 44.1 now to S to Wakarusa River arrowway at mileage 44.4.

Collected the entire population of uniconids from the river (exposed surfaces). This area (abrupt bend at 4 sycamores) is approx 2400' N and 100' W of the SE corner of sec 14, R18E, T13S. Rock barriers (natural) separated the deeper pools. Approx. 3 gal per second flow. Rocks up to 6 inches in diameter S beyond bend, some at bend up to 1 1/2 feet in diameter. Many half buried stumps in water which are covered when water at near normal level.

At bend the river channel is wide from erosion action during high flood periods. Beyond the last ripples of 75' there was fewer rock barriers. many live uniconids from rapids where water flowed over the ^{small} rocks. It would be of value to test the amount of water flowing at different parts of the river course to test for difference of evaporation etc.



Left area and drove N to main valley road and at 44.6, turned to W, 45.1 bridge over Wakarusa River, juncos & cardinal there; 46.4 passing by Patton Bridge ~~over~~ and continuing W; 46.8 now to S, no birds in area which is unusual; 47.2 rapids; 47.5 main road leading to Clinton, Cardinal & black-capped chickadee here; 48.1 mourning dove & bob-white; 48.7 Crows; 2 mourning doves; 48.8 2 mourning doves; 49.2 Clinton; 50.0 5 mourning doves; 50.8 3 mourning doves; 51.0 2 doves; 51.4 m. dove; 51.8 Rock Creek bridge; 2 mourning doves; 52.0 1 dove; 52.3 dove; 53.1 south end of proposed dam of Clinton Reservoir dam, now about 1/2 hr before ^{and night} sunset - down, rain clouds all around, strato-cumulus clouds. mourning dove seem to come to roads at sundown.

Ottawa, Franklin Co., Kansas

Oct. 2, 1966

Family & I drove to the Marais des Cygnes approx 1 mi E of Ottawa and collected all shells from an area 80x40' or 3200 sq feet of rock & gravel bar at edge of river (approx 1/10 mi E of bridge that cross the river E of Ottawa. This collection is no. 661002-1. The Marais des Cygnes is a more stable river and more water flow than the Wakarusa. This river would make a good canoe river from its source to the Lake of the Ozarks. Enroute to Ottawa on highway 59 (left 3:00 P.M., high wind, clear sky). Road hills between Wakarusa bridge & Pleasant View were: 1 striped skunk, 1 fox squirrel, 1 opossum. Between Pleasant View & Baldwin Junction were: 1 raccoon, bird sp? Between Baldwin Junction and Ottawa: 1 opossum. Because of the highwind observability almost 0. Between Lawrence and Ottawa observed 1 marsh Hawk (in Ottawa River Valley) and 6 small sparrows were the only birds noted on the entire trip.

Univ. Kansas, Lawrence, Douglas Co., Kansas

Oct 11, 1966

60 Franklin Gulls flying around large, conspicuous Comptonville on campus. Approx 10:00 A.M.

Oct 12, 1966

Chimney swifts in area but not in usual aggregations and fewer in number. They have started to leave area.

Lawrence, Douglas Co., Kansas

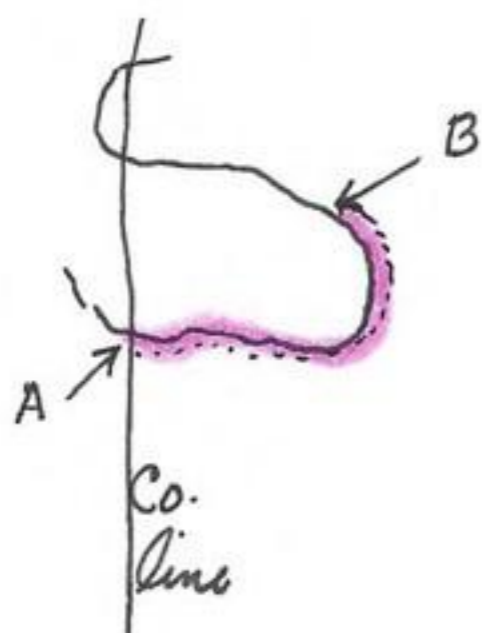
Oct 16, 1966

Frost last night for first time this season. Many plants were effected and leaves drooping.

Wakarusa River, Douglas Co., Kansas

Oct 16, 1966

Mary Bee, Diana Miller & I made collection of unionid molluscs on the Wakarusa River from a point where river crosses the Shawnee-Douglas Co. line to a point $2\frac{1}{10}$ miles down river. An area equivalent to 5000 sq feet of ^{exposed} gravel river bed was examined and all shells were collected, including living forms observable in water bordering the gravel bars. Water flowing at approx 1 gal per 10 seconds. Water dark, presumably from stain of leaves which covered most of the water. From a general comparison would say that the unionids in this area are considerably fewer in number than lower in the drainage system of the Wakarusa River.



area are considerably fewer in number than lower in the drainage system of the Wakarusa River.

Enroute made complete census of birds beginning at Siegel at the N end of the proposed dam site at Siegel School House at 46.7 mileage. 15 Franklin gull circling field $2\frac{1}{10}$ mi. to S; 47.9 blue jay, yellow-shafted flicker, all creeks are dry; 48.2 N end of old proposed dam; 49.2 blue jay; 5:03 Wakarusa bridge opposite Peterson Island; 5:16 passing by Patton bridge; 52.0 blue jay (it is remarkable how few birds are in the area); leaves in valley along river mainly green and yellow and averaging 30% leaves gone, on side hills trees brown & less yellow & green and not intensely colored as in past years. Some areas 80% leaves gone but would average 50% overall, this situation is probably due to drought & high winds. Some trees that were brilliant in previous years have missed out this year & are now dead leaves where right next to them are green trees); 52.7 main road & now to W. 53.5 Belvoir bridge; 53.7 mourning dove; 54.3 now to S; 56.4 bridge in valley; 56.9 meadowlark; 59.5 Elk Creek water intermittent or drop connections, 3 Eng. Sparrows; 60.9 4 Eng. H; 61.5 2 blue jays and leaving main road & following private rd to river; From here walked to area of shell collection & returned. Left & drove to Richland & returned to Lawrence. At 67.1 (4 corners on side hill) 2 great horned owls. Sun down at about 5:35 P.M. Did not keep complete record on return trip.

1620 Tennessee St., Lawrence, Douglas Co., Kansas

Oct. 18, 1966

Noted a ruby-throated hummer at home at 9:00 A.M. It attempted to feed on house plants flowers on house side of picture window. Hovered at window for about 5 seconds and then left.

On route to Univ of Kansas (near power plant) noted 60^{red} crossbills in groups of 40-12-8. They were feeding on juniper berries. Two cardinals, a ♂ & ♀, inspected one group ^{of crossbills} with curiosity.

Oct 19, 1966

Noted approx 18 ^{red} crossbills males & females on campus today. Also an increase in numbers of slate-colored juncos. These birds were still on campus Oct 21 but not after that date.

Shawnee Lake, Shawnee Co., Kansas

Oct 22, 1966

noted the following birds on lake between 10:30 A.M. & 1:30 P.M.
 10:30. approx. 600 am. coot in small groups feeding at edge of lake. One pied-billed grebe with one group of 12 coot. Red-tail flew overhead (300 high) and most of the coot kept an eye on the hawk as they continued to feed on plant material which they shared. One would bring plant to surface & 2 or 3 other coot would share, some anticipating the emergence of the feeding individual. One sail boat on lake. Wind about 15-20 mi per hour ^{from NW}. Temp. cool, high cirrus & strato-cirrus clouds. 10:35 sail boat raised 17 shovellers and 6 blue wing teal. 11:30 on east side of lake 1 horned grebe ^(white wing patches) among 80 coot. The grebe fed and slept among coot as if a member. When disturbed the coot would form compact group at which time the horned grebe would move nervously among coot and would be pecked by the coot. The grebe would, on occasion, peck at a coot, especially when ^{group} more loosely formed. Coot fed but grebe slept some of the time. The coot tended to form long line paralleling shore but when disturbed from land would form close packed unit. Some waves about as high as birds. One pied-billed grebe with considerable reddish brown in plumage. 11:40 another group 60 coot and 1 pied-bill. blue jay, crow, chickadee in area. no shorebirds, blackbirds, grackles etc so far. 12:00 at SE end of lake noted 2 fair killdeer, one focused on high ^{hawk} (almost a speck in ^{killdeer} sky and I would never have noticed the hawk - kept by watching the ^{killdeer} bird)

for approx 30 seconds without moving. a ^{fifth} killdeer joined the two pairs. 12:30 Cormorant flew S and circled south end of lake. Red tail hawk circling high (just a speck) and killdeer occasionally stopping their feeding to watch. 1:00 P.M. osprey alighted on point at edge of water with something in claws (not over 3 inches in length), then after about 1 minute without feeding on prey, left and circled over bench & trees as it moved to S end of lake. 10 gadwalls arrived. 1 scoup and 3 ruddy ducks? swam in lake in about the middle, not approaching land at any time. 1:15 S end of lake on promontory. 1 lesser yellowlegs (right leg injured), 2 wilson snipe, 6 killdeer. This is the best vantage point on lake. 8 Eastern bluejay at point. Left Lake at 1:30 P.M.

Kaw River, Douglas Co., Kansas
Oct 22, 1964

Son James Robert and Cynthia Cole rowed down Kaw from point where the river leaves the east cliffs of the valley and trends NE out into the valley. to at or the Lawrence bridge. at a point in the middle of sec 4, T12S & R19E they observed approx 32 pelicans in a sand bar in the river. On approach ² they left and returned while the others remain while the closest passed at about 150 feet distance. Observed approx. 100 ducks, mainly in 3 large flocks. Channels open the entire route.

Lawrence, Douglas Co., Kansas
Oct 23.

47 Canada Geese flew S over the campus of the Univ. of Kans. at about 150 above Hack Auditorium.

Lawrence, Douglas Co., Kansas
Oct 27, 1964

35 Canadian Geese flew S over campus.

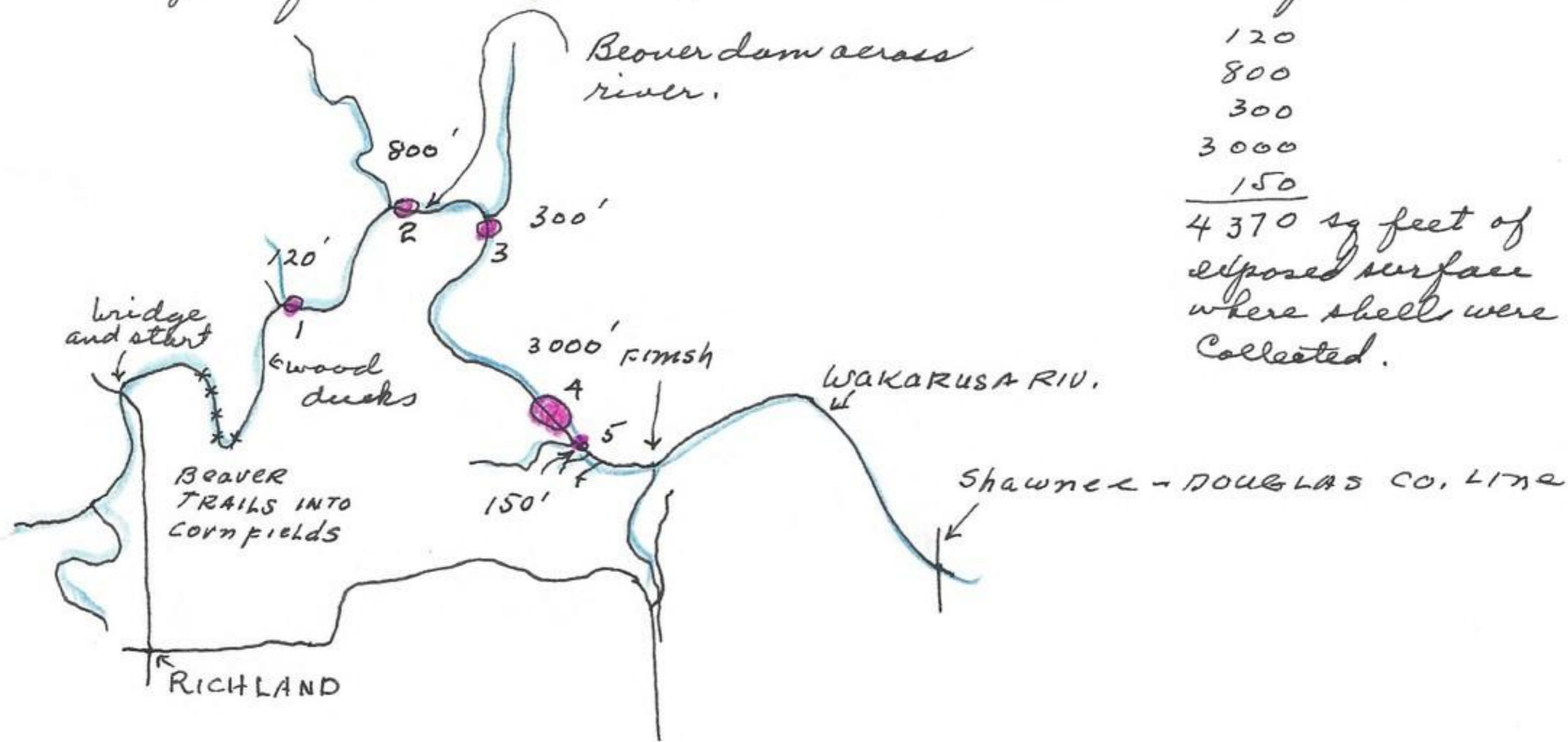
Lawrence, Douglas Co., Kansas
Oct 29, 1964

2 titmice visited the bird feeder at home & first this season. Flock approx 40 ducks flew SE over house.

Wakarusa River, Richland, Shawnee Co., Kansas

Oct, 23, 1966

Temp. 64°F 11:45 A.M. Slight wind, high Cirrus, Strato-Cirrus + Cumulo-cirrus. Seigel School 51.2 mourning dove; 52.5 blue jay; 53.0 N end proposed dam (old); junco (Peterson tells 90% free of leaves, along river about 10% gone & still yellow & green); 54.8 Wakarusa bridge, water clear & about same as last trip. 56.0 Patton bridge passing, Chickadee; 56.3 junco; blue jay, red-breasted woodpecker; 56.4 new to S thru forest; 56.6 junco; 57.2 main road to W; Beaver bridge 57.9; 58.3 crow; 58.7 to S Chickadee; 59.7 to W, sparrows sp?; flicker; 60.2 to S; 60.4 8 crows one group; 60.8 bridge, blue jay; 61.3 2 meadowlarks; 62.0 along river) blue jay; 63.1 bridge new to S; 64.0 Elk Cr, ponds intermittent; crow; 64.8 sparrow sp?; 65.6 Top hill into valley below. Osage orange all vibrant leaves & apples conspicuous; 65.8 turn off to river but continue to Richland bridge; 66.4 red-tail hawk; 66.7 7 crows; 66.9 Richland) 4 Eng. Sparrows; bridge N of Richland 67.4, 12:45 P.M. Will leave for river



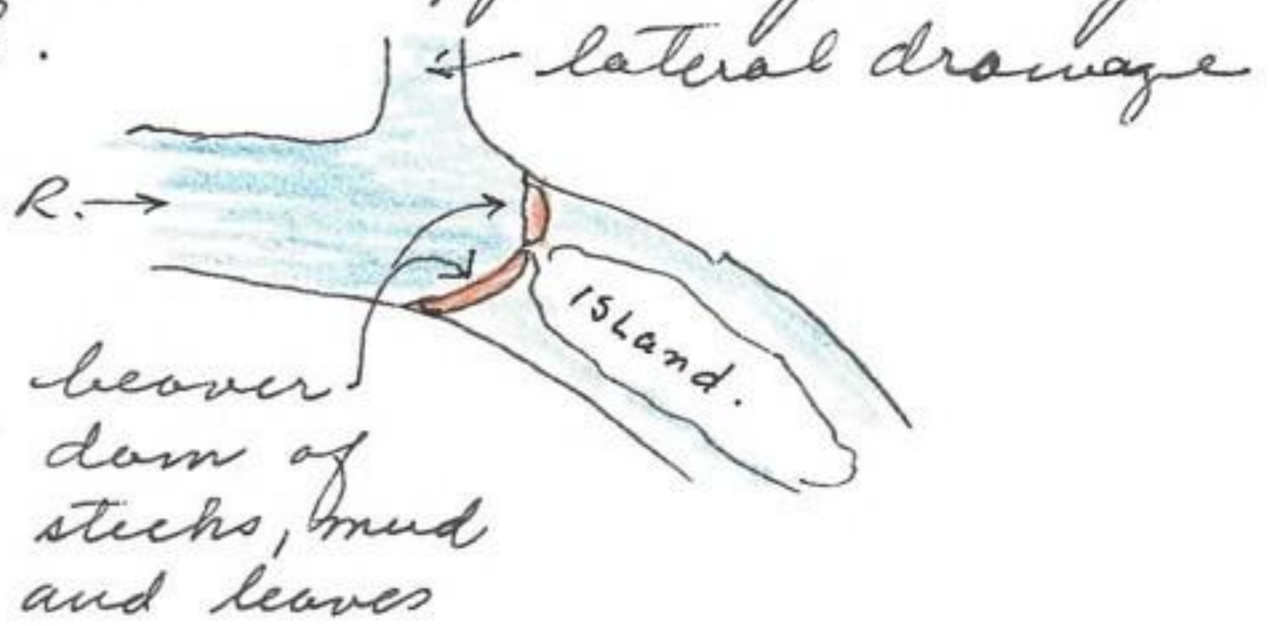
will keep record of birds observed enroute. Left by foot from Richland bridge N of town. Red-bellied woodpecker, downy woodpecker, 4 juncos & 2 crows here. At points on map marked with x are well developed trails, better than those leading to wood resources, were evenly spaced and leading into earl field as far as 50'. Trails worn smooth & depressed. This area of Wakarusa in deep ponds (continuous) and except for 5 or 6 rapids are between start & finish are easily navigated by beaver.



or canoeist. just before first lateral drainage from N was a large great horned owl being harassed by 6 crows. It flew down stream. 2 belted kingfishers flew by, chasing each other. at bend were 3 blue jays, 2 chickadees & 2 cardinals. The exposed bar below 1st site ^{approx} 120 sq. feet but shells uncommon. 2 titmice, 1 red. bellied just beyond. 3 Franklin gulls circled over field beyond. At 1:30 red-tail and 3 crows and 6 bobwhites. Arrived 2nd site at 1:40. Approx 800 sq ft exposed. a beaver dam stretched across the river effectively damming it 2 1/2 feet above its normal height.

I can see that in the past, beaver dams have contributed to the perpetuation of mollusc fauna during period of extreme drought.

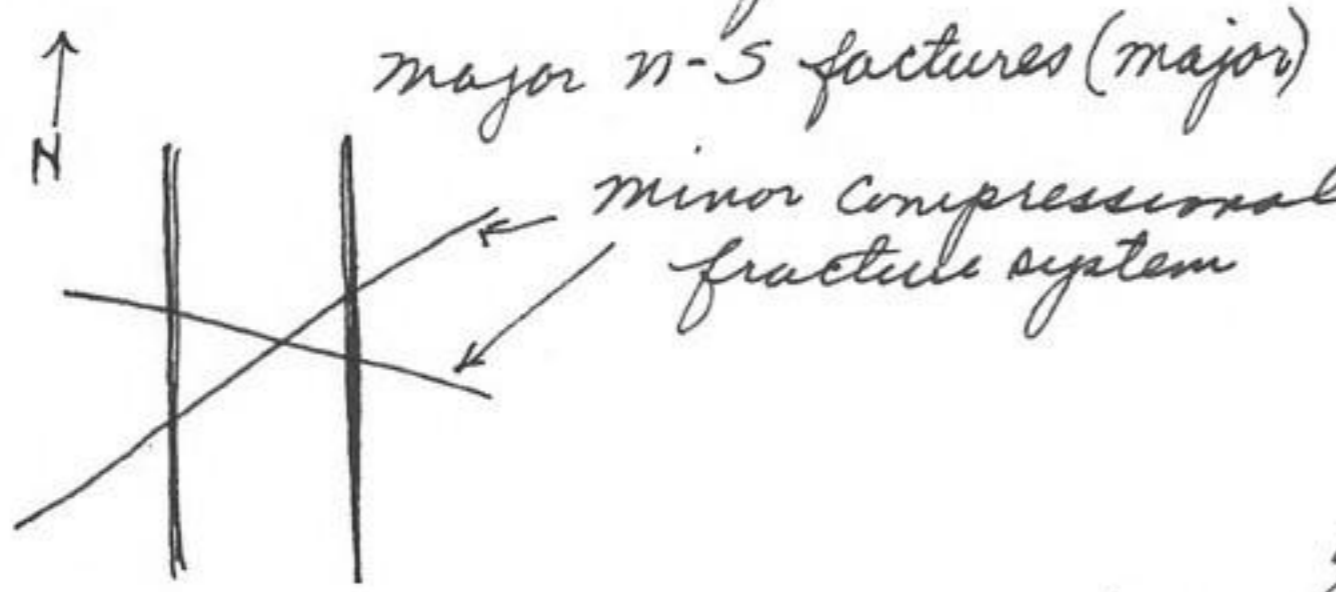
Wakarusa R. →



here. at 3 lateral channel (approx 300 sq ft) collected a few shells below drainage. The river makes an abrupt curve & trends SW. 2 crows & 6 cardinals here as well as 2 yellow shafted flickers 8 redwings come into river area. 8 Franklin gulls circling 200-300 above. At point 20 I

examined an area of approx 3000 sq feet of exposed river channel. (approx. 1600 ft E and 1800 ft S of NE corner, see 27, T113S and R.17E) This area is unique for the Wakarusa in this position on the drainage in being a solid rock bottom of native limestone of horizontal stratification. It is continuous from one side of the river to the other without erosional water channel. smooth as if being exposed by stream

erosion for the first time. N to S is as follows:



The fracture system from It would be interesting to examine packets in rocks for evidence of glacial or post glacial debris. The surface of rocks appeared to be eroded smooth by water or glacial action. ~~and~~ Fracture blocks removed more recently. The substantial

Collection of shells from this area. Examined site no 5, (150 sq ft) just below the solid rock area. This small accumulation from lateral drainage to W. Two other lateral drainage beyond but recent in formation. Continued to point marked finish. at

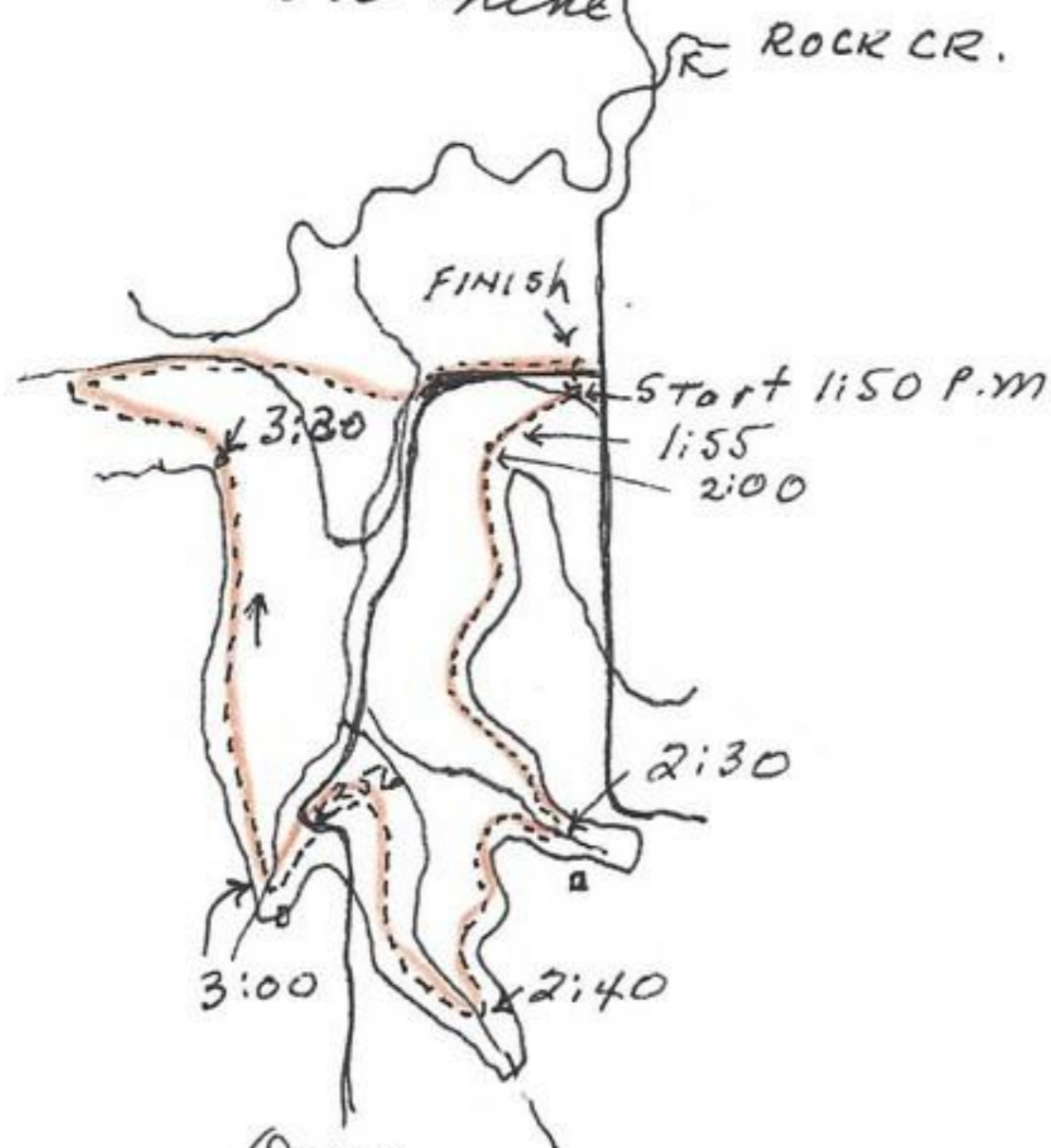
this point noted 4 juncos, 2 black-capped chickadees,
 1 nuthatch, red-bellied woodpecker and one small, 12
 inch *Thamnophilus*. Left river at 3:15 for car at
 Richland. at main road noted 6 robins & 8 juncos.
 3:25 4 crows feeding in winter wheat, 3 on hillside to south.
 One fox squirrel feeding in ^{out} soybean field. The nearest
 tree 150' beyond. 3:30 4 juncos, 3 cardinals, 13 goldfinches.
 Insects, wasps common. 3:35 now W to Richland, 8 crows at this
 bend. Eastern bluebird in open field toward Richland. Richland
 at 3:42 P.M. Car at 3:50. Will return and pick up shells.
 Left Richland at mileage 68.3. 69.4 picked up shells &
 continued to E. 71.3 Elk Creek, flicker; 71.4 now to N.
 72.1 bridge & continuing N. blackcapped chickadee. 72.4
 red headed woodpecker flew from ground up into tree. 73.3
 4 corners on hill & now to E; 73.6 sparrow hawk; 74.7 drain-
 age from sportsmens lake, flicker; 75.3 3 bluebirds.
 75.4 4 crows at 4 corners & now to N. 75.6 Wilson snipe
 exposed on bare mud flat at edge of pond. 2 mourning
 doves; 76.6 main road, now to E. at this corner a red tail
 (tail dark) sat on top of telephone post and remain while
 we watch from car directly below (1 1/2 min), shrike beyond.
 77.2 now to N. 77.7 top hill between Wahawasa & Dry Creek.
 47 Canadian geese flew high above & directly S. 77.9
 Dry Creek, 2 eastern bluebirds, 3 juncos, 1 shrike;
 78.8 now to E, flicker; 79.7 Deer Creek; 80.9 Coon Creek
 (it is interesting to note the lack of birds along this route.
 81.6 drainage, 4 juncos, 3 goldfinch, 1 bluejay; 81.9 boy scout
 drainage. 82.6 now S on Peterson Road. 82.8 6 goldfinches,
 1 mourning dove; 83.3 Rattlesnake Pt (top); 83.9 now to E,
 84.2 3 meadowlarks; 85.2 N end of proposed dam site (old)
 flicker; 85.7 drainage, 2 blue jays; 86.3 shrike, cardinal.
 87.1 Hegel School House and end of complete census. now
 5:00 P.M.

Analysis of unionid molluscs collected today from sites
 nos 1-2-3-4 and 5.

Rock Creek, Douglas Co., Kansas

Oct. 30, 1966

Annette and I made trip up a lateral drainage of the Rock Creek, starting at a point 1200 ft E and 1200 ft S of the NW corner sec 25, T135, R18E (at old house recently raised by tornado). Enroute to this area made complete bird census, beginning at S end of proposed dam (Clinton Reservoir) at mileage 66.0 (1:30 P.M. clear sky, windy). 67.7 now to S at Collins corner (no birds to this point). 69.0 loggerhead shrike, 69.4 bridge over Rock Creek (this creek is now intermittent + water clear but weedy). From specific locality above left par and at 1:30 P.M. started on hike.



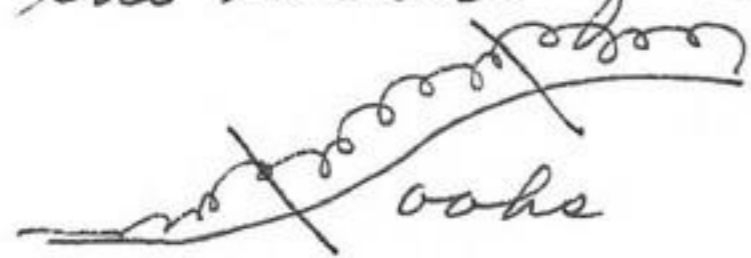
Our Trail followed upper bench the entire way and was at the 960-970 feet contour interval.

The area of the old house (now gone) is weeds and uncultivated. 3 slate-colored juncos in weeds. murature activity, especially in grassy areas not completely grown to weeds. 1:55 8 Harris sparrows on hillside among shrubs and 100' from good weed slope below. 5 slate-colored juncos with these sparrows; 2:00 main point. 2:15 black-capped chickadees (4); rock fence line 50' beyond. 2:30 head of first drainage, no water, yellow-shafted flicker, chickadee; 2:40 head of second drainage, 3 black capped chickadees, neotoma, eating orange-apples which were at the bases of orange trees; yellow-shafted flicker, 2 cardinals. 2:45 fence, cottontail, more junipers than usual, downy woodpecker; 2:56 road 3 black-capped chickadees; 3:00 main W lateral drainage, 2 chickadees; 3:17 fox squirrel, 2 chickadees, 1 red-bellied woodpecker; 3:20 old abandoned pioneer trail, red-bellied woodpecker; 3:25 great horned owl; 3:26 downy woodpecker, 2 grey squirrels; 3:30 main point.

It is my impression that in the area covered so far, there has been an increase in the amount of ground shrubs (vines, small trees, weeds etc) since a year ago when I followed this same route. This increased understory is probably a result of ^{many} the large trees removed by the last tornado that passed thru this area. Continued down slope from

point to next bench where we then followed trail diagonally down & to the NW to bottom of hill, arriving at 3:35; Continued E to plowed field now planted to winter wheat. In this field noted 5 separate fox squirrels feeding 20-30 feet out into the field, a red-tail circled above and the squirrels retreated to cover. A yellow-shafted flicker flew across the field, ^{2 crows} Arrived road 3:50, just beyond bend flushed 6 bobwhites. Approx 150' from car flushed a second covey of bobwhites (13 in number). Arrived car 3:55. In weeds noted 18 juncos and 14 Harris sparrows.

Left area at mileage 69.8 and continued to S up hill. 69.8 2 juncos. From position can see that hillsides are made of 10% oak which can be identified by reddish-brown leaves still on the trees. The rest of the leaves of deciduous trees are bare. The oaks occupy the lower & middle slopes and less so toward the crest or upper slopes. The symphoricarpos among trees is the greenest of the understory plants & shrubs. 70.9



2 crows and a single meadowlark; 71.5 8 starling; 71.7 redtail in tree; 72.0 road (Lone Star). Continued S to Lone Star Lake, followed E side and thence E to main road that runs N to Lone Star village. In a farm pond 18 killdeer left because of a red-tail that circled overhead. 2 Eastern bluebirds; nearing Lone Star village noted 18 meadowlarks in one group. Also 2 mourning doves. Continued N to Banner Corners on Main Clinton Road. Here noted 1 loggerhead shrike. At budge over Rock Creek to E noted a line of red-wing blackbirds (♀♀ & ♂♂) flying N E (2 miles of solid flight line). When this flock is observed from end of line, they look like utter confusion with birds flying in all directions. This is an illusion and represents the undulating line in one plane. These birds were flying to Haskell Bottoms. We followed them to their resting area in the trees & fields there. One Haskell Avenue near Wakarusa observed 35 crows in one flock. They seem to be more common there than elsewhere and regularly inhabit the area. The roosting grove on Haskell Avenue may account for this.

Lawrence, Douglas Co., Kansas

Nov. 1, 1966

Approx. 100 red crossbills on campus of the Univ of Kansas.

Nov. 2, 1966

Temp. last night to 20°F. Skies clear, yesterday windy. Red-breasted nuthatches have been in area for at 1 1/2 weeks.

17th Street and Louisiana, Lawrence, Douglas Co., Kansas

Nov. 4, 1966

witnessed the electrocution of a fox squirrel. Two adult squirrels were on transformer (located in center of block beyond end of 17th Street), one of which made contact and fell directly below transformer. The other retreated, apparently unharmed although only inches from the squirrel that made contact. There was a bright flash of light and a loud noise as if thunder. The squirrel that dropped from transformer seemed to be intact. These electrical boxes could be a dangerous threat to children if they should climb these utility poles.

Tuttle Creek Lake, Manhattan, Kansas

Nov 5, 1966

Annette C and I drove to Girl Scout Camp at Tuttle Creek to pick up Mary who has been camping there for the last two days. Well sunny route, via Clinton area and Wakarusa drainage. Left 11:30. cloudy sky, ^{windy} ^{temp 58} rain yesterday afternoon & night. mileage 838 ~~40.0~~. Redtail & crow at Hashell Bottoms, also slate colored juncos, ¹ mourning dove. ² now to Highway 59 & 5 to Clinton road. 5 end, Clinton Res. dam at 32.4. Complete census. 34.4 3 meadowlarks; 36.3 Clinton, 8 Eng. sparrows; 36.5 2 mourning dove, 1 meadow l, 1 loggerhead shrike; 37.6 bluejay; 37.8 2 cowbirds; 38.3 red tail; 38.5 shrike; 38.7 Belton bidge; 39.3 2 starling; 39.7 100 starling-cowbirds in equal numbers; 40.0 60 starling, 10 cowbirds; 40.4 orate nest; 41.4 2 meadowlarks, 1 red-tail hawk; 41.8 bluejay; 42.1 corner to S 42.2 2 meadowlarks; 42.6 meadowlark; 43.2 marsh hawk at corner. now to W; 44.3 orate nest; 44.8 8 juncos; 44.9 12 juncos; 45.4 approx 200 starling one flock; 45.9 Rubland Rd to left but coming W up Wakarusa Valley; 46.3 meadow (will continue complete census to Manhattan); 47.3 red-tail in tree by house, 2 crows; mockingbird; 48.0 yellow-shafted flicker, meadowlark;

48.7 Disney School, red-tail, 2 blue jays; 49.5 2 crows w roods;
 51.5 red-tail; 52.1 meadowlark; 53.1 blue jay; 53.8 red-tail;
 55.4 highway 75. 56.0 RR. shrew saw across road; 56.8 red-tail,
 56.9 large redtail; 58.1 bridge (Burlingame Rd) continuing on SW 93 rd.
 bluebird (eastern); 58.7 flicker & meadowlark; some blue
 in sky, low flocks - clemens; 59.7 meadowlark (Wavemaker Rd);
 61.2 bluebird. 62.0 Turnpike; opossum rd hill. 63.5 Auburn
 63.4 red-tail on top wind mill; 64.3 blue jay & rabbit rd hill;
 64.9 2 crows; 66.0 red tail & budge; 67.8 sparrow hawk;
 68.4 rabbit rd hill; 5 starling; 68.6 east end rd hill, meadow l.
 71.2 rabbit rd hill; 72.2 meadowlark & new to S; 72.8 flicker;
 72.9 meadowlark, 4 goldfinch; 73.6 new to W; 74.8 crows;
 78.4 flicker; 79.8 rd to left to Bradford, meadowlark, 4 crows;
 sun out, clouds 5 per cent coverage; 81.5 main rd to Eskridge to
 S. 84.4 Eskridge new to W; 85.7 opossum rd hill; 89.7
 Wabawsee Lake, birds have been rare; (1:15 P.M.); 91.7 3
 horned larks 92.4 crow; 93.5 cardinal; 93.7 red-tail, 2 meadow
 larks; 4 goldfinch; 94.9 2 crows & drainage. 95.2 main rd &
 new to S, 96.3 flicker; 98.4 red-tail; 99.2 red-tail on post; horned
 lark; 03.6 rabbit rd hill, crow; 05.3 red-tail with noise;
 06.2 red-tail, meadowlark; crow; 09.4 Alta Vista turnoff;
 10.0 main road (177) and new to N. (1:40 P.M.); 10.7 red tail top pole;
 11.1 red-tail on fence post by stream lined trees; 12.8 rabbit
 road hill; 21.4 sparrow hawk; 24.2 red-tail in tree; (most red-tails)
 are resting; 25.9 interstate 70; 27.4 2 meadowlarks. 32.6
 outskirts Manhattan just down off hill leading into
 Kaw Valley. (end complete census). 34.6 Kansas River bridge
 2:00 P.M. Approx 300 ducks flying below dam, probably in
 protected area. 6 red-tails between dam & junction 390 on
 177. marsh hawk 2 mi. E of junction. 80 juncos near
 girl scout camp. Left camp at 3:15 and arrived Lawrence
 at 6:30 P.M. at mileage 105 on 281 miles round trip. At
 the bend of road east of Belvoir bridge noted a great horned
 owl in the road (after dark). Route travelled: Clinton,
 Richland, Auburn, Eskridge, Alta Vista, Manhattan. Returned
 same way. The girl scout camp is east on 390 from 177, or
 6 mi. SE Randolph. In summary, the greatest concentration
 of red-tails were more common in deciduum-prairie area
 rather than prairie. Fewer birds of all kinds in prairie area.
 There is an increase in large flocks of starling, cowbirds
 etc, than earlier in season. Road kills uncommon.

number of birds observed: (From Lawrence to highway 75)

redtail hawk 1-1-1-1-1-1-1-1 = (6)

crow 1-2-2 = (5)

juncos 16-8-12 = (36)

mourning doves 2-2 = (4)

meadowlarks 3-1-2-2-1-1-1 = (11)

Eng sparrow 6 = (6)

loggerhead shrike 1-1 = (2)

blue jay 1-1-2 = (4)

cardinal - 2 = (2)

starling 2-~~100~~ 50-60-200 = (312)

cowbird 50 = (50)

marsh hawk 1 = (1)

mockingbird 1 = (1)

yellow shafted flicker 1 = (1)

From highway 75 to Alta Vista

red-tail hawk 1-1-1-1-1-1-1-1-1 = (9)

eastern bluebird 1-1 = (2)

yellow shafted flicker 1-1-1-1 = (4)

meadowlark 1-1-1-1-1-2-1 = (8)

blue jay 1 = (1)

crow 2-1-4-1-2-1-1 = (12)

sparrow hawk 1 = (1)

starling 5 = (5)

goldfinch 4-4 = (8)

horned lark 3-1 = (4)

cardinal 1 = (1)

From Alta Vista to Manhattan

red-tail 1-1-1 = (3)

sparrow hawk 1 = (1)

meadowlark 2 = (2)

(of same kinds)

Totals for trip (Lawrence to Manhattan)

18 red tails

2 sparrow hawks

17 crows

1 marsh hawk

5 yellow-shafted flickers

21 meadowlarks

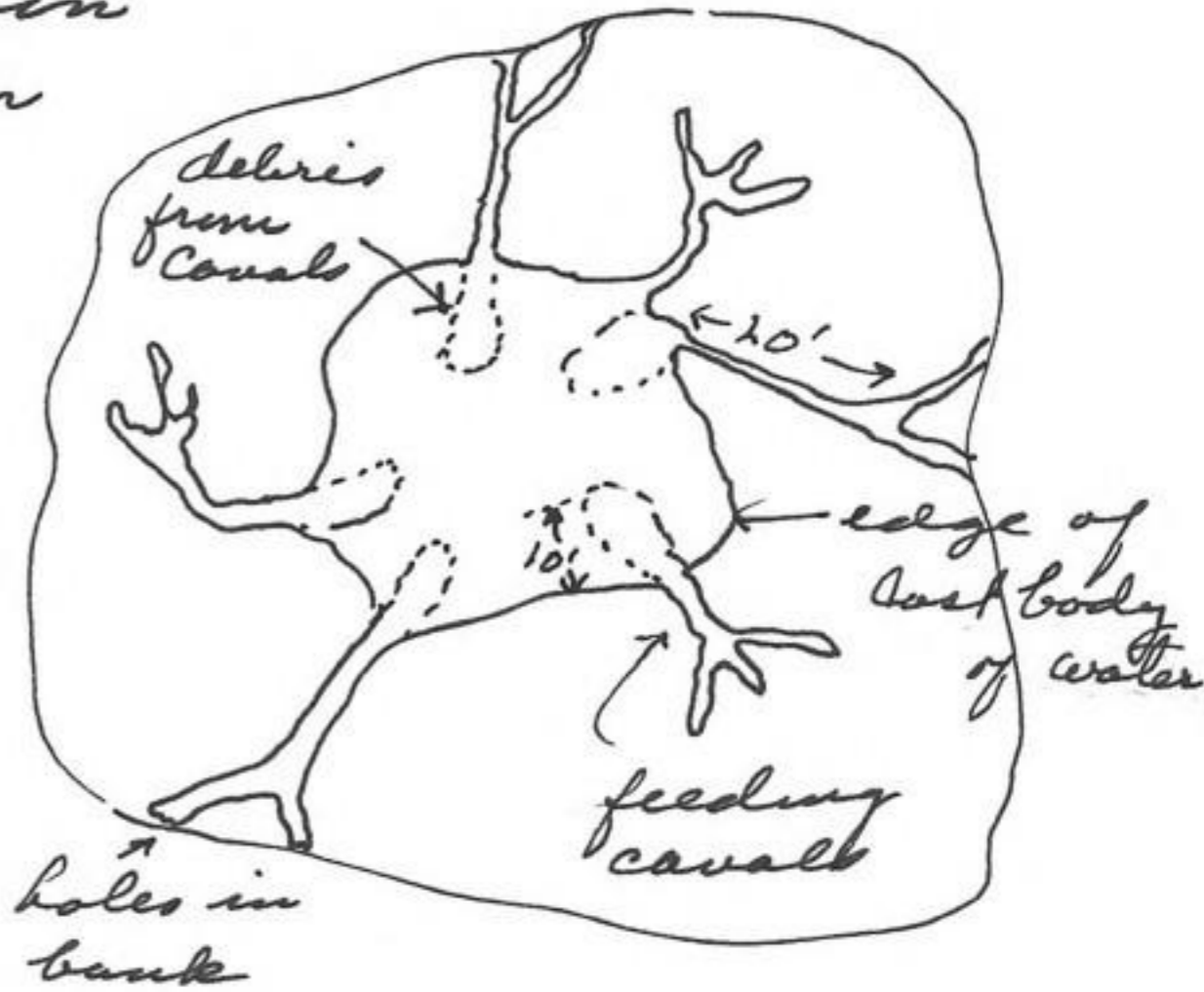
5 blue jays

4 mourning doves

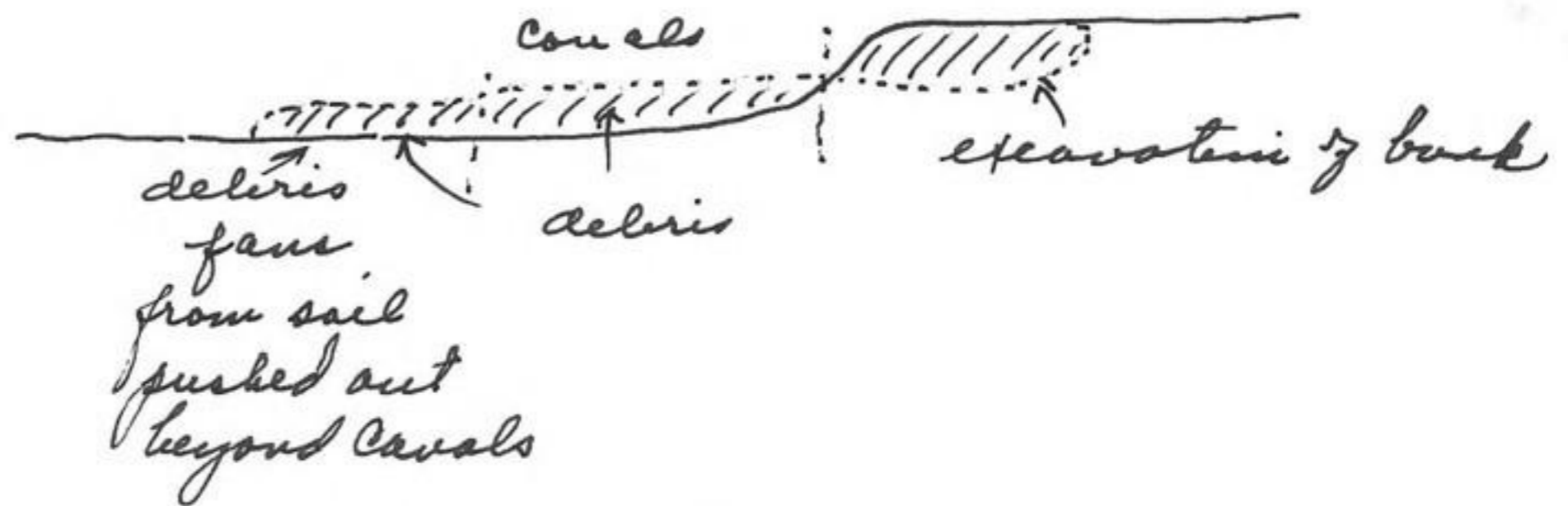
Sandpits, NE Lawrence, Douglas Co., Kansas

Nov. 11, 1966

Checked area between 4 and 6 P.M. Water low and broad flats between vegetation and dwindling water in ponds. Noted the following birds: 1 golden plover, 5 killdeer, 8 tree sparrows, 3 wilson snipes, 2 meadowlarks and 2 muskrats. Flocks of red-wing blackbirds passed at about sundown, some were startling and would estimate 2,000 blackbirds in all. Two ducks (sp?) arrived 20 min after sundown. The muskrats are active at sundown. In ponds that have dried one can determine the extent of reaction between the muskrat and the floor of the pond. There is a decided accumulation and rearrangement of the floor of the pond. Canals are maintained from the bank holes or feeding areas to the center or deeper parts of the lake and as the lake dries these canals and debris accumulations are shifted about and reworked.



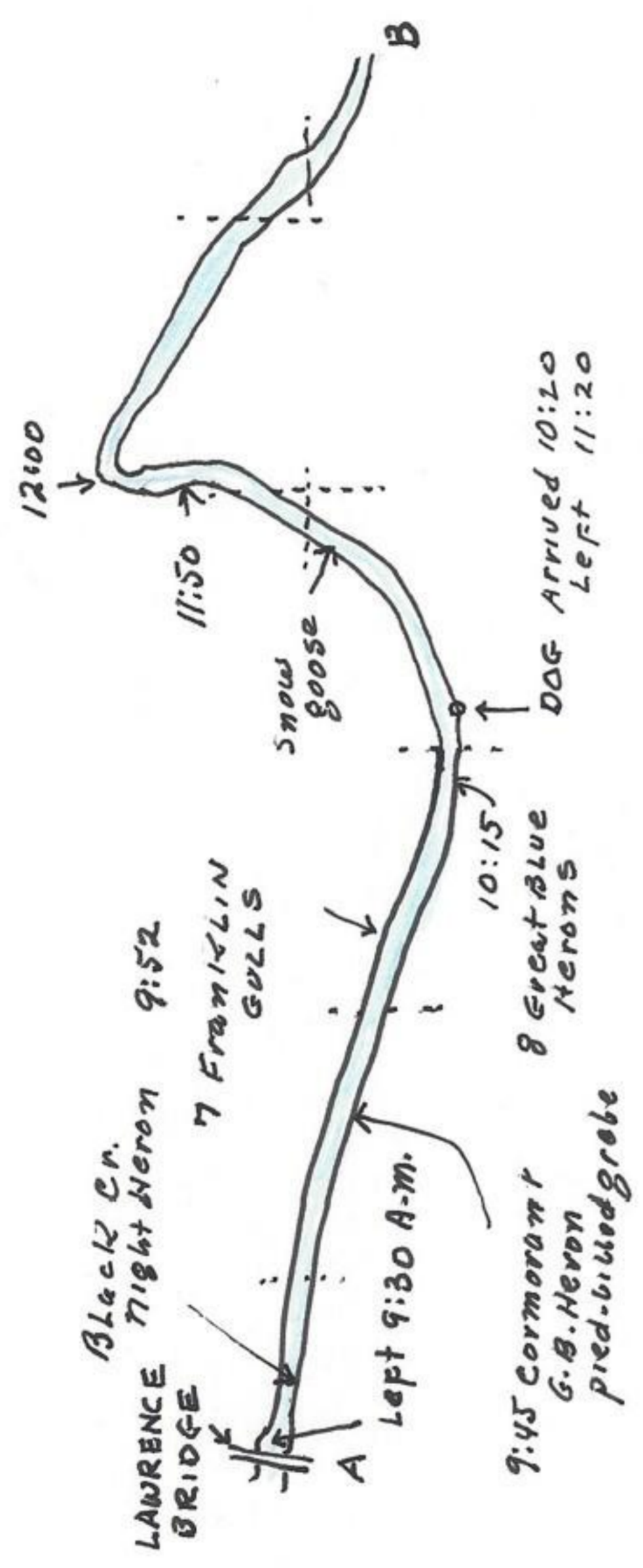
I would estimate that 7/10 or more of the sediment in the ponds, especially around the edges, has been produced by the activity of muskrats. These animals contribute more to sedimentation of ponds than any other natural force and, in addition move progressively the bank of the pond landward.



Kansas River (Lawrence to De Soto), Douglas Co., Leavenworth Co., and Johnson Co., Kansas

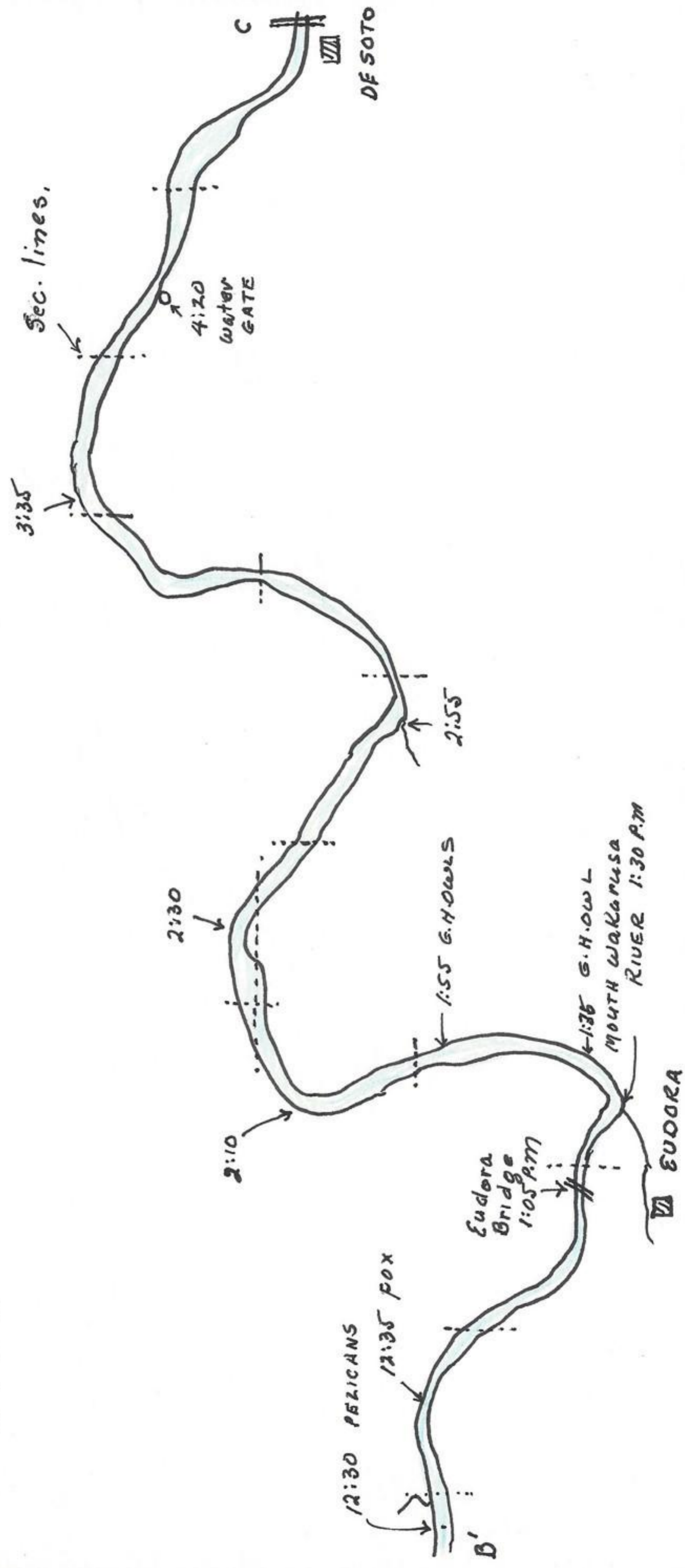
Nov. 12, 1966

Son James Robert and I made canoe trip from Lawrence bridge to De Soto bridge on the Kansas River, leaving at 9:30 A.M. with day clear (no clouds), no wind, air temp 41°, water temp in shade of canoe (2 inches deep) 40°F. Forecast for clear warm day. At base of dam noted 4 killdeer and approx 400 pigeons on rock island below dam. It is planned to keep a complete record of ^{all large} birds and mammals in river channel, ^{and elsewhere} and general



SURVEY OF
KANSAS RIVER
LAWRENCE TO
DE SOTO

NOV. 12, 1966
21 1/4 miles
6 1/4 hrs.



12:30 PELICANS
12:35 FOX

Eudora
Bridge
1:05 PM

1:36 G.H. OWL
MOUTH WAKARUSA
RIVER 1:30 PM

EUDORA

Sec. lines.

ARRIVED
4:45 P.M.
DE SOTO

2:130

1:55 G.H. OWLS

2:55

3:35

4:20
Water
GATE

notes on ^{small} birds that are associated in riparian vegetation on the sides of the river. Water is higher than usual because of control of Tuttle Creek. Ordinarily 70-80 per cent of river bottom is in sand but today I would estimate that only 30 per cent is sand. The normal low water always makes a more interesting river course because of the braided channel systems and great exposure of sands. The speed of travel is greater, however, with more water. I have wondered how this artificial fluctuation of lake and stream water influences native animal populations. At a point approx. 1/2 mile down river from dam on South side of river noted an immature black-crowned night heron leave edge of water and fly to rocks of sand dredging area and after remaining here for about 1 minute walked into bush bordering the rocks. This bird looked like a yellow-crown but on the basis of departure dates would eliminate this bird from the Lawrence area for this time of year. Between here and the dam (south side) the several commercial companies are putting their liquid and material debris directly into the river. It would be interesting to test the water on the N side of river + the south side and determine amount of contamination. The Creamery puts its debris in water above the dam. I think that there should be an all inclusive law to ban placing liquid or material in a river course without it first going through a government controlled disposal system. Continued down river. and 1 double crested cormorant

9:45 single pied-billed grebe and 1 great blue heron. Old piling of former bridge now exposed as a result of shifting mud & sand, also pipes exposed on east side for first time. 4 bluejays, almost continuous group of slate-colored juncos, some chickadees on bank. 9:52 7 Franklin gulls resting on sandbar. 10:15 8 great blue herons on logs in river on east side, they flew down river and all but 2 alighted on logs, the other two on sandbar. 1 red-tail flew out to inspect great blue herons as they flew down river. 1 kingfisher, 2 yellow-shafted flickers so far. At 10:20 just below area where great blues were resting noted a large

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6611235

German shepherd dog. It was at edge of water and unable to get up bank. A bandage supported its hind quarters, and it was obvious the hind legs were partially paralyzed. We fed it our sandwiches and attempted to find its owner. One farm house (sheriff residence) agreed to find its owner and we left area at 11:20 to continue our trip. 11:40 James Robert shot a snow goose (measured 75 total length and 55 inches wing spread). This goose was on a sand bar on N side of river, flew S across river over field and then returned to river directly overhead. ^{approx 300 Lapland Longspurs on bar & fly to field to S.} 2 crows and on red-tail in area. 11:50 bypass canal to right, 2 hildee 1 crow and a kingfisher at entrance of canal or channel. 12:00 opposite mud creek; 12:10 2 crows, 3 redtails, all soaring; 12:30 2 white pelicans in river at bend. One remained on water while a second one left and returned twice, circling the area while off the water. We pursued the one and approached to within 20' before it left and flew up river out of sight. 12:35 red fox moved along bank of river for 200'. As we approached it was cornered with steep bank beyond, water below and sleep bank above. It remained in weeds for about 1 min and then gained top of bank in the only part of the bank that was negotiable and then only by perpendicular wall climbing. 12:50 2 hooded mergansers (sp.?), 1 kingfisher, 1 redtail and 3 Franklin gulls (flying down river); 1:05 Eudora bridge. Temp 64°, water temp 43°. From here to mouth of Wabasha River we moved by current only, arriving at 1:30 or 7/10 miles in 25 minutes or approx 2 miles per hour current. 2 Franklin gull on sand bar in river. Small frogs (acris) rare but occasionally on bank. One large Rana pipiens noted so far. Retail also at mouth of Wabasha. 1:35 Great horned owl left trees and flew 1/10 mile down S side of river. Goldfinches seem more plentiful here than observed so far. They feed on weeds in steep slope of bank. I have always observed them here on previous trips. 1:40 13 hildee together, some bathing. 2 crows; 1:55 3 great horned owls together, they worked down stream in three movements and then flew E across river. They call while flying over water. One kingfisher in area. 2:05 2 hooded mergansers; 2 willet; 2:10 bend of river

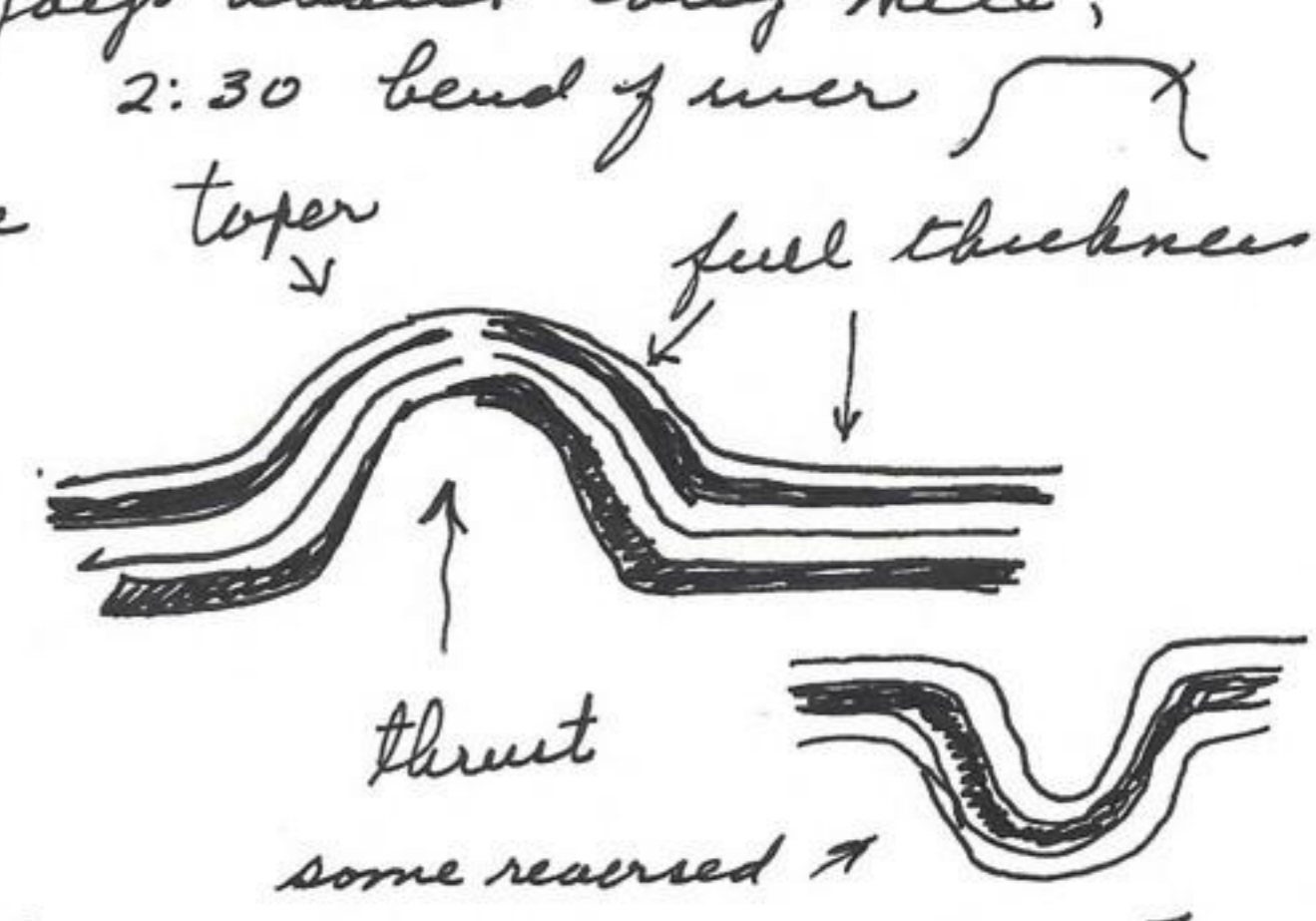
Locality of anticlines approx.

3/10 mi. W of SE corner Sec 22, R 21 E, T 12 S,
Leavenworth Co., Kansas.

184 236

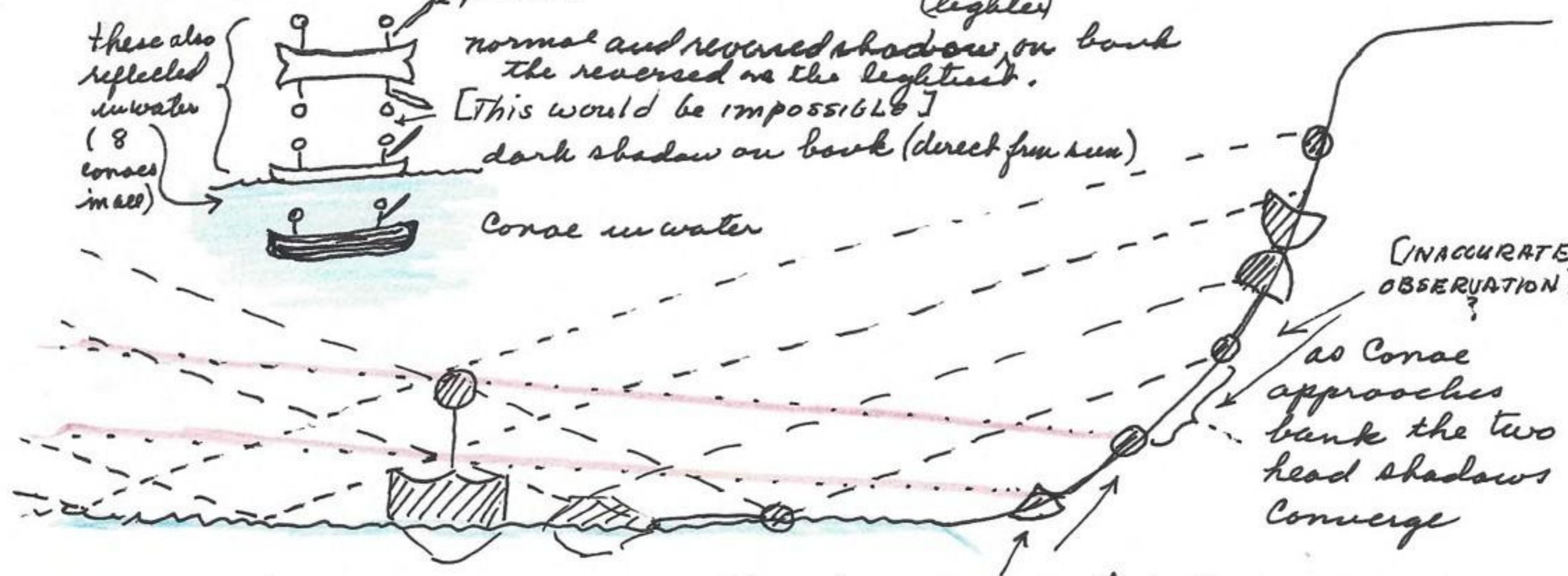
66112-236

2:18 utelily lines crossing from N to S over river; Kingfisher. Slate colored juncos are the most common but along the river, some tree sparrows, occasional song sparrow one of which was singing; blue jays about every mile, flickers about 1 every 2 miles, along the north bank of river are soil or sand profiles which I have not noticed elsewhere. They are domes that have been thrust up. The stratification is not continuous and more than an upthrust is indicated



2:55 mouth Captain Creek; 3:00 temp 60° and water 43°F. First fish jumped today, redtail herling, goldfinches dominant bird on S bank; 3:12 bank swallow nests (others have been noted along route and in places that have not been used before; 3:15 2 crows; 3:20 good swallow cliff & nests; 3:22 Kingfisher; 3:35 one greater yellowlegs, ^{high} island mass has been eroded down to river valley level; 3:41 old columns of budge support; beaver active between river & R.R tracks in an area I would judge unworthy to a beaver. There has been beaver activity along our route but I have not noticed house construction.

Beaver trails and cut timber are in evidence but no houses. With the sun low there is a ^(shadow) reflection of our canoe on the steep sand banks, the nature of the reflection ^(shadow) is unexplainable and as the



The above angulation (other than red) does not explain the direct shadow of canoe from the sun (red). It can explain the dark shadow and uppermost but not the reversed one

18237

4:20 Sunflower water gates; 4:30 red-tailed hawk; one large
Kana piceps on bank; kingfisher; 4:40 good Cliff Swallow
nesting cliffs; 4:43 one yellow-shafted flicker and one red-
shafted flicker together; arrived De Soto Bridge 4:45. Temp
in last hour has dropped to 56°F. sky still cloudless and no
wind. In summary:

- red-tail hawks 1-1-3-1-1-1-1-
- pelicans 2-
- red-billed grebe 1
- cormorant 1
- hooded mergansers 2-2-
- ducks none
- snow geese 1-
- Franklin gull 7-3-2-
- S. Horned owl 1-3

- kingfisher 1-1-1-1-1-1-1-
- heron 4-2-13-
- greater yellowlegs 1-
- willet 2-
- crow 2-1-2-2-2-
- black crown night heron 1
- great blue heron 1-8
- red fox 1

There is an increase in numbers of duck blinds over previous
years, having counted approx. 30, none of which was being
used during our trip. The lack of ducks is reason enough
for their desertion. There were also more pigeons observed
and more generally distributed than on previous trips of the
last few years.

Leecompton - Lawrence, Kaw River, Douglas & Jefferson Co.,
Kansas,

Nov 20, 1966

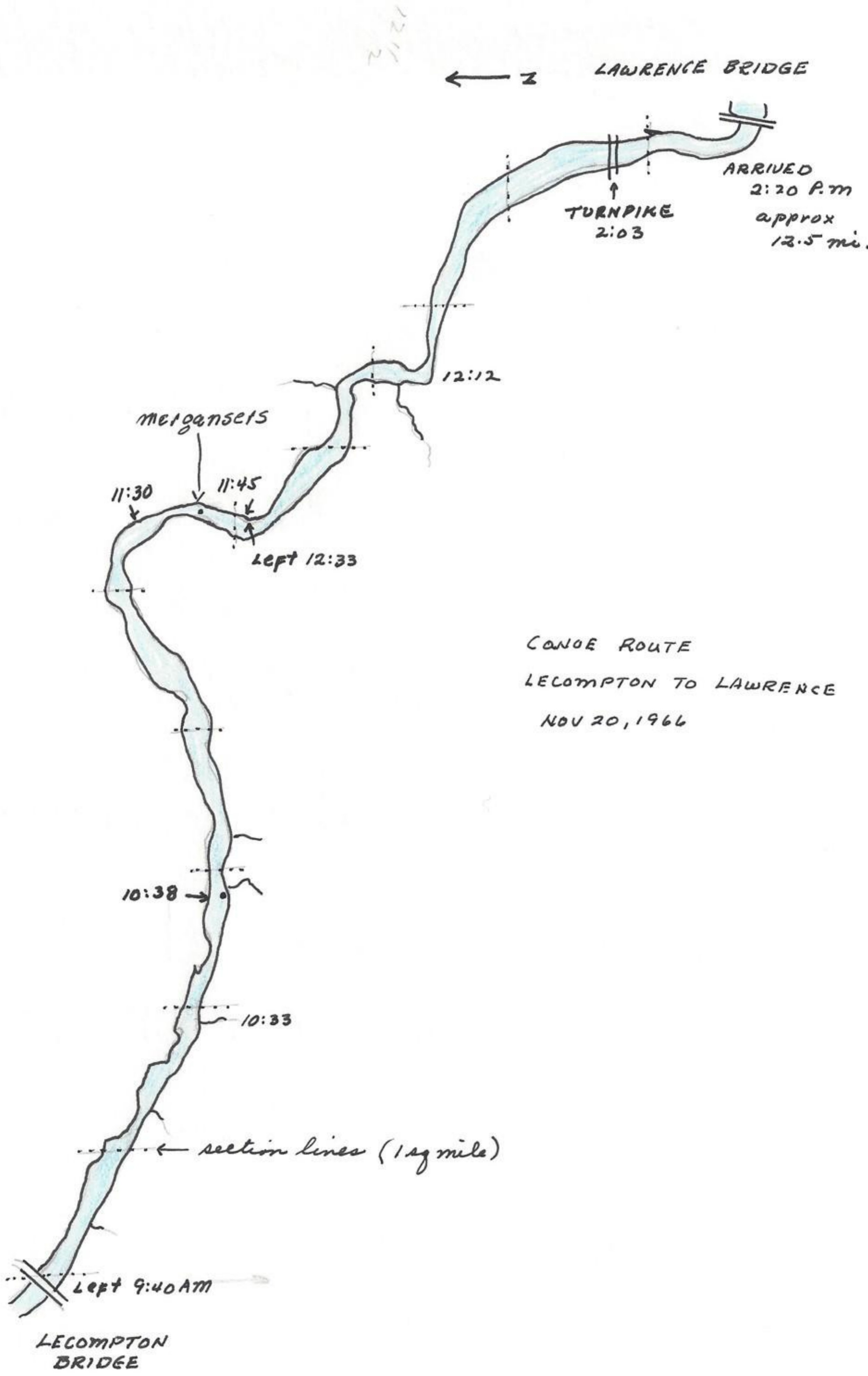
and complete census

Sam James Robert and Chris Wahl and myself made canoe
trip on Kaw River from Leecompton Bridge to Lawrence bridge
starting from Leecompton at 9:40 A.M. Day with high clouds,
slight breeze, air temp in shade 53°F, water 2 inches below
in shade 42°F (all temps are in shade). The water is excep-
tionally clear with visibility to 3 feet. This condition may
be due to stabilization of water flow from Tuttle Creek Dam.
All leaves off tall cottonwood and elm & sycamore trees
along edges of river. Willow mostly off and leaves remaining
a golden brown. Green willow leaves only occasionally
observed. The weeds beyond willow are red 9:48 Equisetum
well developed on S side and good beaver activity. Will keep
complete census of birds of the river channel but not of the
small birds of the riparian community but will list at end
of census with remarks. 10:00 kingfisher. 10:05 right drainage
and beaver house beyond; just beyond some bank swallow
nests. One area of white-wash from one localized part of

7-20-74
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sand bank and could be a kingfisher roost. The first kingfisher noted is still preceding us down river. They usually do so and then fly out around or across the ~~low~~ river. 10:15 male mallard left side of river. 10:18 red-tail hawk circling, temp 54°F. 10:30 beaver activity. There has been minor beaver activity all along the way. 10:33 drainage from right; kingfisher; an unusual amount of Equisetum. 10:38 creek from right that enters and east end of ridge to S. Collected a male greater scaup from edge of river on S side. It chose to swim along edge of river rather than fly. This duck 66120-1 measured 19 inches total length and weighed 730 gms. The head was rounded and had a faint greenish tinge. The white band of the secondaries extended out into the primary feathers without a break. The sand bars along this area have considerable more gravel than elsewhere and may be due to adjacent hillside of limestone. There is also more green scum on bottom of river than I have noticed in previous years which could be due to late seasonal warm temperatures and stabilized waters from Tuttle Creek. 10:45 Creek from N and newly eroded banks. 10:55 3 crows; 11:00 2 redtail hawks. 11:13 selected the channel to left. Considerable beaver activity in young willows. Trails muddy from last night. 11:15 marsh hawk 11:20 drainage from N. 11:30 at bend and now to S. 11:35 group of 28 mergansers, 10 of which were definitely male American mergansers. These 10 remained partially isolated from the other mergansers which were noticeably smaller and consisted of 18 female red-breasted mergansers. I am not positive about the 18 but they could be the ♀♀'s of the American, although there is not the size difference between the ♂ + ♀ American as evidenced here. These mergansers were extremely alert and nervous and reacted while we were 2/10 miles away. At about 1/10 mile they all left in one group and flew down river alighting 3/10 miles beyond. Their calls were typical and called while on water. 2 kingfishers flew across river. 11:45 bend of river (E of Bruner) and stopped for lunch on E side. Bone in sands highly polished & blackish-brown. Left 12:33. At 12:44 the 28 mergansers (noted first at 11:35) left river again & flew downstream. They flew only 2 feet above the water and again were very nervous and left some 2/10 miles down river

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CANOE ROUTE
 LECOMPTON TO LAWRENCE
 NOV 20, 1966

beyond. 12:46 red tail hawk. most redtail were noted in air and circling a particular area, frequently calling. A *Sylvilagus* ran along base of bank and then gained top. 2 Kingfishers here. 12:54 great horned owl flew down river just above surface and alighted in trees 300 feet beyond. 12:12 opposite Kansas Power and Light Co. Killdeer. 1:17 Kingfisher, good beaver activity on N side. Occasional butterfly, white, flew by. Temp 58°F. 1:38 red-tail hawk. 2:03 Turnpike bridge. At a point 50 N of the bridge noted a young beaver (approx length 2 feet) leave hole in bank under roots of trees and drop down to beach approx 2 feet below where it remained motionless for 2 minutes until we paddled back to within 8 feet of it. The canoe was now alongside bank. The beaver finally walked to edge of river and swam alongside the full length of the canoe before disappearing. When a beaver first enters the water it carries many air bubbles in its fur and gives the animal a pinkish cast. This may have some adaptive significance. 2:10 red-tail. Arrived 2:20 at Lawrence's Bridge. At the point where beaver was observed (2:03) collected a gizzard shade (Dorosoma cepedianum) from edge of the river. It measured 2 1/2 inches long (no 661120-2). A growth on its tail interfered with its movement and was picked up with paddle.



This growth is apparently a fungus and is parasitizing this species of fish. An examination under the microscope (slide no 661120-2) showed a mass of strands which were long and flat and presented the following diagnostic characteristics. Other

SAPROLEGNIA FERAX
(sp.?)

gizzard shade, of the same size as above have been noted dead in water and, along shore lines and probably represents a weakened fish (from water pollution) and, under this condition, has

7-2-81

been susceptible to the fungus. There ^{have been many} small birds along the banks in the riparian association. Included are: slate-colored juncos, common and along banks; song sparrows (approx 8) and either heard calling or feeding on wet bank; black capped chickadees, one or group per 1/2 mile; yellow-shafted flicker, 5; blue jays, groups of 2 or 3 and about 1 ^{group} per mile; Cardinals, 15; tree sparrows, few small flocks; and maybe others. These small birds were not counted or too carefully observed on this trip.

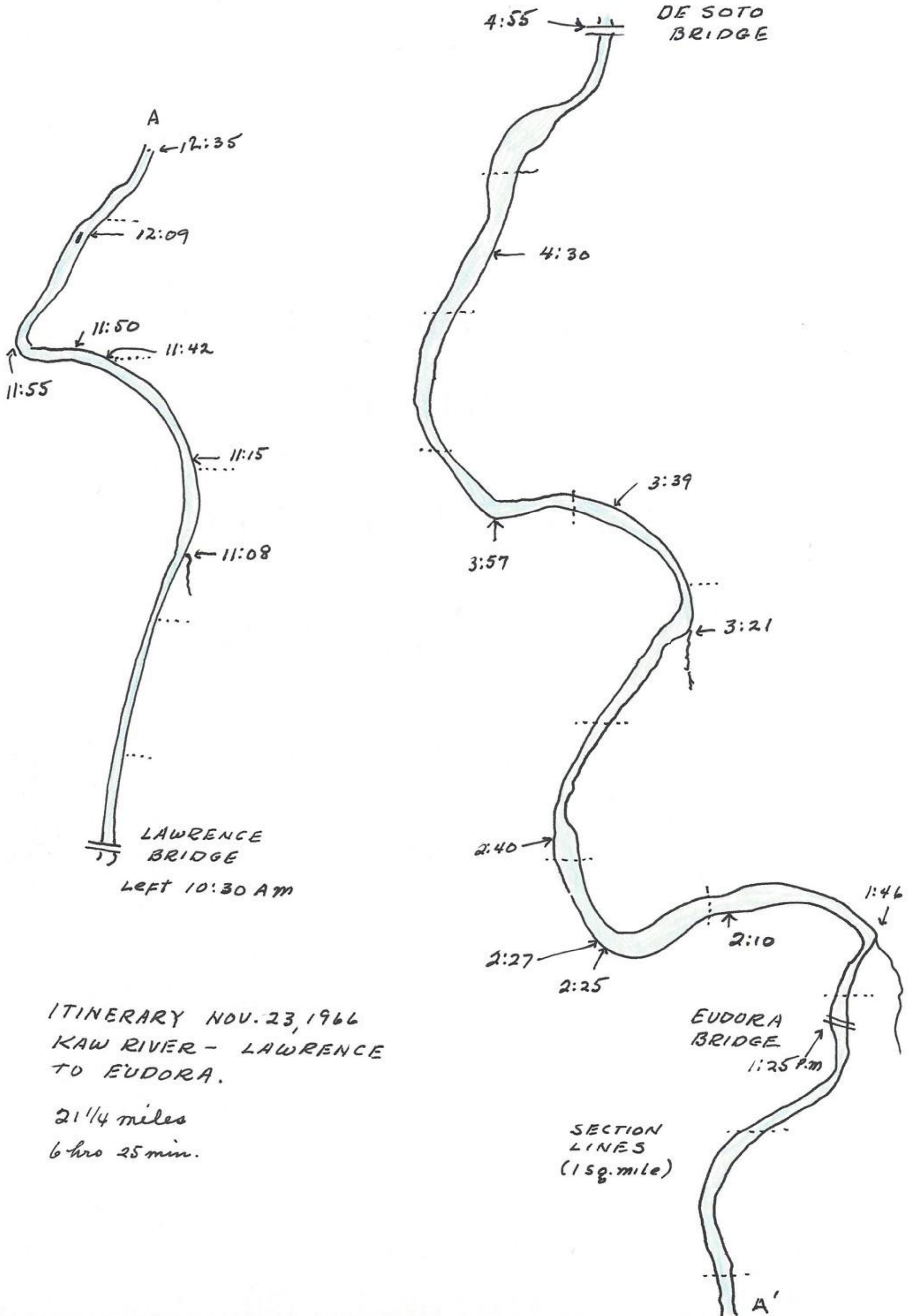
Summary of larger birds.

Crows 3-	Kingfisher 1-1-2-1
redtails 1-2-1-1-	Mallard 1
greater scup 1-	marsh hawk 1-
American mergansers 10	Sylvia 1-
red-breasted mergansers 18	great horned owl 1
Killdeer 1-	

Lawrence to De Soto, Kaw River, Douglas, Johnson, Leavenworth Counties, Kansas

Nov. 23, 1966

James Robert Bee and I made canoe trip from Lawrence to De Soto via Kaw (Kansas) River. Left 10:30 A.M. from Lawrence at bridge. Wind about 20 miles per hour and from SW. High clouds and wind-blown. Just below dam a Franklin Gull was flying and circling and then left down river. A kingfisher here. 10:40 2 kingfishers, 2 great blue herons left from bank and flew down river. 11:00 pipes crossing river and one bubbling vigorously as has been the case for years. 11:05 utility lined crossing river. 11:08 major drainage from right. 11:15 6 great blue herons left from some partly submerged trees as noted on last trip. The two heron noted earlier left first at about 1/10 mile while the other four left at about 200 feet to 150 feet on approach. A hooded merganser flew by and James shot or winged it and it hit the water but never surfaced so that we could see it although we searched the area for 10 minutes. ^{11:30 good beaver house on N side & activity on both sides.} Continued and at 11:42 passed Capsy Point. Wind blowing sands on beach to left. Approx. 300 Lapland Longspur on sands and continually flying and circling and returning to open cultivated field to S beyond river. 11:50 side channel to E, one Killdeer on beach. 11:55 mouth Mud Creek and now to S. Temp 68° and water 58°. 12:09 downstream end of island. 12:15 drainage to N, redtail (first one since Lawrence), good beaver activity. 12:30 2 white pelicans in same area as noted Nov. 12. The bird



ITINERARY NOV. 23, 1966
 KAW RIVER - LAWRENCE
 TO EUDORA.

2 1/4 miles
 6 hrs 25 min.

SECTION
 LINES
 (1 sq. mile)

1973

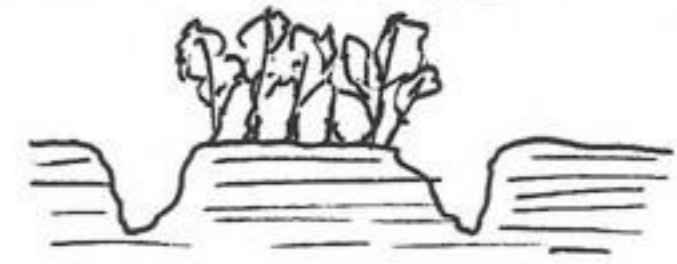
are the same two and both capable of flight although one still slightly incapacitated in flight. They remain in area as we continued on. Muskrat on bank here. 12:35 redtail. 12:45 greater yellowlegs and good swallow hole in bank. 12:47 drainage to N with island of trees.

Temp 58° water, 69° air

1:05 merganser (Am. or red-breasted)

1:10 dead carp on bank and washed up by water, approx 1 1/2 foot long.

American merganser. It measured: 580 mm total length and weighed 1200 grams. It was sitting on bank under roots of a tree in cove.



1:25 a kingfisher

Arrived Eudora bridge at here. 1:45 kingfisher.

1:46 mouth Wabaruska River having floated with wind all the way from bridge at Eudora. At the mouth of this river noted an unusual aggregation of carp, 3 or 4 observable at all times as they surfaced or dove from near the surface.

Water temp here 60°F, Air 69°F.

1:50 great horned owl left trees on edge of river and flew 200' down stream to alight in trees on same side of river. Blue jays harassed the owl continuously.

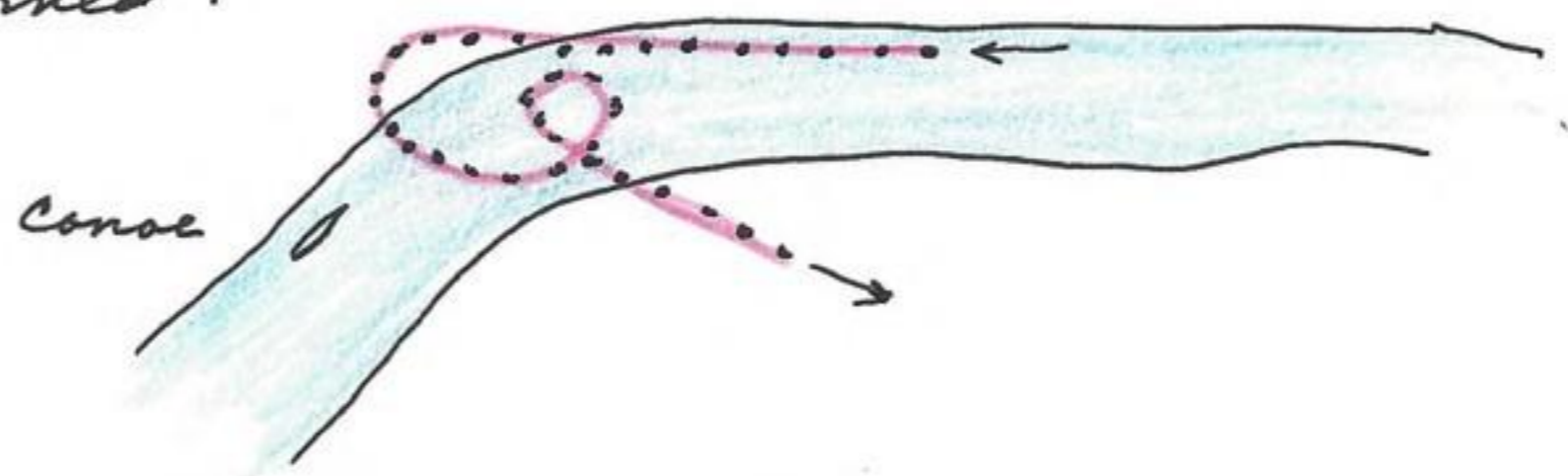


6 inches water flowing over sand bar

This is the same area where a great horned owl was noted Nov. 12. Kingfisher here. 2:10 4 great horned owls in a linear area of 300 ft. They were in same area as Nov. 12 and all flew down bank over water alighting in trees before flying & across the river. This time each flew at different times as we moved down the river and alighting in trees on opposite side of river at about 200 foot intervals. One called several times as it flew over water. *Sylvilagus* noted along bank here but no explanation as why the owls preferred this stretch of river. The trees are very small and field comes to very edge of bank.

Temp 72°F, 2:20 killdeer and lesser yellowlegs within 40 feet of each other. 2:25 an ^{large} adult bald eagle was

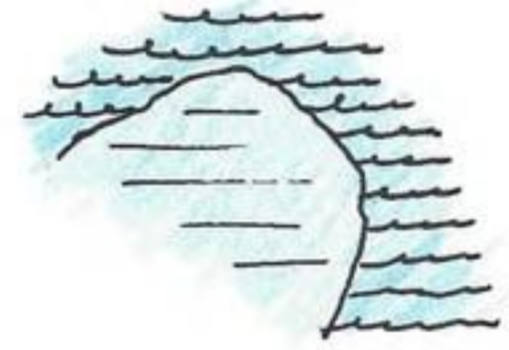
noted flying up river. It turned & circled once about 150' overhead and then flew SE beyond trees. Primaries ragged.



Water temp 60°F, air 72°F. 2:33 passing under utility line. Kingfisher, 2 large carp surfaced, jumping completely out of water. There has been an unusual amount of carp activity compared to practically no activity Nov. 12. Grad wind at our backs. 2:35 small drainage bridge for railway. 2:40 leaving RR and now to SE; redtail, good swallow cliffs. 2:44 drainage from N. 2:53 redtail hawk (rock pile in middle of river. 3:06 ten minute rest, left 3:16. 3:21 stream to right. A single redwing blackbird in shrubs at edge of river, the second one noted today. 3:23 R.R. bridge along side of river. 3:39 east bend & now to N. Wind from SW. 3:45 2 redtail hawks. 3:48 2 more red-tail hawks. all hawks circling. There is considerable character to the surface of the water. With high winds the waves are present over deep water but end where shallow water crosses sand bars, although with out wind the water appears to be the same. Under windless conditions the edge of submerged sand bars are identified by a surface line of disturbed surface with agitated waters beyond. 3:48 2 crows near redtails. 3:53 Mouth creek. 3:57 Contact with RR slope at bend of river. 2 kingfishers. Temp 67°F, water 60°F. The water temp is unusually high for this time of year. 4:05 redtail hawk and kingfisher. Live hornet flew by, white cabbage butterfly in water. Sun now obscured by overcast clouds moving in from W. Wind almost simultaneously decreased. At 4:15 air temp 64°F. 4:23 a kingfisher caught a fish 1 foot from bank. 4:30 Sun-flower Ordance intake gates. 2 sparrow hawks concerned with eaves of the building. 4:36 good beaver house on bank on N side river. Redtail hawk circling. 4:52 Kingfisher. Arrived De Soto 4:55. Kingfisher at bridge. Temp 68°F and water still 60°F even though sun behind clouds. The usual birds noted in riparian growth including Harris sparrows, slate-colored juncos, song sparrows, cardinals, blue jays, gold-finches, Eng sparrows, yellow throated flickers, black capped chickadees, tree sparrows. Remained at bridge until late twilight 6:00 PM and did not see any activity on water below. D.H. Owl called E of bridge at 5:45 P.M. Summary of large birds:

American merganser 1-1
 Kingfisher 1-2-1-1-1-2-1-1-1
 Sparrow hawk 2
 red-tail hawk 1-1-1-1-2-2-1-1
 crows . 2

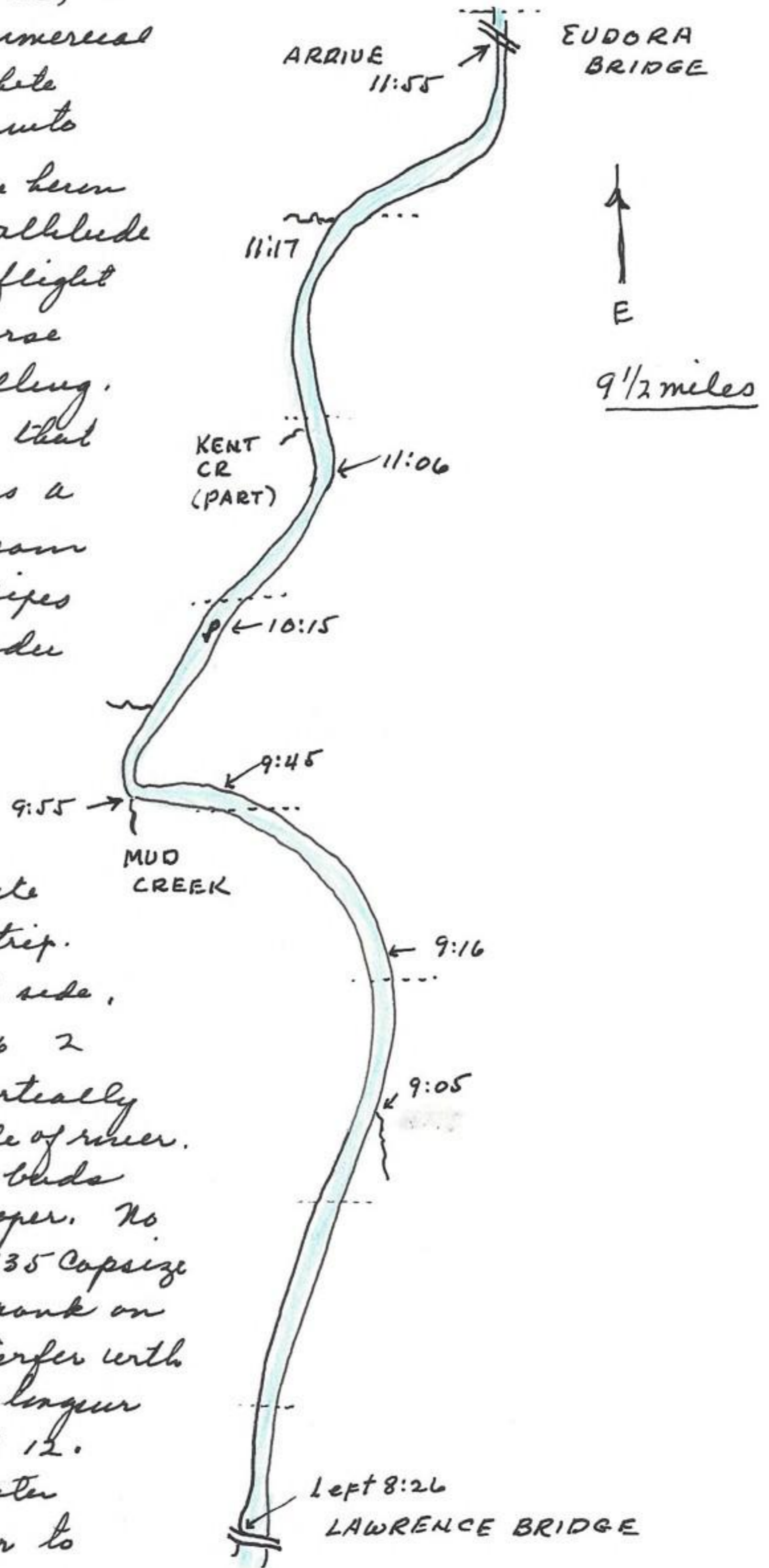
pelicans 2
 great horned owl 1-4
 great blue heron 2-4
 hooded merganser 1-
 Franklin gull 1
 killdeer 1-1
 lesser yellowlegs 1
 bald eagle 1
 greater yellowlegs 1




661126-245
Kaw River, Lawrence to Eudora, Douglas & Leavenworth Cos.,
Kansas

Nov. 26, 1966

Mary and I made canoe trip down Kaw River from Lawrence to Eudora leaving Lawrence Bridge at 8:26 A.M. Overcast, no wind temp of air 51°F and water also 51°F. One killdeer just below dam. Good beaver activity all along n side river. 8:30 Kingfisher. 8:38 under first utility line, 2 crows. 8:48 passing commercial drainage on left with white water being discharged into river. 8:55 2 great blue heron flying S across river at altitude of approx 200 feet, their flight not associated with course of river. 1 killdeer calling. 9:00 over bubbling pipes that cross river. The ³ pipes a hundred feet or so upstream have piling to maintain pipes in alignment. 9:03 under high voltage power lines. 9:05 main drainage from right and at an abrupt angle to ^{main} stream. 9:16 log jam of trees and site of injured log of previous strip. 9:20 beaver house on south side, killdeer on sandbar. 9:26 2 meadowlarks resting on partially submerged tree in middle of river. It is unusual to see these birds associated with the river proper. No longspurs on sands to n. 9:35 Capsize Point, 3 crows, weeds grow rank on steep slope of bank and interfere with swallow holes. 9:40 first longspur on open sand but only about 12. 9:45 channel to right. no water flowing thru. Crossed river to n side. 9:56 12 large (6" diameter and large) tree recently downed by beaver. Good house associated.



661126-246

It would appear that beaver are just starting house construction for winter with new branches on old house or new ones just starting. 2 kingfishers. 9:55 mouth Mud Creek and good beaver house just a few yards to left of its entrance. 10:15 end of high mass of island. Good beaver house across river to NE. 2 kingfishers. 3 crows calling to SW and probably harassing a g. horned owl. 10:16 drainage to right which includes short cut channel.  Temp up to 55°F. 10:28 major drainage to left. 3 American mergansers about 2/10 miles down stream including 2 males and 1 female. Even at this distance they were weary and started to swim down stream. 10:58 now at bend of river. The mergansers had moved down to this point and left down river as we approached to within approx 300 ft. No pelican this trip although they were observed here on two previous trips. 11:00 2 kingfishers. 11:06 drainage from N. 11:17 double drainage with trees between. Temp 60°F overcast and some low stratus umbellike clouds. Slight wind. 11:25 kingfisher. 11:27 small flock longspurs on sands to SW. 11:30 the 3 mergansers left water 400' ahead of us, flew down river, circled and then returned up river past us. 11:31 3 meadowlarks at sandbar and bathing in water. 11:42 3 large Kanapipiens, one of which left rocks. Kingfisher. Dead carp noted on last trip not on sands at edge of water as noted previously. None noted appear 12 dead gizzard shad in water since Lawrence. Some minnow action at edge of river at places, jumping out of water. No large carp activity today. Kingfisher here. Arrive Eudora bridge at 11:55 having covered 9 1/2 miles in a leisure 3 hrs and 21 minutes or approx.

Summary of large birds:

red-tail hawks no hawks!

great blue herons 2-

kingfisher 1-1-2-2-2-1-1-1-

crow 2-3-3-

American mergansers 3

killedeer 1-

Kaw River, Douglas Co., Kansas

Checked Kaw River at first N bend beyond Eudora. High winds on river from NW and white caps on all exposed waters. Turbulence particularly great where waters + currents were greatest and on long stretches exposed to NW winds. Sand as clouds on sand bars.



661127-247

This would be a day that ducks ^{would be moving but} did not see a single duck during the 2 hours of observation. There is now a road on right-of-way by railroad that follows at edge of river from the De Soto road N of the bridge to the Eudora road N of the Eudora bridge. This accessibility to river may influence bird populations along this part of river. At sundown the wind subsided abruptly. At about the same time the moon appeared. It was measured and appeared to be three times the diameter of the moon at higher angles $\bigcirc\bigcirc$ but when remeasured at a high angle it was the same. A more careful measurement will be made at a later time to determine if the large size at low angles is an optical illusion.

Lawrence, Douglas Co., Kansas
Nov 29, 1966

Marvin Broach reported a magpie near Concordia, Kansas. The local game protectorate informed him that the magpies have always been in the blue hills (at least last 6 years) and since last year have moved across the intervening flat area to the blue hills to the east.

Dec. 1, 1966
First night of sub-freezing temperatures (24°F).

Kansas River, Lawrence to Eudora, Douglas & Leavenworth Cos., Kansas

Dec 3, 1966

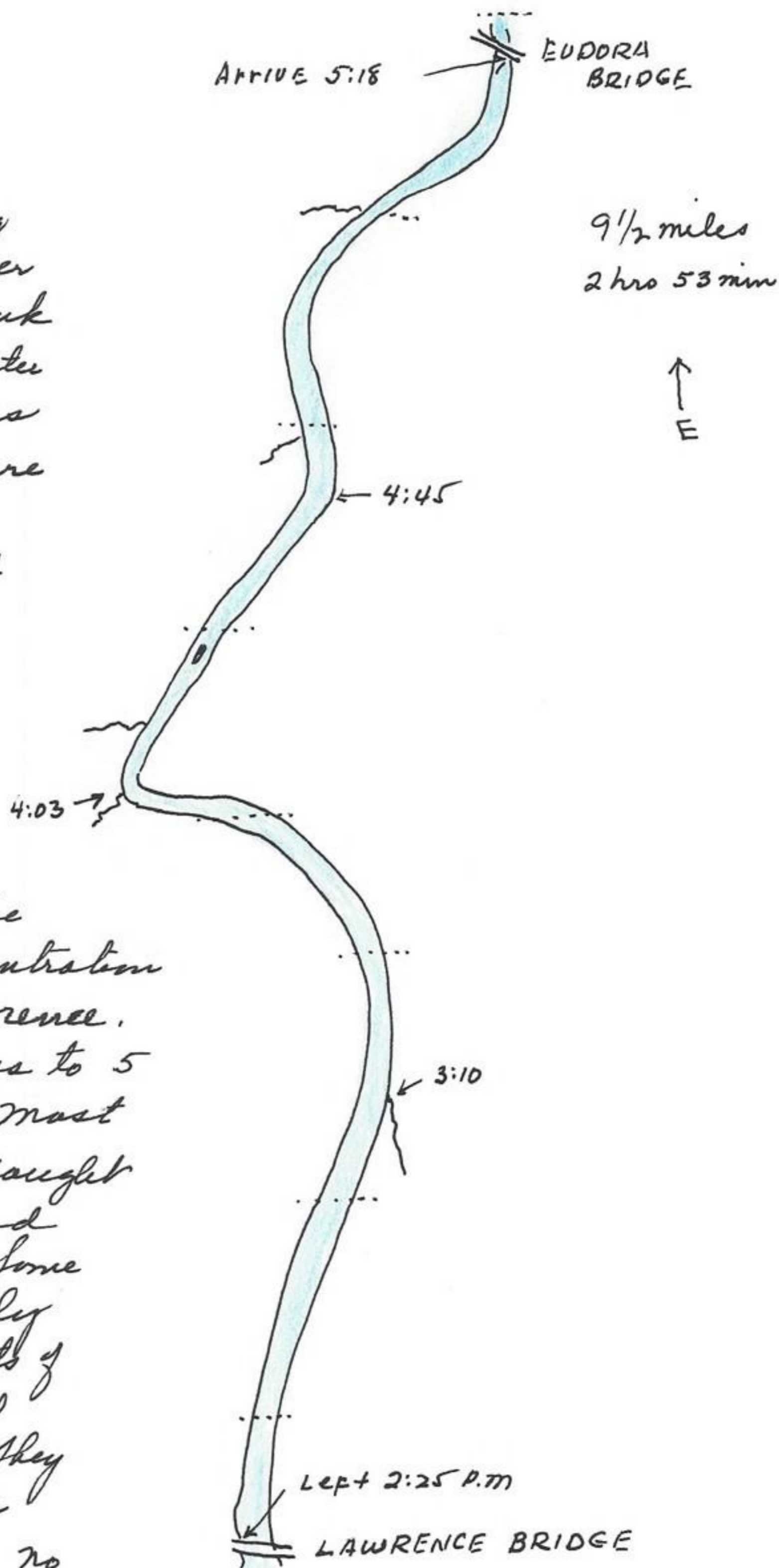
Son James Robert and I made canoe trip from bridge at Lawrence to bridge at Eudora, starting at 2:25 P.M. Day with high clouds, wind from E, waves up to white caps on long straight stretches, especially out of Lawrence. Temp of air 31°F , water 34°F . Ice masses to 4 sq yards in protected areas and moving along edges. Ice 8 inches above present water level on shore. Ice on twigs, branches at water level. Keel deer 2:48. Water about foot lower than last trip, exposing islands & sandbars but not as low as usual without Tuttle Creek Control. 3:01 large pipes that go under river. One scaup left bank and flew directly across river and up over trees. ^{yellow shafted flicker on sand island} 3:07 high vantage line crosses river. 3:10 major drainage from right. Great horned owl and red tail hawk. The hawk flew with labored wing beat. 3:15 kingfisher 2 scaup ducks, Herring gull (sp.?), great horned owl. The gull was flying up river. ^{longspur 8 only on sand bar} 3:48 Caprice Point. 3:52 mallard flying up river (high). 4:03 opposite Mud Creek entrance. 4:17 kingfisher

A ♀ lesser scaup duck was found floating in water. It measured: 400 mm total length, 750 gms weight. Good separation of white of secondaries + primaries, head faintly purplish. Left foot had been eroded. Otherwise in good condition as far as flesh was concerned. 4:38 great blue heron left edge of river and flew E up over trees. 4:45 head of river and now turning NE. Sundown about

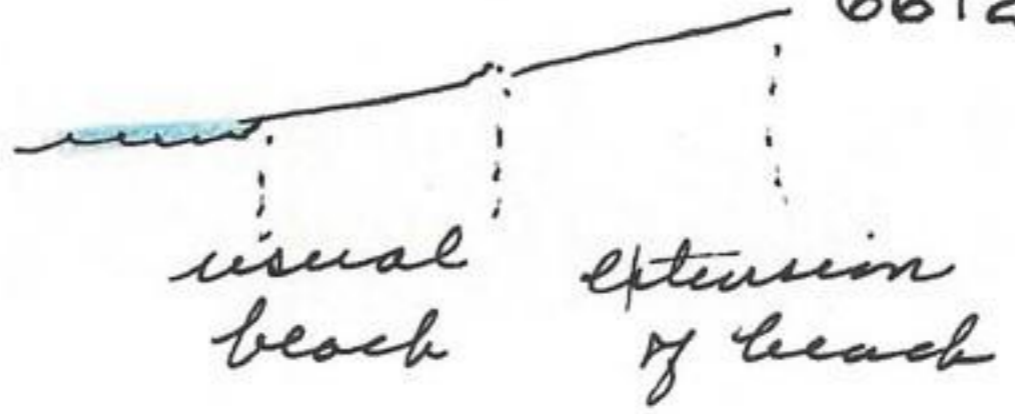
4:55 P.M. Solid cloud bank low on horizon to W. Kingfisher.

Have noted several groups of juncos among root systems of the larger trees overhanging the bank of the river. Two winter wrens left beaver holes and may have been there for roosting. There are fewer juncos and definitely fewer other kinds of birds along the edge of the river. The census of large birds is complete.

The gizzard stone is found all along the route with greater concentration of dead ones nearer Lawrence. They range from 1 1/2 inches to 5 inches in total length. Most of them are in water or caught on branches in water and seldom on the bank. Some have their tails completely consumed, some with parts of head missing. I would estimate one ^{dead} per 15 feet. They are more numerous than on any previous trip. No carp action noted today. The high wave action of last Sunday has eroded the banks by

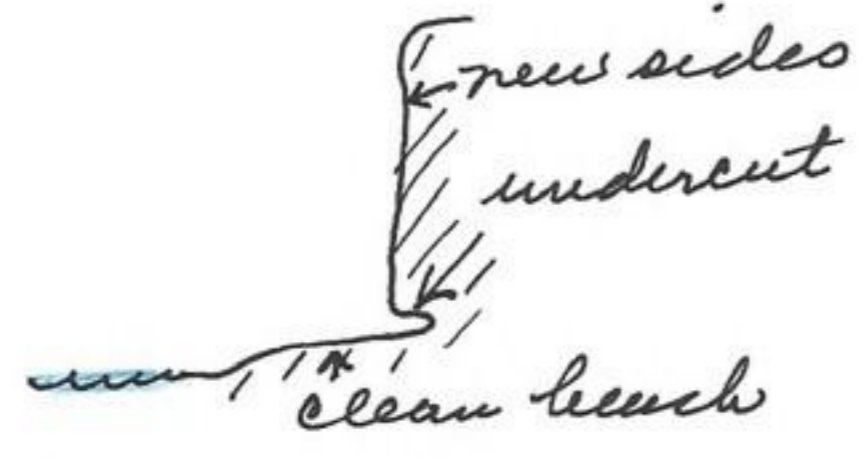


broadening the beaches.
are whiter and
more uniformity
new. The steep
slopes have been undercut and upper parts have been
~~sloughing~~
sloughed off to make new exposure of cliffs and new debris
on the beaches.



The sands

In many places the roots of trees
are holding soil masses that



are precariously perched. One should use caution when
approaching the edge of any river bank along the Kaw, as
we approached Eudora, there seemed to be more ice on
the shore which is a condition that has been present on
other winter trips of previous years. at 5:15 noted a
black crown night heron. It arrived at S side of river &
alighted on shore, and as we approached it left and flew
across the river and alighted on N shore. This is some
23 days or so later than the records for this area. Arrived
Eudora bridge 5:18

Summary of large birds:

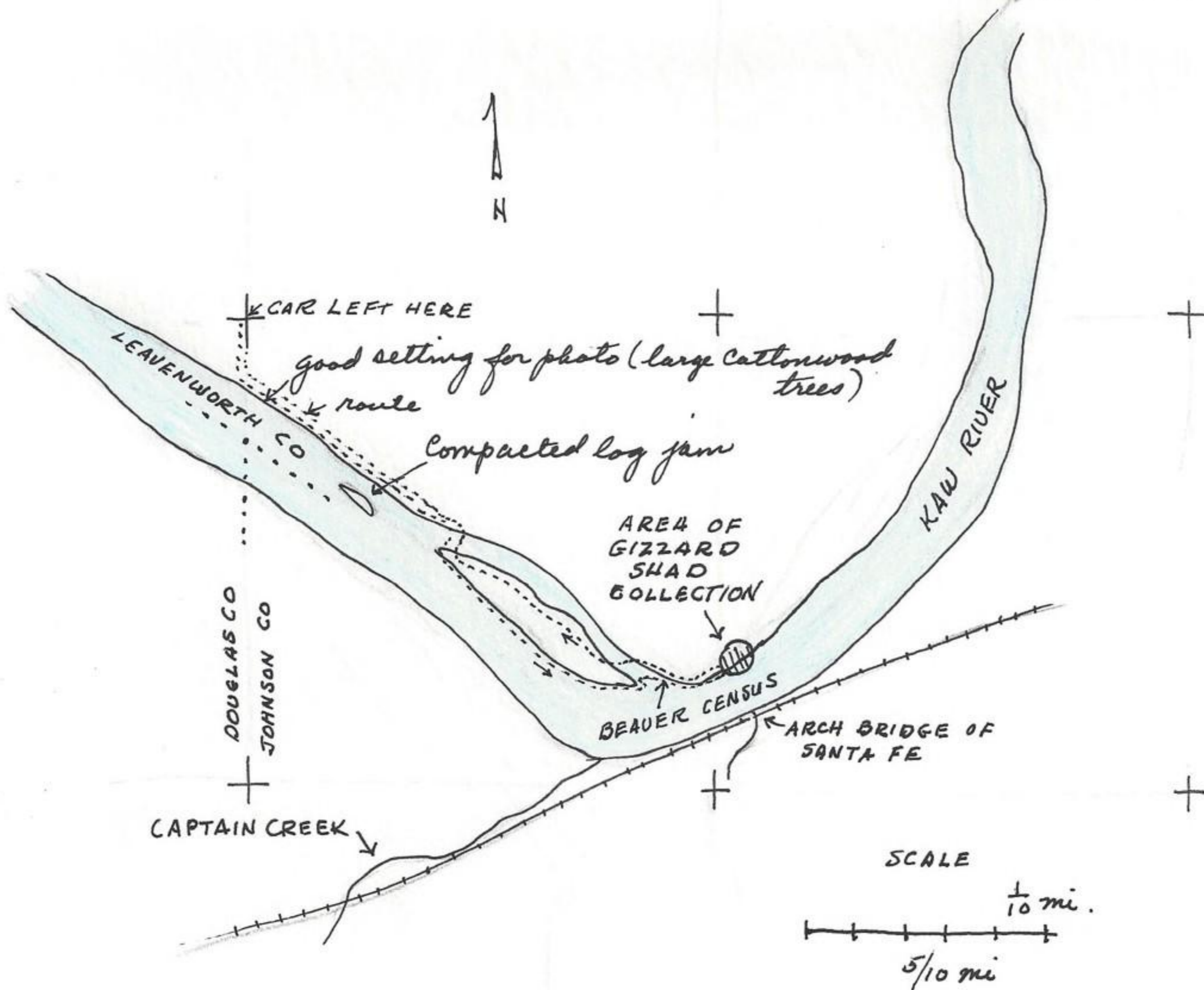
- | | |
|-----------------------|----------------------------|
| redtail hawk 1 | lesser scaups (sp.?) 1-2-1 |
| Kingfisher 1-1-1 | great blue heron 1 |
| killdeer 1 | mallard 1 |
| Herring gull (sp.?) 1 | great horned owl 1-1- |
| | black crown night heron 1 |

There has been more debris pushed over the bank of the river
this year than in the last 10 years, especially E of Lawrence to
first major bend (mud creek bend). This condition should be
brought to the attention of local County officials.

Kaw River,
1/4 mi N + 1/20 mi E of the SW corner of sec. 25, R 21 E, T 12 S,
Leavenworth Co., Kansas

Dec. 4, 1966

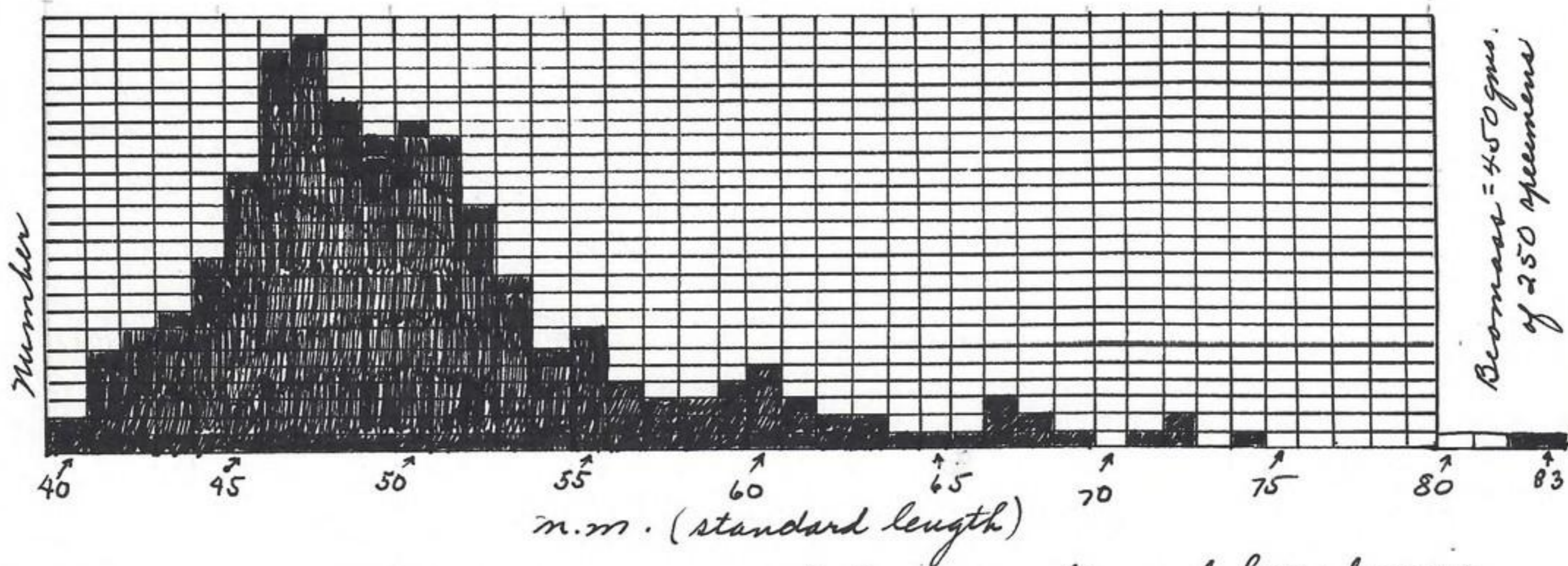
Between 10:00 A.M + 2:00 P.M made trip along river E of Eudora
to check beaver activity and make a collection of gizzard
shad (recently killed by pollution?) to check the



the age class of these fish and to determine the cause of death. These fish are all along the Kaw River in about the same per cent frequency wherever conditions are favorable for accumulation on shallow ripples or edge of newly exposed sand bars. All fish were collected in 200 feet of edge of river. These will be measured and growth class determined. At a point marked beaver census counted number of small willow trees cut & hauled to water. The linear measurement is 200 feet of river bank. Although considerable timber removed (smallest $\frac{1}{4}$ inches & largest 4 inches, average $1\frac{1}{2}$ inches) there was only a fraction of this material in water adjacent cut willows. 11 trails led to the willows in the 200 feet and numbers of willows cut per trail system are: 12-28-15-62-98-52-63-47-8-33-54. The trails up slope had been cut into bank of sand and looked like so *TRAIL*. The upper projection would seem to me to be a barrier for transporting the young trees to the water. With few exceptions, all cut sur-

661204-251

aces of the stumps faced the river. Day with fine mist, about 36°F and practically no wind. Other observations are: Ice in protected places as thick as 2 inches. One killdeer in area. 26 Lapland Longspurs on sands of which there is a good exposure on W side of island. Numerous muskrat tracks and trails ^{and ran along slope of bank, deflecting of the numerous branches as if not used to these conditions}. A single Cottontail noted, but several tracks on sands. 5 sets of deer tracks in area below main bank and travelling consistently up river. Other birds noted along river are 18 cardinals in one group, 15 slate-colored juncos, 2 song sparrows, 8 goldfinches, 2 blue jays, 2 fox squirrels and although 4 hrs. in field did not see a duck. On return followed R.R. grade ^(beautiful native grasses and crops with cliffs) to the Eudora road, thence to bridge + lower road to Lawrence. measurements of the gizzard shad (Dorosoma cepedianum), representing all shad in 200 feet of river edge where the dead fish had lodged on shallow submerged sandbars or caught in slow back current pools:



These gizzard shad were examined for parasites and Saprolegnia but neither was found. Five fragments (not included in above) showed degeneration of flesh as if eaten by other fish or aquatic organisms. There was no evidence of Saprolegnia. There did appear to be general organ disintegration which could be caused by post-mortem changes. Associated with the shad were 19 NOTROPIS STRAMINEUS and 22 [?] young of some species. Photo 661204-1 of the gizzard shad examined above. Photo 661204-2 closeup of gizzard shad as representative example.

Univ. Kansas, Lawrence, Douglas Co., Kansas
Dec. 4, 1966

Noted 15 red Crossbills on Cornhus (1 group). Crossbills have not been seen since Nov 1, 1966.

Lawrence, Douglas Co., Kansas

Dec. 9, 1966

Made the following water collections (1 liter each) on the Kaw River n + n E of Lawrence; (12:00 noon)

661209-1 Kaw River, 900' and 500' S Lawrence (old P.O.), Douglas Co., Kansas. From Lawrence Creamery Plant. Temp at end of pipe 101°F. Approx 1 gal per 3 sec. Considerable detergent foam? and odor. Water sample from pipe.

661209-2 Kaw River, 900' n and 500' E Lawrence (old P.O.), Douglas Co., Kansas. From Lawrence Paper Co. and directly from plant. Temp at end of pipe 64°F. Water sample from pipe

661209-3 Kaw River, 500' n + 1100' E Lawrence (old P.O.), Douglas Co., Kansas. From settling basin pipe. Temp there 59°F. Flow approx 1 gal per sec. Banks ^{along river} coated with a tarlike material.

661209-4 Kaw River, 50' n and 1900' E Lawrence (old P.O.), Douglas Co., Kansas. From mouth of a major, deeply eroded creek and probably from Lawrence Cement Co on S side of river. Considerable ^{yellow} sediment in creek. Flow 1 gal in 5 sec. Temp. 45°F

661209-5 Kaw River, 3/20 mi. S + 1 1/10 mi. E Lawrence (old P.O.), Douglas Co., Kansas. Edge of river at old inactivated junk yard. River temp 43°F.

661209-6 Kaw River, ^{n side} 100 feet up stream from following number. Temp 43°F

661209-7 ~~at~~ Kaw River, 9th Street E, North Lawrence or 1 1/10 mi. E Lawrence (old P.O.), Douglas Co., Kansas. From Chemical Plant, ^(Food Machinery Corp) to W. Flow about 3 gal per second. Yellow sediment 150' down river. Temp. 43°F. Some oils above entrance.



at 2:00 P.M. subjected seven common goldfish (averaging 45 ± 3 mm standard length and 2.5 gms weight), one each to the samples of river pollution (1 liter) at 58°F . Results are:

- Sample 661209-1 (ph 6, $\frac{1}{10}$ sediment but kept in circulation). When fish was placed in water, it immediately reacted by darting up and ~~go~~ down in the jar. At 2:13 it remained on top; at 2:20 on its side and at 2:40 was dead. A second fish was placed in jar and in 45 minutes was dead, having reacted the same as above.
- Sample 661209-2 (ph 8, dark brownish-black tarlike sediment completely covering bottom of jar) at 3:00 the fish occupied top of water in normal horizontal position. At 4:00 was at 45° with mouth at near surface. In final stages was almost perpendicular to surface. This water caused fish to position themselves at surface and then remain so in an emaciated state until death which in this case was 18 hours later.
- Sample 661209-3 (ph 7, sediment as above). Fish followed same reaction as above and died 24 hrs after being placed in water.
- Sample 661209-4 (ph 7, white sediment covered about $\frac{1}{2}$ bottom of jar. Fish ranged up & down but at 2:45 mainly at top. As of 72 hrs fish still living.
- Sample 661209-5 (ph 7, sediment $\frac{1}{10}$ of area of bottom of jar) Fish reacted normally but more erratic than ^{the} following. As of 72 hrs, normal.
- Sample 661209-6 (ph 7, no sediment and clearest water to be seen. Fish reactions normal and ranged thruout jar but mainly on bottom. As of 72 hrs normal.
- Sample 661209-7 (ph 7, ~~$\frac{1}{10}$~~ $\frac{1}{16}$ sediment and kept in circulation during first 2 hrs) Swimming erratic at first and would sink to bottom where it remained most of the time. Fish died 52 hours after later. This water must be mainly sediment without damaging chemicals.

Of the fish still living at 72 hours (nos 4, 5, 6) placed in a refrigerator for stress and 24 hours later, no 6 was the only one living. It would appear that there is some effect of water pollution on fish in The Kaw River and that the N side of the river is relatively free of pollution. At the first bend to NE, these waters are mixed. A powerful dye could be used to determine the mixing of polluted waters of Lawrence

with the relatively clean waters of n side of river. I have noticed that when strong winds blow from the NE, the discharge of pollution or normal waters always flow upstream so samples taken above entrances of pollution will not be reliable, especially as oils or tars are concerned as they line the stream and remain when winds subside and change direction.

Photos: 661209-8 Samples nos 1-6-7-3 (left to right)
661209-9 " " 1 to 7
661209-10 " " 1-7-2-6
661209-11 " " 1-7-2-6

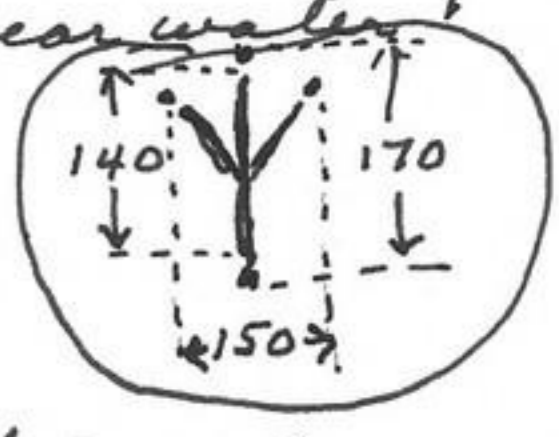
Patterson Lake, Univ. of Kansas, Lawrence, Douglas Co., Kansas
Dec. 11, 1966

Patterson lake frozen over for first time and ice 24 mm thick. Only open area about 10' SW bridge and about 10' in diameter. Domestic & mallard frozen to ice by breast feathers. Feet & wings free. 4 white geese & 1 mallard (domestic) walking and resting on ice.

Kansas River, Douglas Co., Lawrence, Kansas
Dec 14, 1966

Took several color photos of areas of water pollution at Lawrence, as follows:

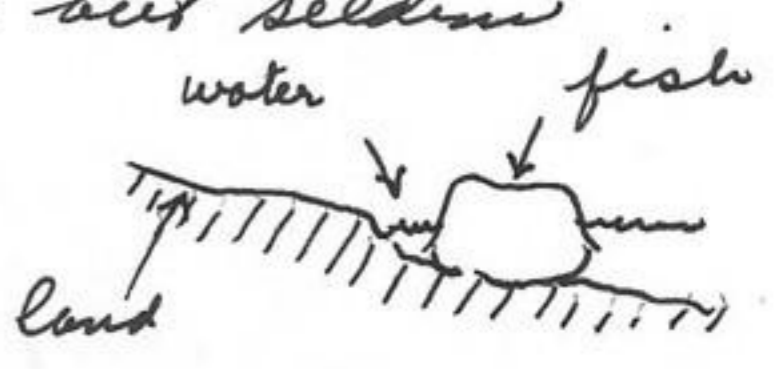
- 661214-1 at outlet of food-machinery Company (see water collection site 661209-7), showing accumulation of yellow sediment at edge of river. A great blue heron and a killdeer left the immediate area upon my arrival. Their tracks are recorded in photo. Two Kingfisher in area, no ducks.
- 661214-2 close-up of track of great blue heron and killdeer tracks.
- 661214-3 close-up of accumulation showing thickness at edge. This sediment is at least 1 1/2 feet thick ^(or more) in channel and would always be a source of contamination if presently covered and then uncovered at a subsequent date.
- 661214-4 contact between contaminated water and clear water of river.
- 661214-5 general view of entrance of canal into river
- 661214-5a " " " " " "
- 661214-6 general view of river to NE.
- 661214-7 from above looking down at outlet and canal leading into river.
- 661214-8 from outlet of water falling to pool. The concentration of sediment would vary from almost saturated to almost clear water from pipe. The agitating of water below kept sediment



in execution.

- Photo 661214-9 of contamination from Lawrence Paper Co. showing sediment basin for tarlike material. There are two of these basins.
- Photo 661214-10 of outlet pipe from sediment basin (see 661209-3 for area)
- Photo 661214-11 outlet falls from associated processing of material from the plant.
- Photo 661214-12 ^{as above and} at convergence with the Kansas River.
- Photo 661214-13 " " " " " " " "
- Photo 661214-14 Lawrence Creamery Co outlet showing surface condition of water before between the outlet and the Kaw River of greaselike material (see 661209-1 for area).
- Photo 661214-15 as above of surface water contamination.
- Photo 661214-16 " " " " " " " "
- Photo 661214-17 ^{as above and} general view ^{of surface of canal.} ~~up bank with drainage~~ Canal in foreground.
- Photo 661214-18 ^{as above and} general view of contaminating water entering the Kaw River. Ice on river and contaminating water flowing under ice. White water moved up & down channel by fluctuating water level under ice. Reason could not be determined.
- Photo 661214-19 drainage canal about 100' up river from Creamery outlet showing ^{low} river beyond where city takes water for culinary purposes.
- Photo 661214-19a ice at edge of snow at Creamery outlet
- Photo 661214-20 water condition with green algae from outlet about 100 down stream from Creamery outlet. source unknown and comes from springlike area.
- Photo 661214-21 from N side Kaw just below Lawrence bridge showing river, and commercial compounds on E side of river where there is considerable general river contamination.
- Photo 661214-22 same as above.

At a point along river N of ^{Rennet Ready mix -} Cement Co., noted 21 small gizzard shad ^(average 45 mm) in a pile which were on a log in river. These fish could have been placed there by either the muskrat or raccoon, the latter had left tracks on beach. These fish had been partly eaten at head and tail region but seldom more than 1/5 the area of the entire fish. Under the circumstances would say that the shad had been eaten by raccoon.

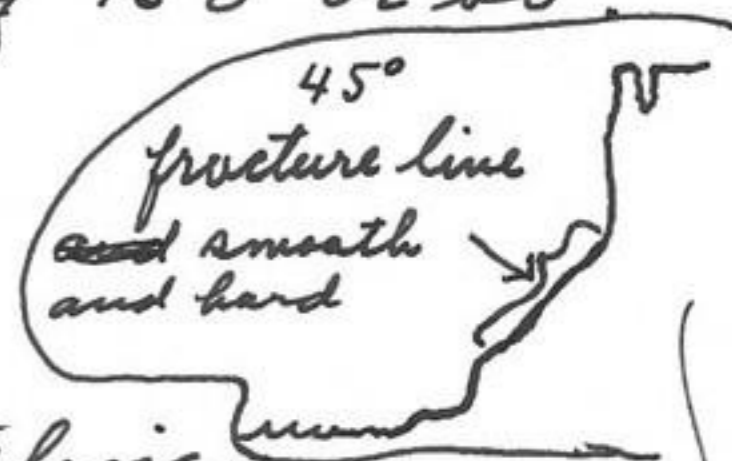


3/10 mi. W of SE corner Sec 22, R 21 E, T 12 S, Leavenworth Co., Kansas. Kaw River.

Dec. 16, 1966

At approximately the locality above, plus or minus the amount of erosion since the map of 1951, are located three anticlines and 1 syncline (approx meter high) on E exposure of eroded river banks. (see Nov. 12 notes). These structures are in a linear distance of 150' or so. made the following photographs.

- Photo 661216-1 of anticline.
- Photo 661216-2 of ^a second anticline
- Photo 661216-3 of syncline
- Photo 661216-4 close up of S limb of anticline
- Photo 661216-5 from top with grass foreground looking SE down river.
- Photo 661216-6 To west three weed stacks.



Because the cliffs are high, precipitous and insecure, the cultivated fields end at approx 8-10 feet from edge. This leaves an unaffected area of weeds. There is a well developed animal community here of large & small trails as well as large and small holes. There is a definite reaction between the mammals & cliffs, especially where fracture systems parallel cliff approx 1 foot inland. Along edge of river are about 10 sets of raccoon tracks and some fox tracks. This area below cliffs is inaccessible to large mammals except along river. I found only 1 place that I could gain bottom or base of cliffs and that precariously down drainage channel. Water clear.

At a point approx 1/2 mi. W and 3/20 mi. S of NE corner of sec 28, T 12 S, R 21 E, ^{Leavenworth Co. small} at bridge of R.R. (NW corner of bend) photographed no. 661216-7 of Kaw River showing eroded septum. This area on last trip was water from bank to bank because of the release of water from Tuttle Creek. This area ^{of river} is almost spanned by sand bars at low water level.

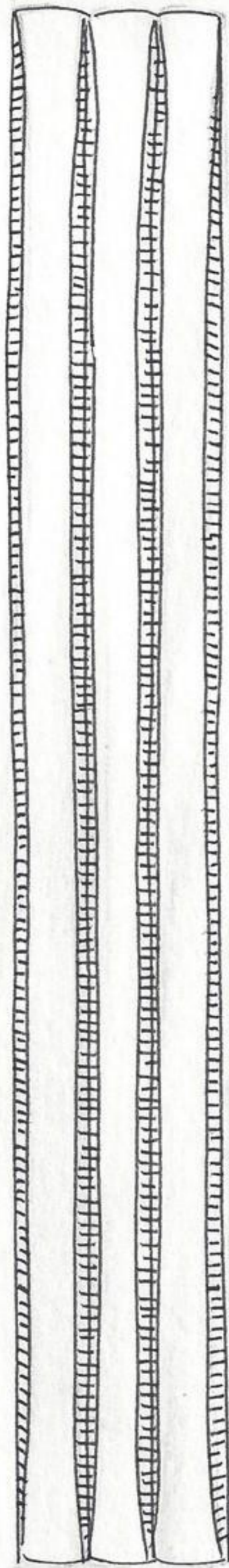
At the Eudora bridge made one photograph of Kaw River to E no. 661216-8 and one . 661216-9 to W showing gravel streaks off shore.

slide 661217-1 area of striae on pebbles

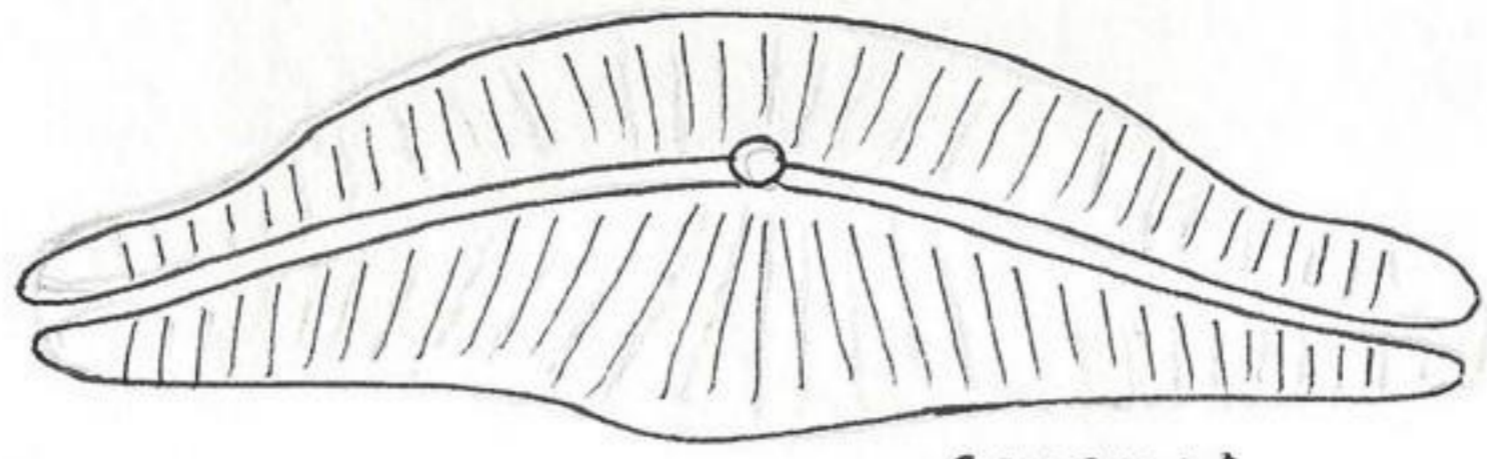
slide 661217-1a general collection in all types of water.

slide 661217-2a slide of scraping from gills of shad

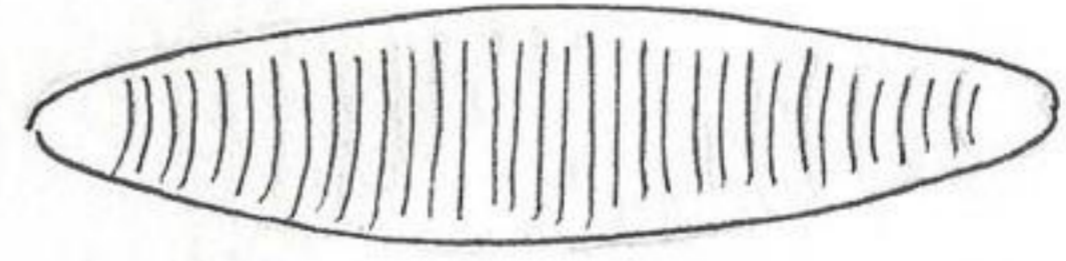
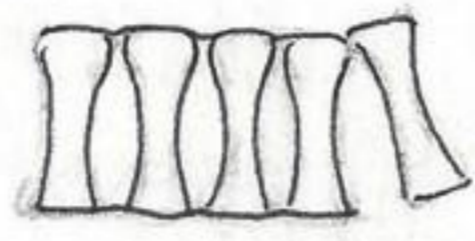
slide 661217-2b slide of skin of shad



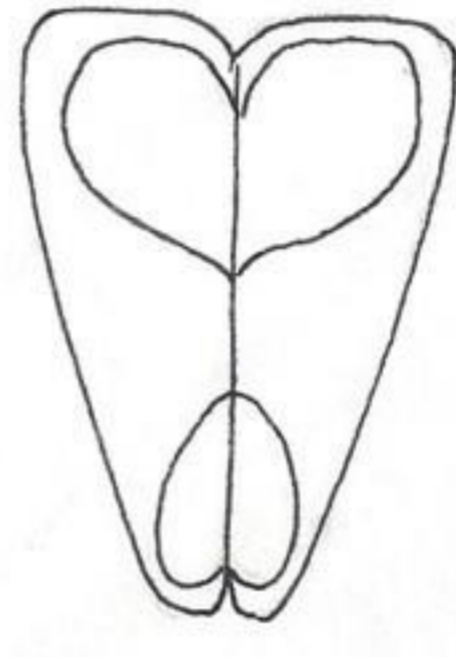
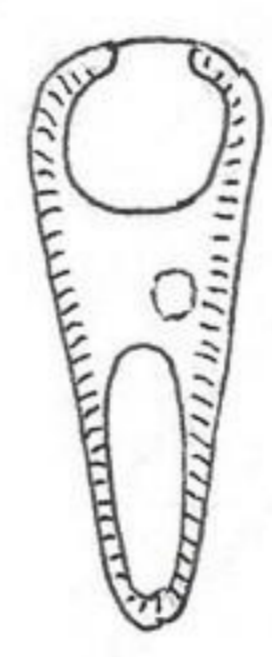
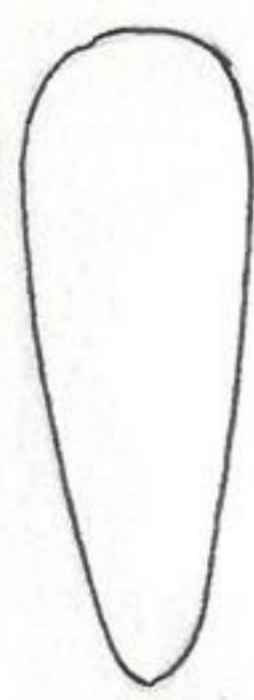
NITZSCHIA



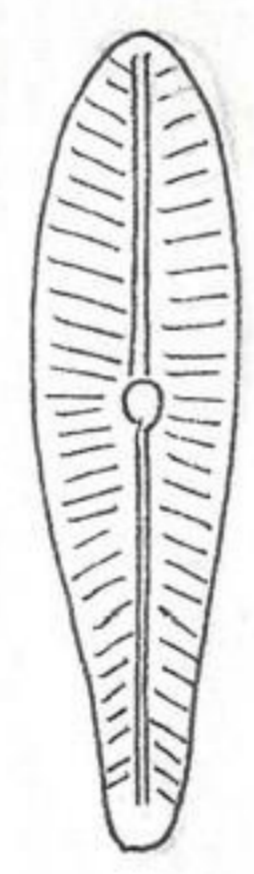
CYMBELLA



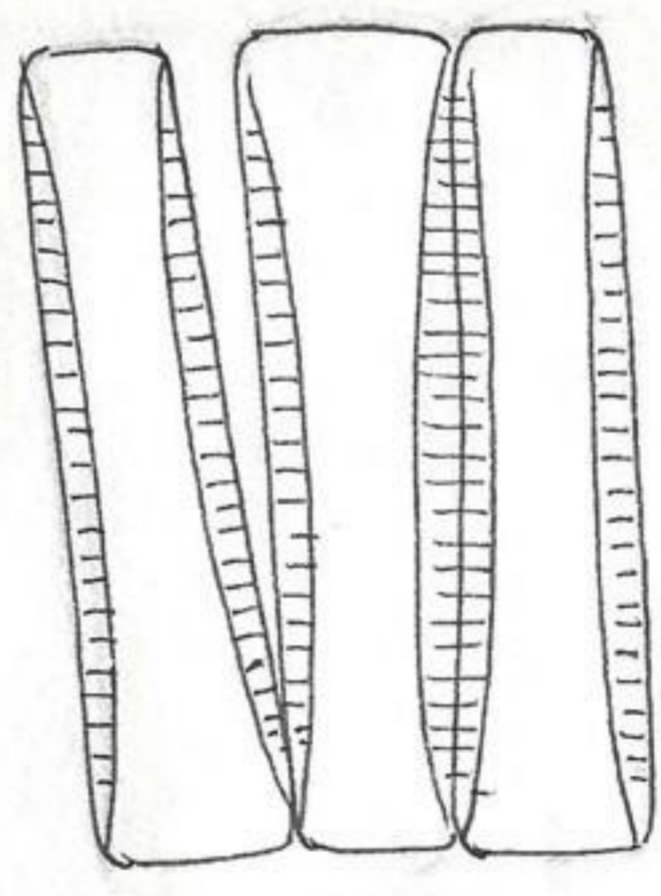
DIATOMA



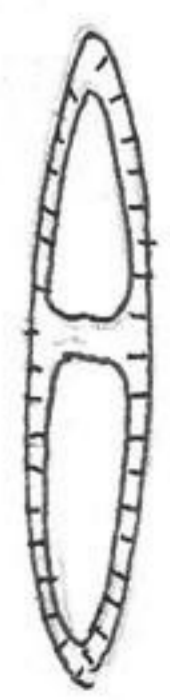
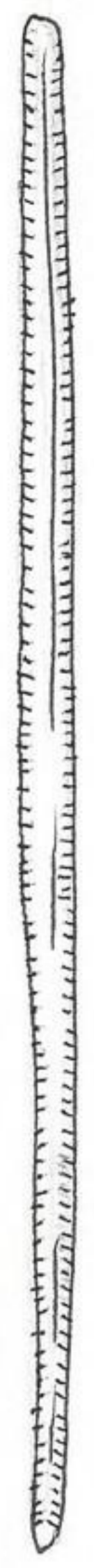
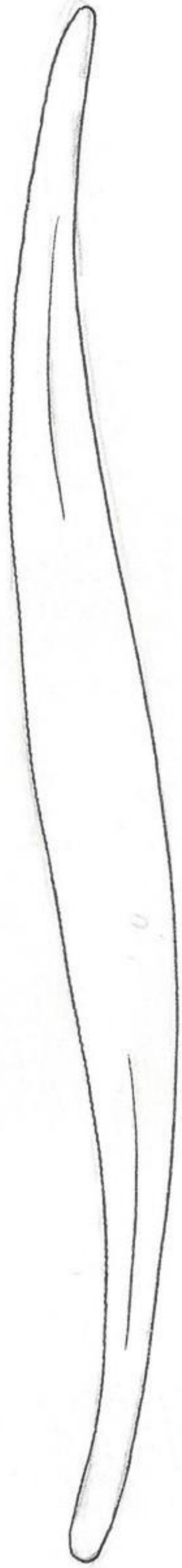
SURIELLA



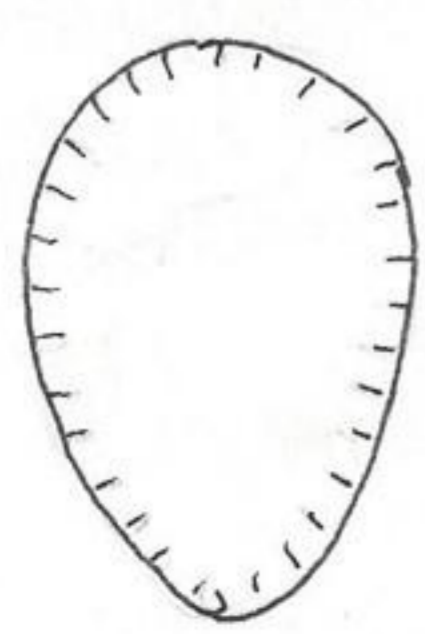
GOMPHONEMA



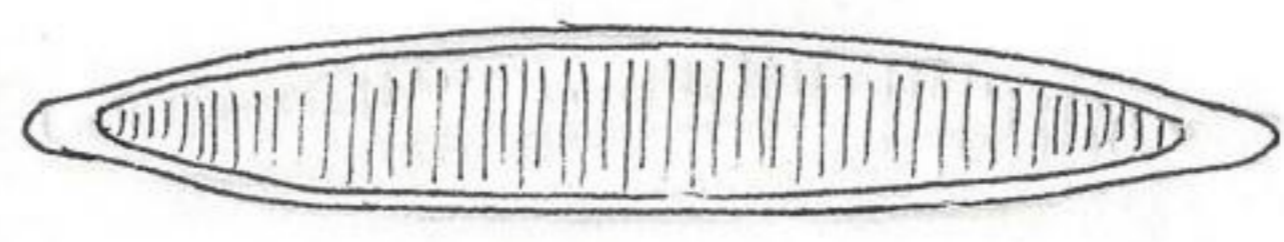
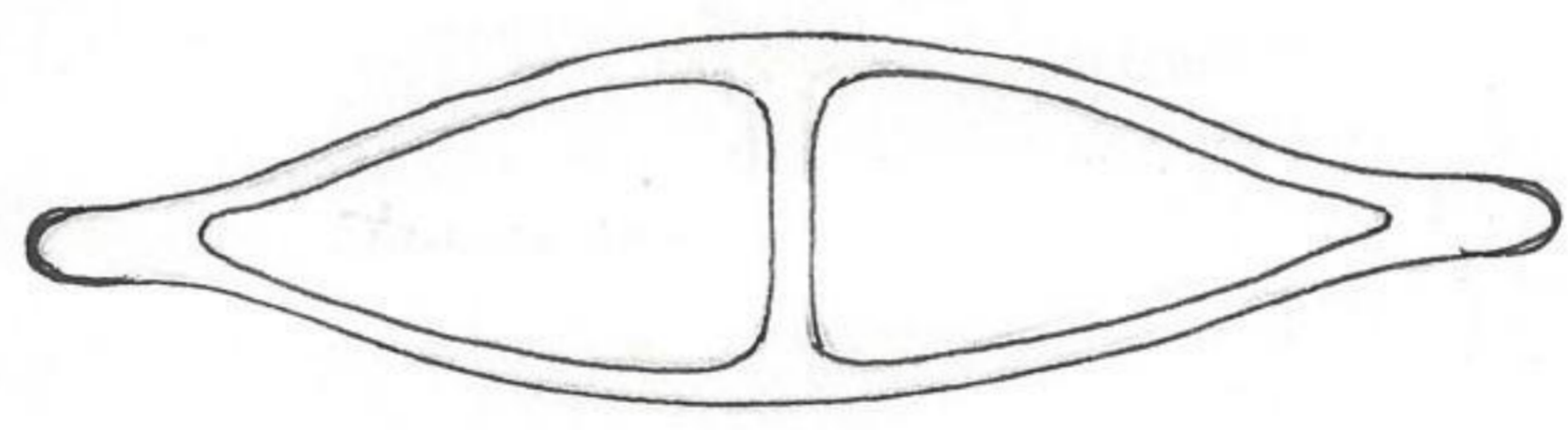
SYNEDRA



GYROSIGMA

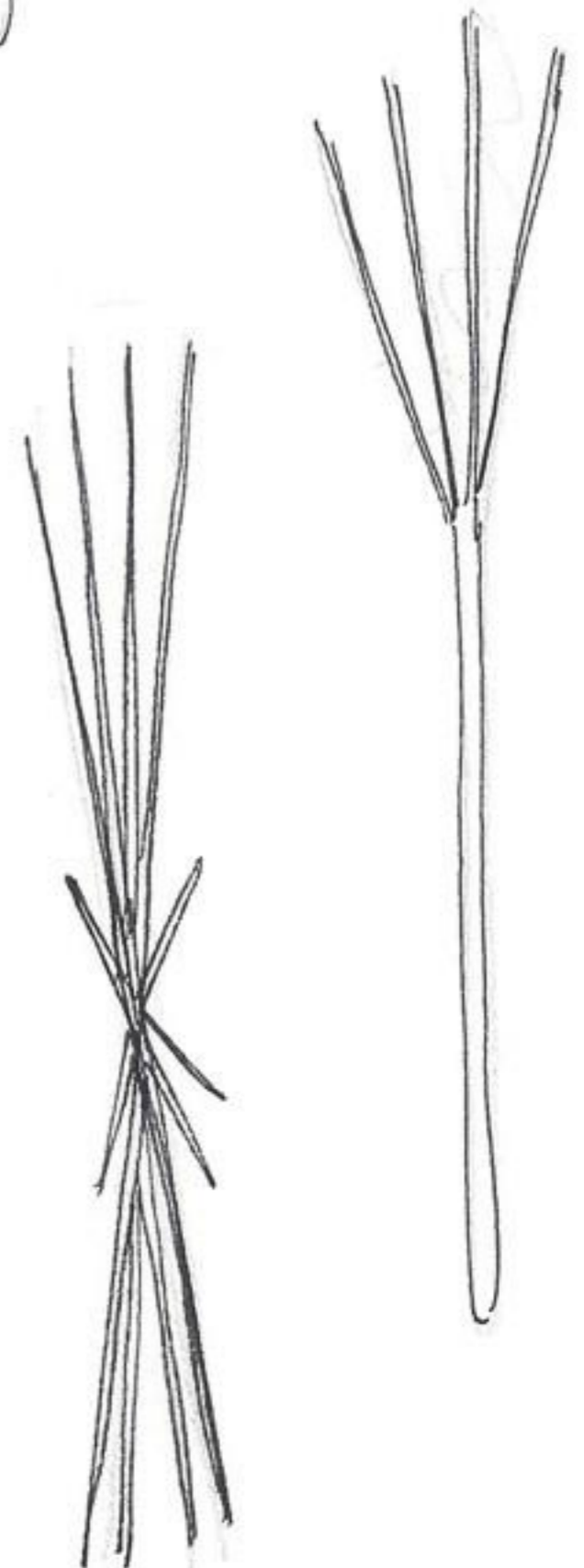
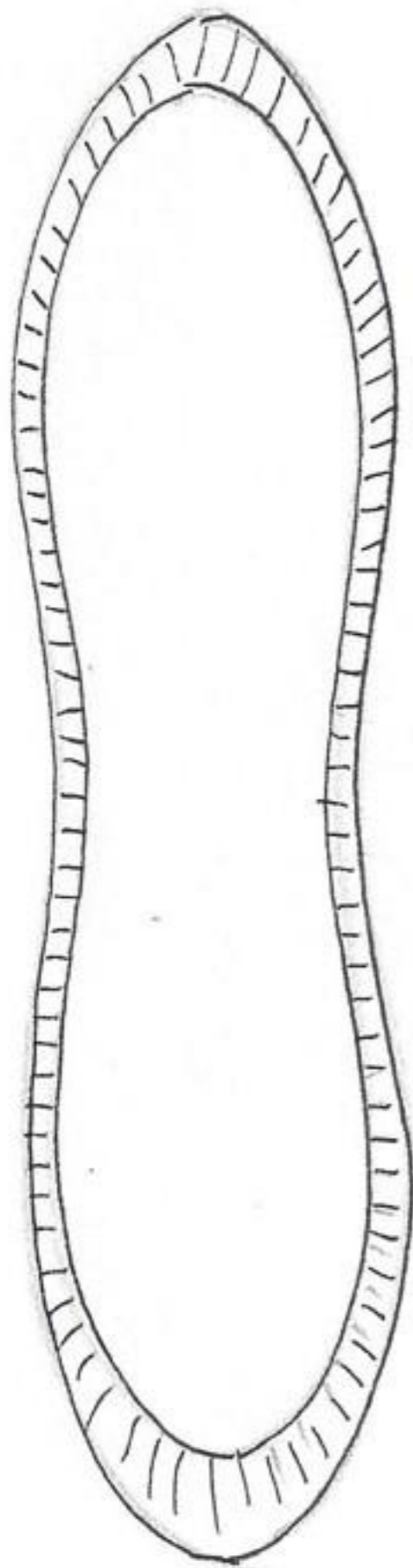
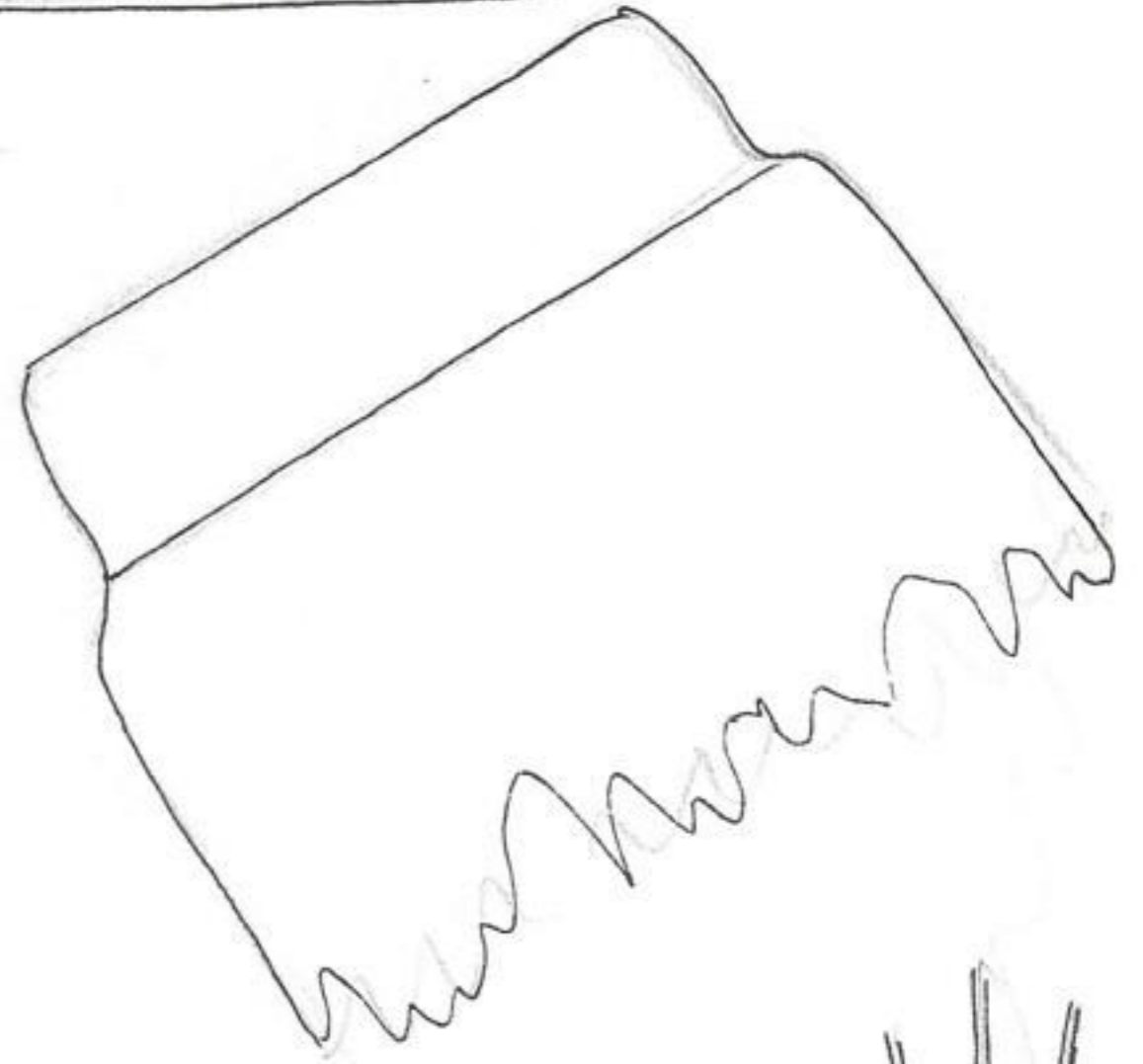
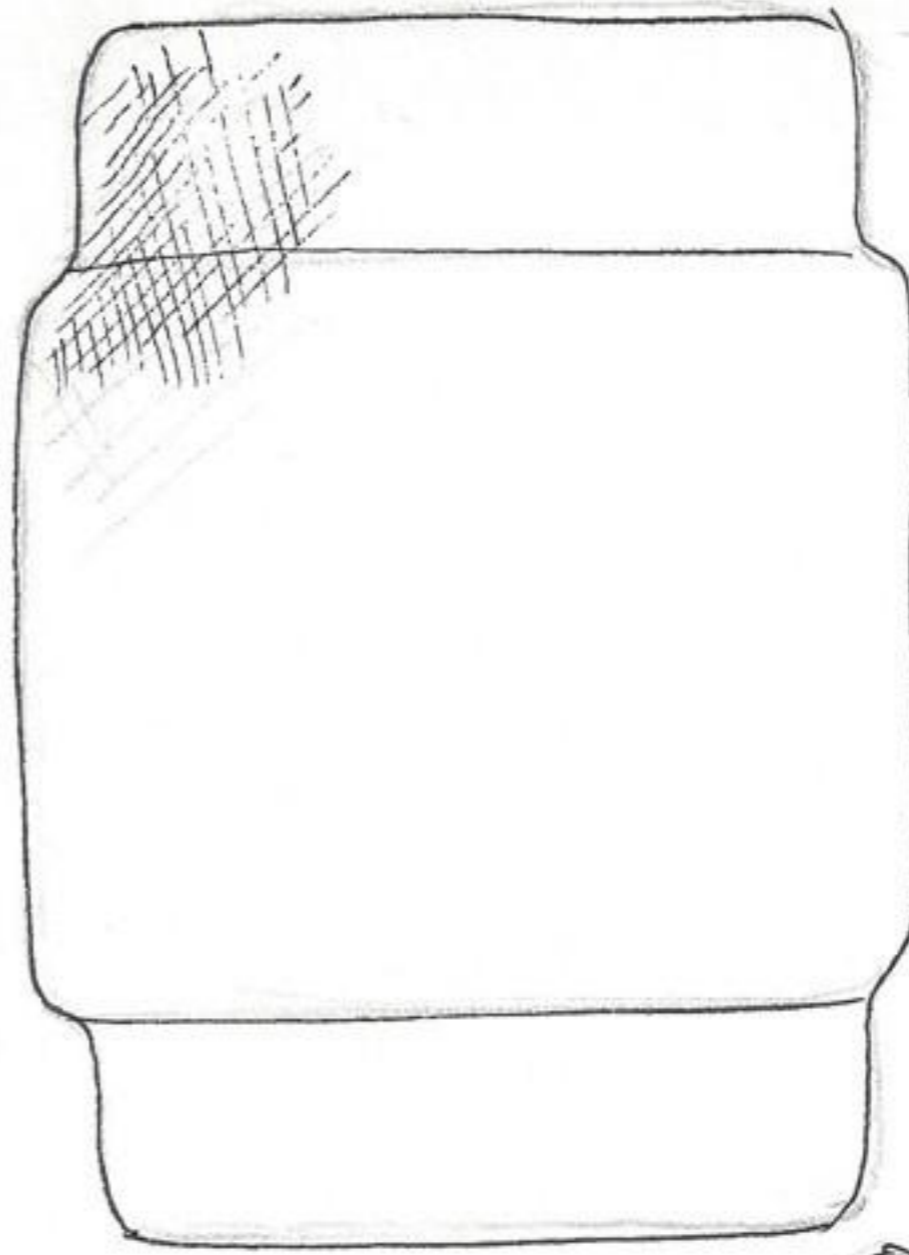
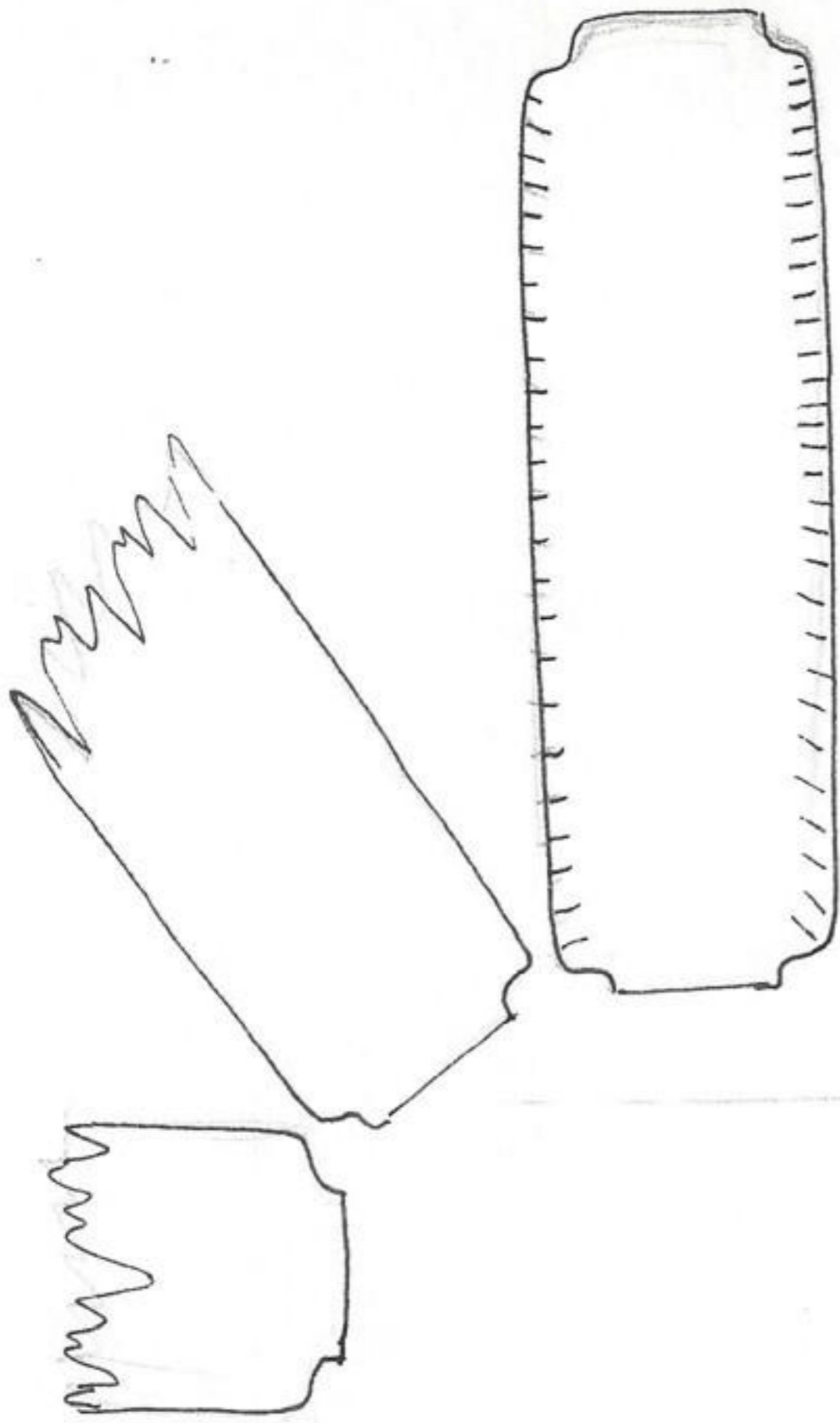


SURIELLA



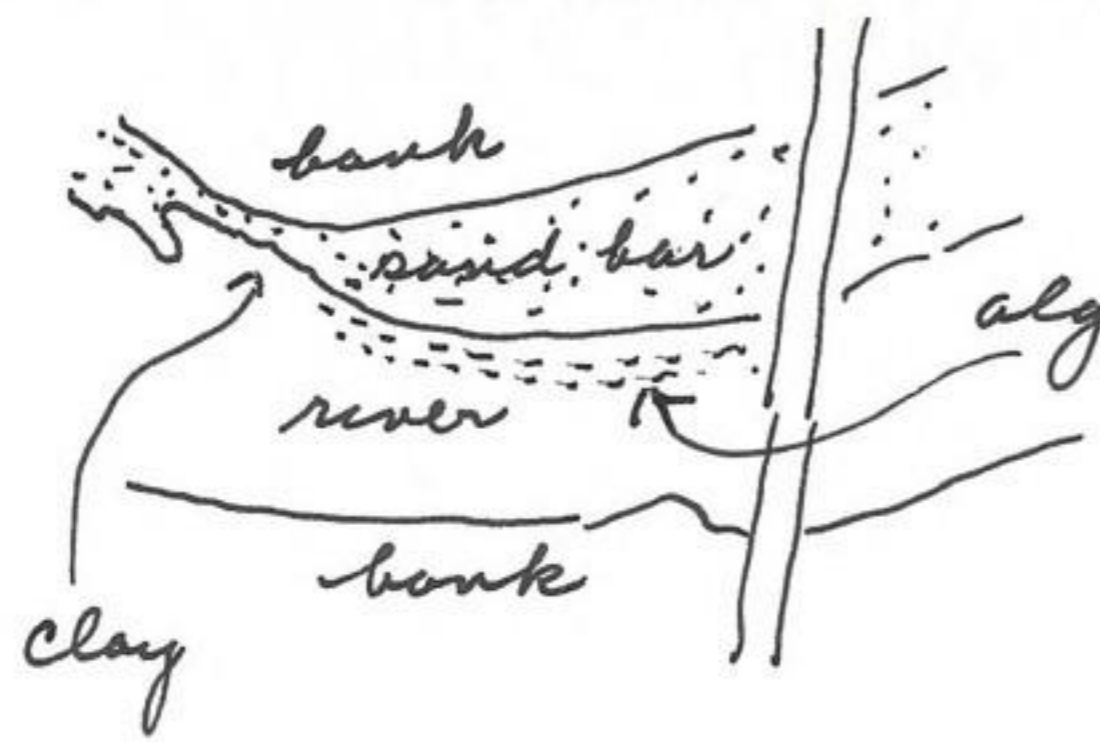
DIATOMA

BIDDULPHIA



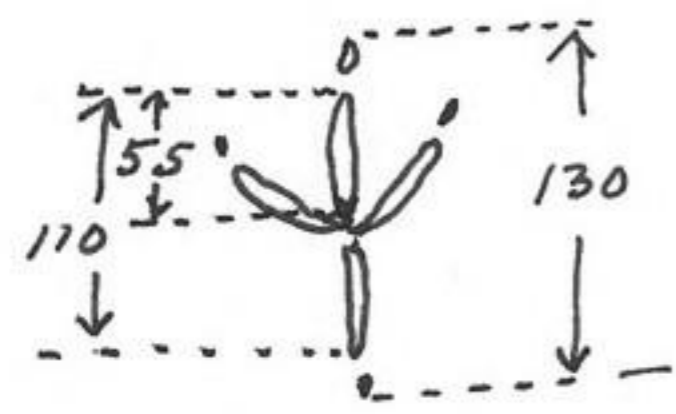
CYMATOPLEURA

As one approaches the point of convergence of the sand bar, the stable layer of pebbles ^{and algae} disappear and the floor of the river along edge of sand bar is clay and greater depth.



Between the point of convergence and pebble striae are individual masses of clay that are lodged in the floor of the river. These show eroded tops and are flat-topped. Pitted areas are more common here than below where surface has developed a depression. These are source of moving sands and there is less algae below.

Although the water is clear there are masses of contaminated material lodged in protected places. Noted tracks of what I determined as those made by the black-crowned night heron, observed in this area (Dec 3 notes). They are not large enough for great blue heron and I do not know of any other bird that could make a track by this dimension. Raccoon tracks common and about 10 sets at point where water restricts area between bank and water. Muskrat here also.



The gizzard shad average 1 per 20 feet along edge of water, some already stranded on sands now above water. One gizzard shad (661217-2) collected for examination. It was in 3 inches of water and swam awkwardly with perpendicular axis over about 15-20°.

a kingfisher in area as well as chickadees, goldfinch, cardinals, and horned larks. 5 pink heel splutter unionids noted, 2 of them small.

Coop Plant, E Lawrence, Douglas Co., Kansas
Dec 18, 1966

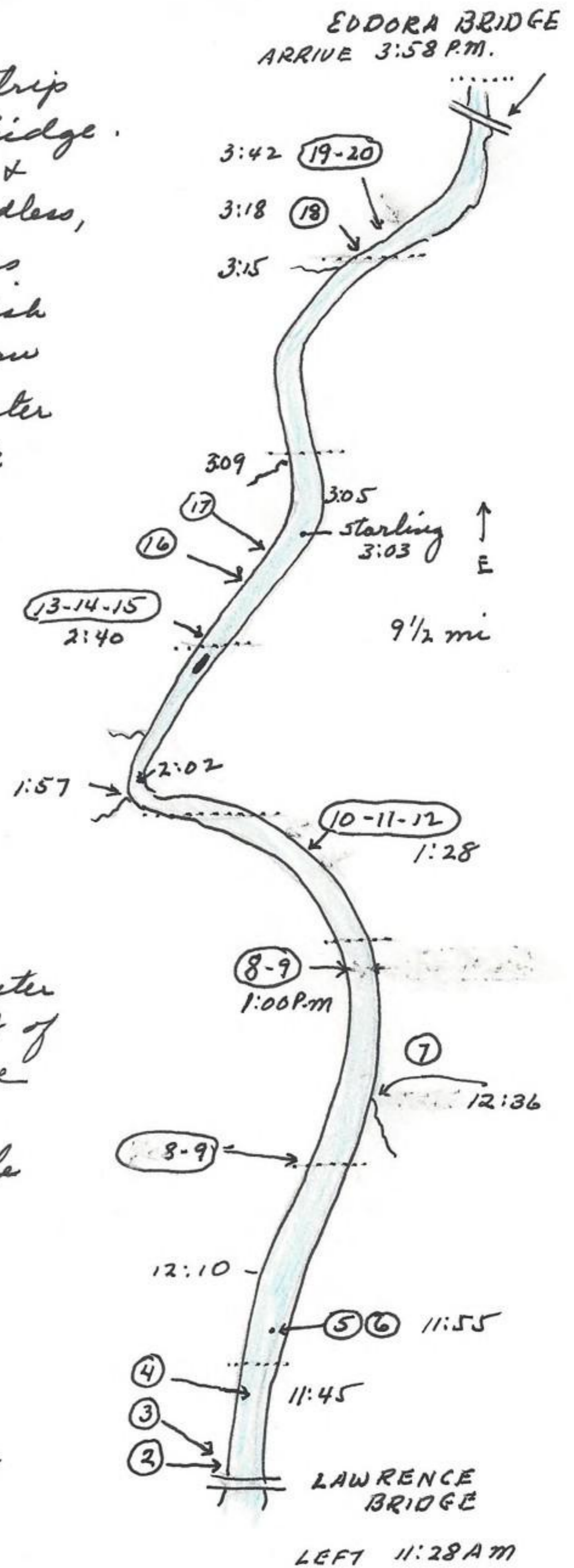
Telephoto 661218-1 of air pollution. The yellow, ^{orange vapor} extended E as far as the eye could carry.

661218-261

Kaw River, Lawrence to Eudora, Douglas and Leavenworth Cos., Kansas

Dec. 18, 1966

mary Pauline and I made canoe trip from Lawrence Bridge to Eudora bridge. Left 11:28. Photo 661218-2 of Annette & mary just before departure. Day windless, temp of air in shade 55°F, water 2 inches below 38°F. Photo 661218-3 of a fish sturgeon taken by a fisherman at dam. 3 bulldeer on sand. Water approx 3 feet lower than last week as a result of Tuttle Creek Control. Photo 661218-4 of piling of old bridge across river (probably R.R.). These are in the middle of the river, others on N shore and the crosspiece is on piling above water on S shore. Photo 661218-5 of white-tail deer and river down stream. ~~661218-6 of block-up of deer.~~ This animal and ~~was~~ S bank never receive direct sunlight from during winter months. Last week the upper part of bank exposed, now all animal above water. Kingfisher here. At the outlet of FMC noted that the river was 6 inches lower since photo made here Dec. 14. Broad beach of 8 feet now exposed along edge of river and extends down stream a 100 or so feet and 2/10 mile showing white of sediment but faintly. New great blue heron tracks in white muck. A beaver had crossed this beach of sediment to cut willows above. Its house about 300' downstream from outlet of FMC water. 12:14 Kingfisher. 12:25 pipes cross river. On north side of river

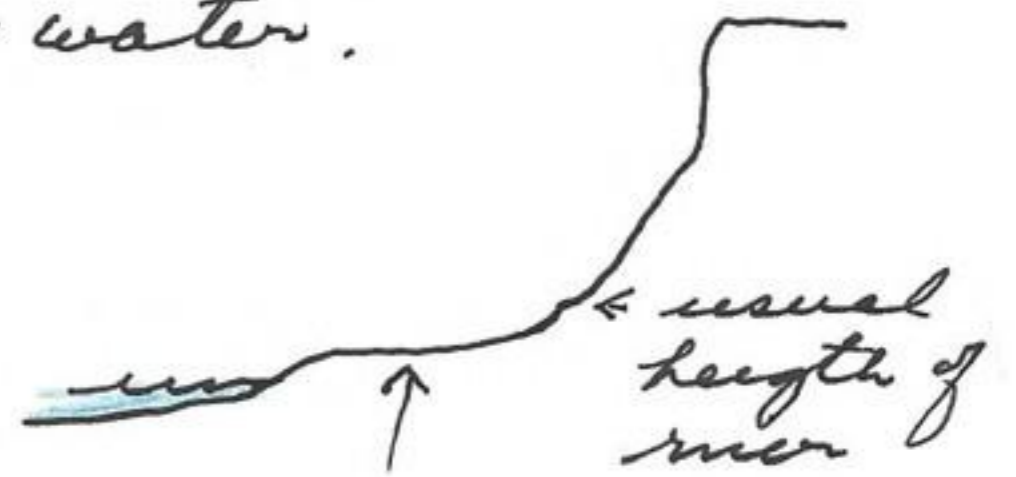


661218-262.
 noted a flock of approx 130 mourning doves which is one of the largest flocks of this species observed in the area. Did not see other doves along river. D. B. hum left here + flew down stream. 12:33 high voltage line crosses river. a kingfisher and and the great blue heron noted previously left and flew up river. 12:36 18 crows left east bank and flew E. They were in a dispersed grouping but all left together. From mouth of the major drainage to left (12:36) made photo 661218-7 to E down river. 1:00 stopped and examined beaver cuttings on N bank. many large trees cut at point just in back of log jam. From evidence of strice in sand appeared that the cuttings had been pulled S across river. Photo 661218-8 of general area with green

masslike covering of sands (from drainage or spring source) and 661218-9 of broadview of beaver activity. Bank slides well developed. Sand bar raw separates cut trees and water by approx 200'. Left 1:20 P.M. at 1:28 took three photos of bank exposure on S side of river at a point about 1/10 mile up river from capsize point. This area used extensively by bank swallows. The beach is now broad and 1/6 height of cliffs because of low water. One photo shows an anticline thus



tapered strata



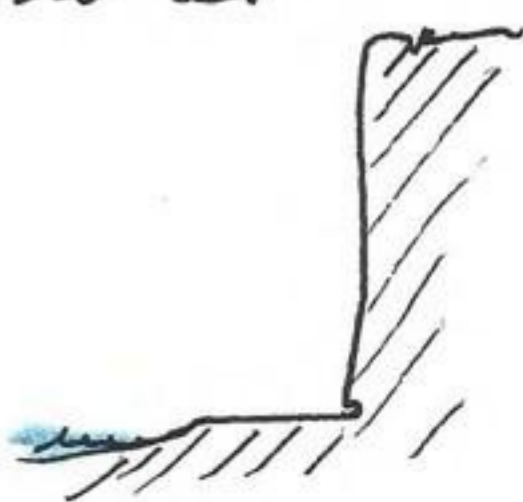
exposed beach

These three photos are 661218-10, 661218-12. and 661218-3. 1:50 passing channel to right. Immediately beyond in main river noted an aggregation of 1 male mallard, 1 great blue heron, 1 kingfisher, 1 beldeer, 1 high soaring red-tail hawk, 8 Lapland longspur and 3 crows. 1:57 Mud creek to left. 1 kingfisher + 1 beldeer here. at 2:02 P.M., just beyond bend and at end of sand bar estimated several thousand small 1 to 1 1/2 and some less in a concentrated area. They were in shallow water and moved away from the cone as we passed. I have

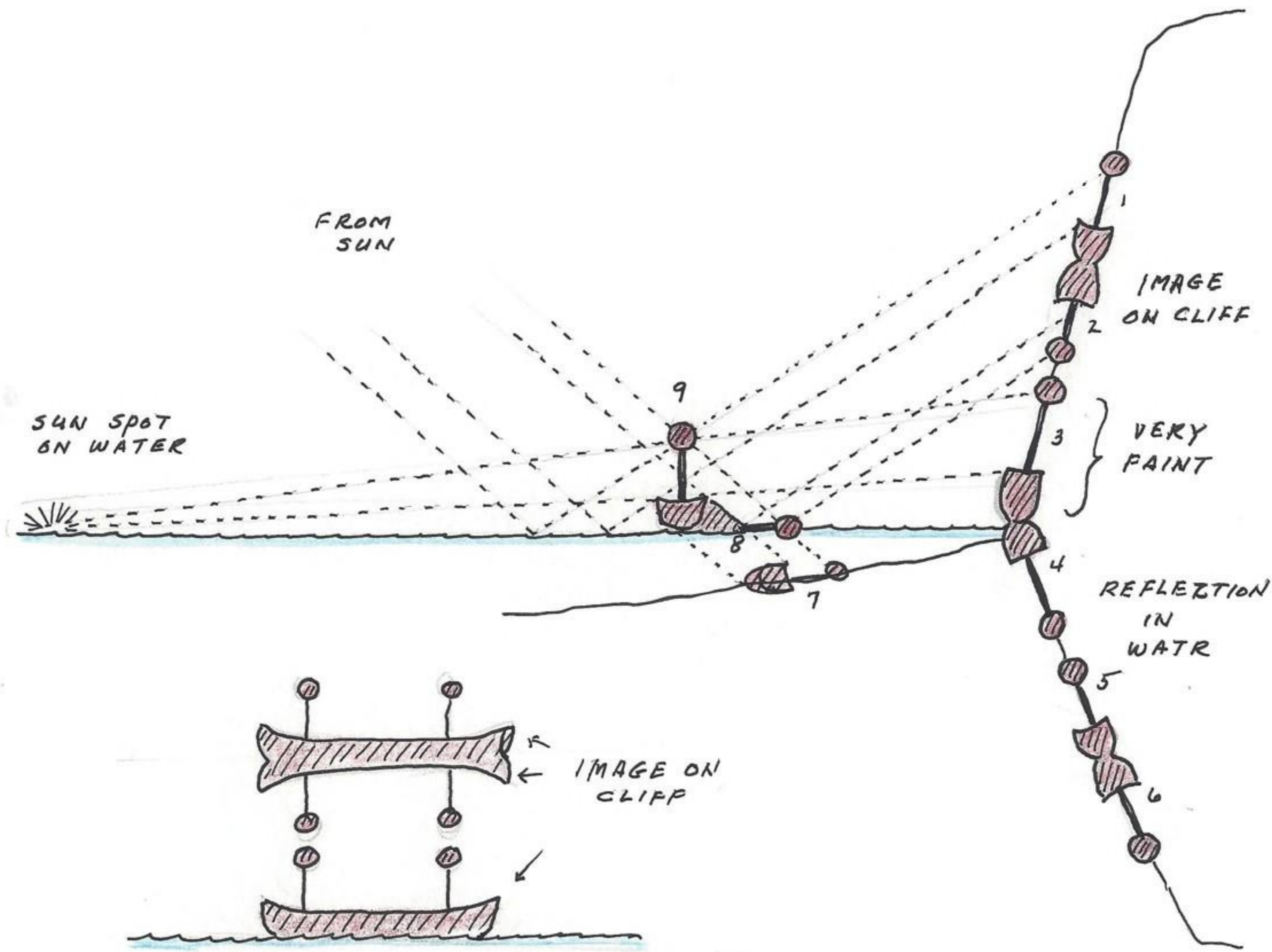


not observed such aggregations of small minnows in any other part of the Kaw River. The ~~SE~~^{SE} bank is in ice from about 2 feet above present water level to water level.

Free of ice beyond toward bank. no ice by sunlit side of river. 5 killdeer in this area. One can feel the difference in temperature in these protected areas, being 5 or 6 degrees cooler than on sunny side. One great blue heron left area down river and 3 crows left river. Temperature now 62°F in shade of and canoe in middle of river and water temp still 38°F. The island is now connected at N end with bank of river. On E side just beyond photographed ~~run~~ slide way of beaver which had been fashioned by continuous use and by physically shaping by clawing. This semi-arch condition would interfere with movement of cut limbs. This shot 661218-13 and ~~661218-14~~ showing many Paulina just below passageway. Photo 661218-15 of some of the cut trees and Kaw River upstream. A side drainage enters to right of photo. Photo 661218-16 of Pleistocene stratification with old and new sand above. Photo 661218-17 of tree that had fallen into water and bark eaten by beaver. There is more, somewhat belated, beaver activity along the river. At 3:03 noted a flock of about 400 starting above at river and all alighting on edge of sand bar to drink & some bath and then to leave as one group. It would be interesting to know what determines the movement of a large flock of birds to go to a drinking place and then to leave after the behavior has been completed. There certainly is no time regulating mechanism but probably controlled by individual. 3:08 bend of river. 3:15 double drainage with trees between. 3:18 photo 661218-18 of stratified bank and birchlike grove of trees. 3:20 Kingfisher and mallard duck. 3:42 Photos 661218-19 and 661218-20 and 661218-21 of high, almost perpendicular bank of stratified sand. These are the most perpendicular cliff on river and base is at river level or only 5 or 6 inches above. They are characterized by white color at a distance and are associated just up stream from the first rock (made) barrier on E side of river.



These white sand banks keep temperature about 8°F higher than shaded river banks on w side of river. White butterfly noted flying here and only one observed today. ^{Five} Hornets occasionally noted at edge of water, some alighting in water. Air temp at middle of river 58°F (3:45 P.M.). In this area along cliffs attempted to project reflection of canoe onto cliffs for photographic record but was unsuccessful because the current was about 5 mpr (or fast enough to keep us from paddling up stream at normal rate of paddling) and the reflective surface of the water was too irregular because of the current. It requires a perfectly smooth surface for best results. It was determined, however, that the shadow on the water contributes to the inverted image on the bank and that one cannot have both the inverted image and the direct shadow from sun ^{on the bank} at the same time. The mechanics of the 9 canoe images are as follows:



Have noticed that sand builds up as a ⁶⁶¹²¹⁸⁻²⁶⁵ dome on the downstream side of rock barriers.



Crossed river and took temp: in shaded area of river which was 8 degrees colder than E side. As we approached the Eudora Bridge on east side of river felt a cool temperature as one finds issuing down canyons in evening. This temperature was 49°F. Arrived bridge at 3:58 P.M. having spent 4 and 1/2 hrs on the river. This trip could be considered a leisure pause. The bird census was complete and a summary is included:

- | | |
|------------------------|--------------------|
| great blue heron 1-1-1 | killdeer 3-1-1-5 |
| kingfisher 1-1-1-1-1 | Crow 18-3-3 |
| red tail hawk 1- | Mallard 1-1 |
| mourning dove 130 | Lopland longspur 8 |
| starling 400 | |

Lawrence, Douglas Co., Kansas

Dec. 20, 1966

Prepared to leave for Provo, Utah. Plan leaving 6:00 A.M. Thursday, Dec. 22. Items to include are:

- Coleman heater - gas - funnel
- Coleman stove + pan
- matches - pocket knife.
- hot water heater (12 volt)
- blankets (3)
- flashlight; journal
- binoculars - bird book
- camera - film - mailer
- exposure meter
- telephoto - regular lens
- thermometer - watch.
- tape ^{recorder} - axe - shovel (snow)
- batteries
- window scraper
- saet
- collecting gun + shells (no.)
- radio.
- suits + dresses all around.
- pants for trip - warm coats
- boots sky jackets
- rubbers
- gloves - hats - scarfs.
- glasses (sun)
- 3 changes underwear
- cleaned
- car shaver
- 2 pillows.
- metracal
- Cocos - sugar - powdered milk
- water - spoons - coffee - postum.
- mail + eat.
- pull light cords
- drivers licenses
- credit cards
- ownership of car.
- house temp to 60°F
- key to house.

Lawrence, Douglas Co., Kansas

Dec 22, 1966

Left for Utah 7:30 A.M. Annette; Mary, James, Annette; Mil and I run group. Temp. 28° F. Cloudy, N wind. Mile 85096.5 Perry, raccoon road bill by Delaware Bridge. Will record all hawks. 85119 red tail on pole. Alma junction, first Crow. Junction City 8:20, 9:35. Temp 24° F. Temp down to 23 about 30 miles E. Birds crossing road from S to N into wind. Water in streams & ponds not frozen. Arrived Salina and visited the Walter Melton abode, 614 W Republic. Arrived pass Russell 1:00 PM, mile 85336, temp. 25°, first snow. Between Salina and here 3 Redtails, 1 Marshhawk, 2 Sparrow Hawks, 8 crows - all birds flying north across road into wind, white caps on large ponds (over 3' in diameter) Wakeley 21° at 2:15 PM. Goodland at 4:40 PM, temp. 18°. Entered Colorado (finally) mile 85536 at 5:10. Just across border entered Mountain Standard Time zone (1 hr back) - now 4:10 PM. Since last birdie recording 3 hawks and approximately 400 horned-larks per mile in continuing line. 3 hawks after last observation arrived Johnson Corners at 9:30 (1 hr adjustment for R. Mt S. Time). Just S of Loveland. Mileage 85776 or 680 miles in 15 hrs. 45.5 Inter 70 all way.

Loveland, Colorado.

Dec 23, 1966

Left 7:10 A.M., foggy, temp 10° F, magpie out of Loveland. 8:30 Wyoming, 3 deer, Temp 10° F ⁸⁵⁸⁴¹ Shortcut to Laramie. Fog in Loveland, dry intermediate, light snow on ground. No clouds. ⁸⁵⁸⁵³ 2 raven, ⁸⁵⁸⁶³ raven ⁸⁵⁸⁶⁴ raven. 85869 Laramie Laramie River open in places. Less than 1 inch of snow. Big Laramie R. 5°C. 85914 Rush Creek Temp 4° F 3 rough leg hawks, no others so far, magpie. 85928 4 magpies. In last ten miles have seen 72 antelope in 4 groups. Temp 9°C 10:00 85927 magpie 85930 magpie 85932 magpie. Medicine Draw 85933 3 antelope just west Medicine Draw. Magpies associated with cattle. Temp 4 mi W Medicine 12° F or 3 degrees higher than in Loveland. 85931 hawk (back to Sun) temp 12°. 85959 2 roughlegs flying temp 15° F. Skies clear today. 85962 rough leg Lovering. 85965 roughleg. 85967 roughleg. 85968 magpie 85969 24 antelope. temp 12° F. 85972 roughleg.

85978 North Platte River. Frozen 85988 10:50 2
 Photo 661223-1 and ~~661223-2~~ by Sinclair air pollution at
 Sinclair. Temp fluctuating between 4° and 12° according to
 valley low & plateau high. Rawlins 85996 10:00 temp
 6°F Left Rawlins 12:00. Temp 10° at 86011
 hawk. The few cirrus clouds in the sky show
~~parallel perspective~~ (parallel perspective), brilliant sun. Snow about
 approximately one inch in depth. 86015 2 rough
 legs. Sagebrush in swales and black, intervening areas
 covered with thin layer of snow. Some yellow of weeds & grasses
 showing thru snow. 86020 ⁷⁰ antelope running. 2 rough
 legs. 86024 rough leg hawk. 18 horned larks, these birds
 are rare more ~~sagebrush~~ ^{sagebrush} beyond Continental Divide Road.
 Red Desert 86046. 86050 rough leg hawk. 86055 less
 snow on ground, more yellow in landscape. Temp 18°F
 86061 rough leg. 86063 horned lark (8) and first ones since
 last observed. Table Rock 86066. 86068 rough leg.
 86074 rough leg. 86077 Red Hill road. 86087 Point of Rocks
 1:40 temp 24°F. N exposures ^{slope} snow, 5 exposures free of snow
 86096 dead hawk, 87100 sagebrush generally detached
 and not in bunches as to E. 87103 34 antelope in one
 group all resting except 6 standing. Temp 25°F
 Green River ^{rise money} 86135 2:30 Temp 11°F Green River 1/3 open
 in center & floating ice, some area completely sealed.
 86147 3 magpies. Arrived Little America 2:52. at
 mileage 86154. Temp 10°F. Left 3:28 rough leg.
 7 look of longspur-like birds fly around Little America
 as if inspecting with curiosity. About 20 road kill
 rabbits across state, 12 in first mile W of L. America
 and then lack of road kills. 86160. rough leg, hawk
 Temp 10°F. 86167 rough leg. 86168 rough leg hawk.
 Am impressed with how black the sagebrush. 86173
 more snow than previous. 86174 rough leg. 86177
 start rabbit road kill ^{2 only in 10 miles} (86178 Smith Fork Creek magpie),
 Lyman 86184 5 magpies. 86189 2 magpie & rough leg,
 86191 Fort Bridger Temp 7°F. River paper (Black Fork
 River 86192) 86195 rough leg. 86196 rough leg.
 86197 rough leg. 86205 LeRoy Road. (RR overpass) more
 jumpers note Stratus clouds to W. Kemmer junction
 86211 Temp 5°F more snow on ground. First aspen
 68216. Evanston 68225. Left 5:00 Lights fading. Bear River
 1/6 open. Arrived Provo (via Echo, Wanship, ^{Salt Lake}) approx 86368 at 8:00 P.M.

DEC. 23, 1966

AMERICAN ROVEN LEG

LOCALITY	TIME	TEMP	MILEAGE	HAWKS	H. LARKS	MAGPIE	RAVEN	ANTELOPE	
COLORADO	LOVELAND	7:10 AM	10	85776	-NW		1		
				85780					
				85790					
				85800					
				85810					
				85820					
				85830					
				85840					
				85850				1	
				85860				2	
WYOMING	WYOMING ST. L.	841	8:30	10	85840				
					85850				
	LARAMIE	869		5	85860				
					85870				
					85880				
					85890				
					85900				
	ROCK CREEK	914		4	85910				
					85920			72	
	MEDICINE BOW	933		9	85930			3	
					85940				
				15	85950				
				12	85960			24	
					85970				
					85980				
	NORTH PLATTE	978			85990				
	RAWLINS	996	11:00	6	86000				
					86010				
					86020		18	70	
					86030				
RED DESERT				86040					
			18	86050					
TABLE ROCK				86060		8			
				86070					
POINT OF ROCKS	1:40		24	86080					
				86090					
				86100			34		
				86110					
				86120					
GREEN RIVER (RIV)	2:30		11	86130					
				86140		3			
LITTLE AMERICA	154		10	86150					
				86160					
				86170					
				86180		7			
FORT BRIDGER	191		7	86190					
				86200					
				86210					
EVANSTON	225		5	86220					
TOTAL MILEAGE 400 (corrected)					30	26	20	3	203

of the Dec. 23, 1966 census, ^{above} and Jan 1, 1967 one can make some generalization:

1. Time of day, weather conditions, ground cover including snow has an influence of populations-numbers.
2. In the case of horned larks, the groups have a more significant distribution than total numbers.
3. Antelope and hawks are closely associated.
4. There is a relatively scarcity of horned larks in Wyoming in an area I would judge to be ideal. In Utah at an equivalent longitude they are extremely common which might indicate a movement from Wyoming to a point farther south and via Green River drainage system.
5. The flocks in Utah are larger than those elsewhere.
6. In Utah & Kansas there is a close relationship between hawks and horned larks. The Swift Fox was associated with greatest number of horned larks as well as in center of abundance of cubs. The fox was using horned larks as food.
7. Hawks and ravens are associated.
8. In Kansas meadowlarks partially replace horned larks. The meadowlarks were feeding on exposed slopes of highway free of snow.
9. Magpies are generally distributed.
10. There is an unusual high bird population in the lower pastures of Utah Valley.
11. There is an unusual lack of raven in Wyoming.
12. Superhighways discourage most kinds of birds and mammals, but encourage others.

of special observation on trip was the increase in numbers of horned lark from E to W across Kansas to eastern Colorado and the somewhat lack of these birds across Wyoming. A second note of interest was the great numbers of roughleg hawks across Wyoming. The large number of antelope in Wyoming was of unusual interest, totalling approx 400 in groups of 15 to 80. The temperature change between uplands and lowlands was consistent from low in valley to 3-5°F higher on uplands. Road dry all the way to Provo.

Provo, Utah Co., Utah:

Dec. 24, 1966

Prepared for Xmas at Dads. 140 Bohemian Waxwings at Dads one starling with white tail feathers

Dec. 25, 1966

Christmas at Dads. Max, Phyllis & Mary Ann from Port Townsend, Wash. more crows in town than I have ever noted before, one in tree at Dads, other flying N and S over city. Coaling frequently.

Timp. Haven, North Fork Provo River Utah Co., Utah.

Dec. 26, 1966.

Max, Mary Ann, Mary Pauline, Annette C, Jimmy & I to Timp Haven for skiing. Photo 661226-1 of Annette on slope. 661226-2 of Mary Pauline and 661226-3 of Mary Ann. Max and I took trip to top of ski lift and return. Considerable cutting and clearing of forest and road building as well as ski run trails. Erosion may be a problem if area is not reseeded. This area should be studied for succession and contamination of introduced plants used for ground covering. The uppermost slope will suffer most from erosion. The canyon return to W is hazardous because of avalanches from Timpanogas slope. The run down canyon to Wildwood would be excellent but trail would have to be developed & sufficient snow accumulated. Two sets of squirrel tracks in snow and no rabbit tracks along entire lift route. Water in creek at base clear. Several snowmobiles up road toward aspen Grove. Some new cabins in area but not many. There were none in the Stewart Cabin development area. All skied, Jay & Jimmy used lift.

Timp. Haven, Mt. Timpanogas, Utah Co., Utah

Dec. 27, 1966

Took James Robert up to Timp. Haven for skiing from 2:00 P.M.

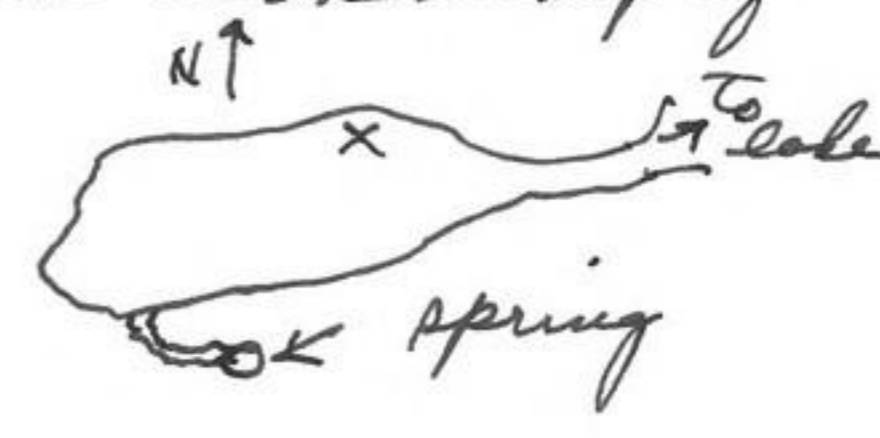
661227-271
on N side of canyon. Cove the long ^{slit on second}
strata of 3 supporting level like concavities "

Lincoln Beach on N end of Lake Mt., Utah Co., Utah

Dec 28, 1966, 3:00 P.M. to sundown
made trip to Lincoln Beach. Recorded the following
birds enroute (via freeway to Springville, thence W along
usual road. At Fairgrounds observed approx 300
Starling and 2 crows in one group. In a tree to
W from entrance onto Freeway observed a dozen or so
nests of the great blue heron. Freeway passes by at
edge of rushes & at point where creek enters the Provo
Bay proper. Old sand dunes formerly inhabited by Indian
now covered. 14 Crow in general area. In creek noted
11 am coot, 5 green-wing teal. Water brownish and
steam rising. Between here & Springville counted 13
crows. From Springville interchange to west. At
one cattle area noted 140 crows in one group & a
flock of approx. 1000 horned larks. Only 2 other small
flocks of larks observed. Between Springville and Lincoln
beach noted 13 magpies & many nests, 30 crows, 8
meadowlarks, 1 sparrow hawk, 3 roughleg, 1 redtail,
5 flocks of Brewer's blackbirds (1000, 1500, 36, 300, 800),
one of which had a few redwing blackbirds but other
group entirely of Brewers. Occasionally a song sparrow
flew across road.

At Lincoln Beach took temp of
main or center springs ^{all open}. The spring
so marked had a temp of 88°F as
water left ground. At area
marked X the temp was 76°F and
air 20°F. Small runways approx
1 inch in length in ^{main} spring pond at X.

At areas of spring
the sedges were green. 2 Wilson Snipe ^{and 1 peewee} left this pond.
7♂ + 14♀♀ shovellers come into ponds & then left for ice
about 200' beyond. 3 gadwall alighted in spring, one of
which alighted on ice at edge. A flock of 60 Canadian
geese flew S high. At this spring made the following
photographs:



- 661228-1 general and to NW. toward west mt. Utah Lake frozen, hot springs ^{open}
- 661228-2 pond to E. Watch in background. Vegetation with ^{ice crystals from spring.}
- 661228-3 pond & ice accumulation on sedges to W. many ^{Arctophila} C.
- 661228-4 same as above, Proverline in foreground.
- 661228-4a ibid.

661228-5 Chris measuring temp of water. (Lincoln Beach)

The photo 661228-6 of valley to SE from just beyond point. A great blue heron flew into marsh at point where road turn to east after traversing base of Lake Mountain.

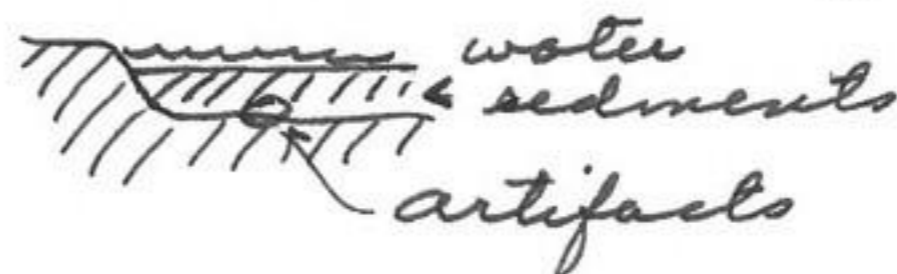
The springs in area should be checked for Indian artifacts which would be on the bottom of the springs at base of sediments.

The entire area

S of both Utah Lake

and Provo Bay should

be favorable for Indian habitation. This area is in sagebrush, ~~creosote~~ greasewood, + rabbit brush in contrast to grass pastures of the N side of Provo Bay.

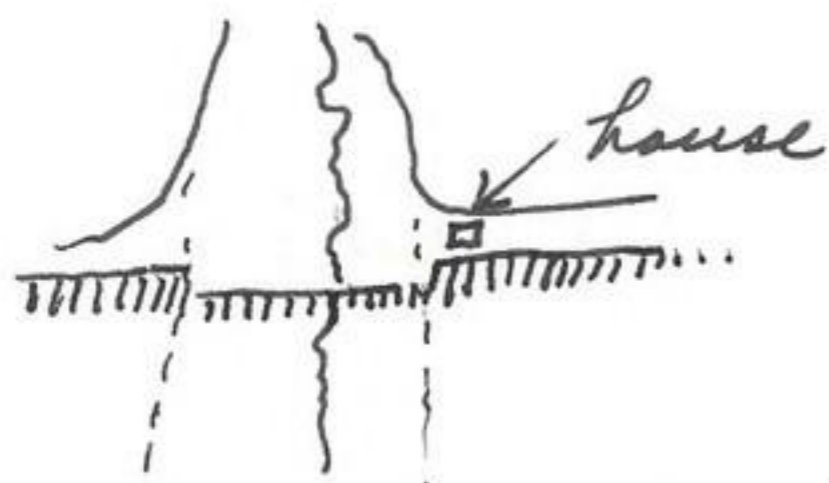


Provo, Utah Co., Utah

Dec 29, 1964

Photographed fault line at mouth of Rock Canyon on Bonneville level on south side of canyon.

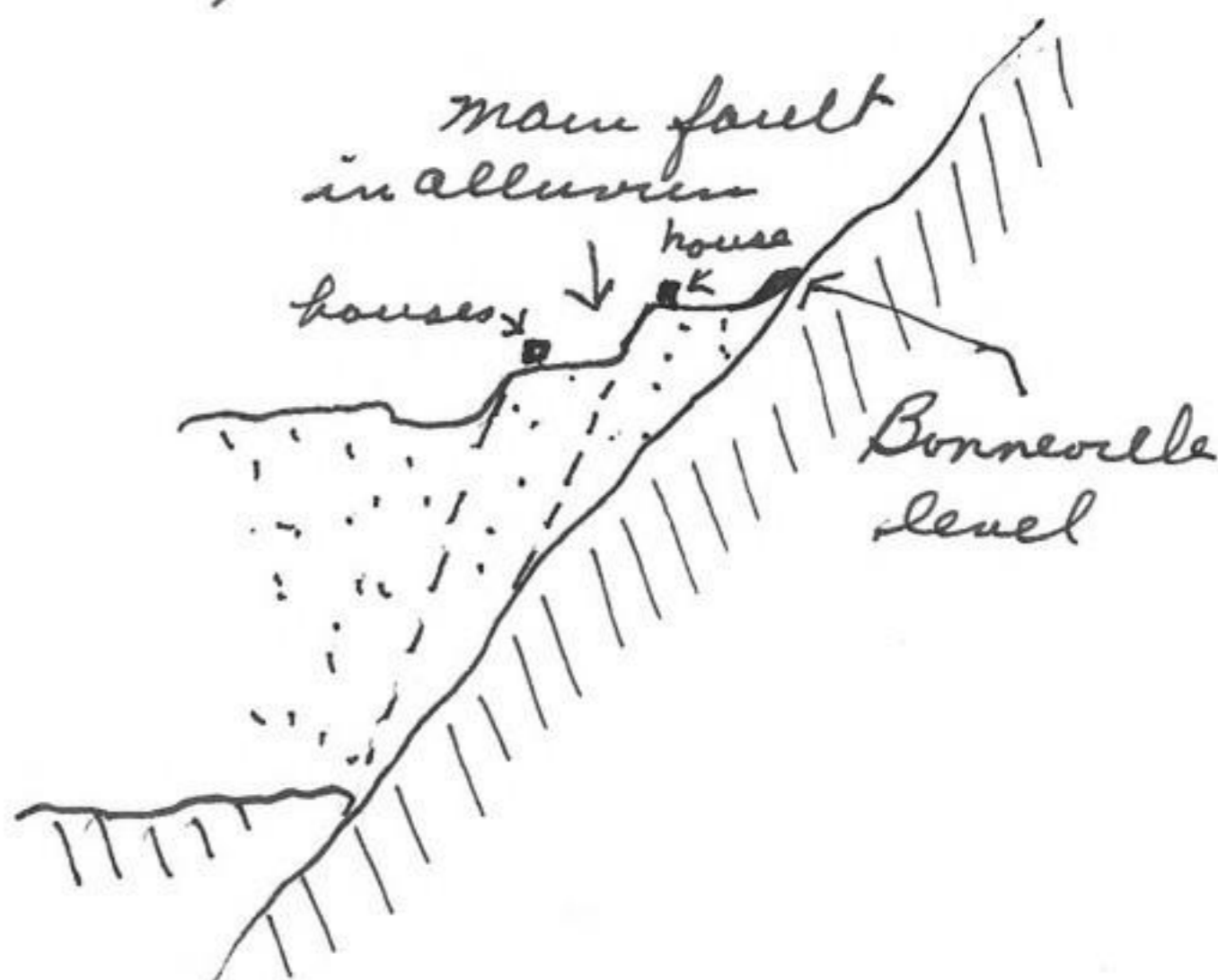
661229-1 of upper fault. This fault line continues S for approx. 2/10 mi and N across the canyon floor.



The floor of the canyon has a displacement of about $1/4$ or $1/5$ the displacement of the fault that is a continuum to the south. Neither the canyon floor fault or the upper alluvium fault show signs of erosion

and vegetation has not become stabilized. It is interesting to try to account for difference of displacement except that the faulting was gradual and the erosion of canyon kept pace until the last steppage of 12-15 feet.

The surface of the exposed fault has not developed the normal vegetation of the Bonneville Terrace and the upper edge and base are sharp and without significant erosion. This also applies to canyon floor proper.



- 661229-2 fault exposure (upper fault or continuation of the fault pictured in 661229-1. Slope relatively bare.
- 661229-3 fault line to S.
- 661229-4 2nd line fault
- ~~661229-5~~ " " "
- 661229-6 first line fault and house on top
- ~~661229-7~~ lower level of Bonneville level with house and Squaw Peak in background.

Pole Canyon, Provo Canyon, Utah Co., Utah
Dec 30, 1966

Took three photos from a short distance up Pole Canyon.

661230-1 of mt. Timpanogas enshrouded in clouds.

661230-2 Cascade mt.

661230-3 " "

661230-4 Top mt. Temp above layer of clouds.

Noted many successional crossonal level of the Provo River valley, some 6 or more distinct levels these should be mapped and Indian petroglyphs correlated. Crossed 2 sets of deer tracks (6 per set)

Crossing road and moving up slope.

661230-5 mt. Lion at Brigham Young Stadium, Provo, Utah

Provo, Utah County, Utah

Dec. 31, 1966

Left Provo at 7:45 AM mil. 86604. Between Provo and mouth of Spanish Fork Canyon, especially in the lowlands noted approximately 500 crows generally distributed in flocks of ten to fifty. South of Provo in first ward pastures crows were flying east where as yesterday evening they were flying west. Approximately 6,000 Brewer's Blackbirds ^(12 redwings) in flocks of 300 to 400 associated with cattle pens, one flock travelled 45 mph. Four groups of Starling of approximately 400 per group. Other birds observed: 8 Horned Larks, 1 Short eared owl, 3 Magpies, 3 Coot. Temp. 20° at Provo. Thrilled at 8:30 AM mil 86630 temp 16° Soldier Summit 86656 Temp 14 Snowing up canyon magpie only bird, deer trails, 6 horned larks 2 mi beyond soldier summit. Arrived Price 9:35 AM mil. 86690, temp 14°.

macrotis neomexicana

Locality of Vulpes ~~relict~~ 661231-1 is: 1 mi. W Floy Wash
on Highway 70, Grand Co., Utah.

greatest length of skull 112 mm.
width of skull 60.8 mm (zygomatic)
mastoid breadth 39 mm.

Photos of this fox:

- 661231-1a side view of head
- 661231-1b top view of head.

4 flocks starting (approx 40 total) in Price area. no other birds observed since last recorded, no blackbuds or crows in valley, ^{although cattle in valley} magpie nest observable at all times. Approx 2 inches snow in desert. Intermittent snow, clear.

86704 horned lark. 86712 3 horned larks. 86714 first redtail hawk. 86716 junco ^{+ prairie} trees blackish with film of snow


86718 rabbit road kill + 7 magpies feeding. 2 great horned owls killed at this rabbit kill. 800 horned larks left edge of road. These observations associated with outer edge of piñon forests.


86720 15 horned lark. 86723 8 horned larks, marsh flat Creek 86725. Snow on NE road cut + clear on SW slopes and some no tree on natural slopes to E. 86728 roven on road, flew out when passing + then right back again. 86730 hooded m. geyers (Price River) 100 horned larks, 9 magpies here. Water green partly open 86735 150 horned larks. 86736 80 horned larks, 86738 300 horned larks 86738 90 horned larks. 86743 roven, 10 horned larks. 86750 60 horned larks. High cliffs to N free of snow but more snow here on ground than so far in desert. Green River 86759 10:50 A.M. ^{Temp 18°F} Left 11:07

~~Temp~~ 86759 Green River bridge, open 80 percent and blocks of ice. 2 hawks (roughleg) 9 horned larks, 1 sparrow hawk. 86761 308 horned larks. 86763 40 horned larks 86764 18 horned larks. 86765 150 horned larks, 1 roven. 86766 8 horned larks. 86768 12 horned larks. 15 horned larks. 86770 7 horned larks.

86772 Swift Fox 661231-1 ^{hind} road kill. This fox measured: 760 Total length, 286 tail, 130 foot. 86 ear, 2280 gms wt. and was 1 mile W of Flay Creek. Area of sage, Chrysothamn, greasewood. 86773 4,000 horned larks. 86786 4 horned larks. 86787 4 horned larks. 86781 2 ~~roven~~ ^{roven}, 86784 roven. 86786 Thompson, Temp. 18, ridge at base of cliffs with white lines of cornice (lacelike) ran out of clouds into clear. 86792 roven. 86795 5 horned larks. Thimbleweed moved across road but only slight wind. 86798 roven. 86799 4 horned larks. Temp 15°F. less snow than previously.

86802 roven. 86804 roven, 8 horned larks, the roven patrolling the highway. 86805 Nash Wash Temp 20°F 12:03 P.M. 86810 ⁹ 2 roven. 86811 Cisco. 86812 roven. 86812 30 horned larks. Snow comes have dampened dry soil. Snow cover progressively less. 86820 10 horned larks. Soils in valley red. ^{to yellow} 86821 Cottonwood Wash. 86823 80 horned larks. 86825 marsh hawk. 86829 roven. 86830 beginning of dwarf forest. 86831 roven - (for short distance) (junipers)

Temp 19°F, snow 1 inch, 12:30 P.M., Temp approx 19°F
 across desert. 86837 Colorado line & into juniper, ^(for short distance)
 junco. 12:35, temp 20°F. 86838 roughleg hawk  (tail)
 86839 widely spaced jumpers, more Artemisia
 Snow lower prog. less and showing considerably bare ground
 86844 Photo 661231-2 general. 86845 west Salt Marsh
 2 magpies, nests in trees along creek. Following river valley
 new. 86847 4 starling, Creek partly open. 86847 East
 Salt Wash, flowering, 300 horned larks associated with a little.
 86849 red tail, 86850 track (town). 86851 8 starling -
 magpie nest in cottonwoods common. Redtail. Bullocks
 oriole nest, meadowlark, Loma 86853. 86854 marsh larks
 3 meadowlarks. 86255 8 horned larks, meadowlark, 2
 magpies. (a few undoubted buds). 86857 Big Salt Wash.
 86858 Trueta. Temp 21°F 1:00 P.M. 8 meadowlarks, 3
 starling. magpie nests very common. 86860 8 starling,
 5 starling, Artemisia 8 feet high 86863, 15 starling.
 meadowlark. 86865 junction to Interstate 70. Progressively
 more snow. 86867 3 meadowlarks. 86870 13 horned
 larks. Steam from cut banks. Temp 21°F. Birds absent
 along new Interstate highway. 86870 Photo 661231-3 of
 slope to NE showing distribution of snow. 300 horned larks.
 86880 raven. 86884 2 raven together. 86885 now at
 Colorado River. River partly open & yellowish in color. Not
 clear. 86887 Cornes, 1:36, 22°F. 86891 junction Grand
 mesa. 86893 River compacted ice not covered with snow.
 86894 4 magpies & 2 raven. 86896 river 1/10 open.
 86899 9 magpies, temp up to 28°F in reflective part of canyon
 86900 East Harseshae Canyon 4 magpies. duck (sp?) golden ^{eye}
 86902 Photo 661231-5 of ice packed river. Goldeneye in
 river. Photo 661231-6 also here. Temp 25°F. 2:00 P.M.
 many magpie nests. 86905 Horse Thief Creek. Entirely clouded,
 overcast. Temp. 24°F. 86907 Colorado River bridge. Ice flowing
 in stream (1/2 open). 86908 150 horned larks, 86917 magpie
 Cottonwoods along Canyon point down canyon. 86919 Grand
 Valley. 2:20 P.M. Temp 24°F. 8 Stopped. Left 2:35 86921
 2 raven. 86929 sparrow hawk. 86931 redtail hawk.
 86937 Rifle, 2:53 temp 21°F. 86939 redtail, shrike,
 86942 2 magpies 86943 ^{red tail} hawk, 40 starling, 2 magpie. Silt 86944.
 3 starling. 86946 magpie. 86951 New Castle. 6 ducks (sp.?)
 River about 4/5 open & clear, ice free water. Temp 20°F
 3:13 P.M. 86952 magpie, 8 ducks (sp.?), ~~86953~~ 869761
 Golden eye duck. 20°F. Glenwood Spring 86965, 3:30

temp 20°F. 86966 golden-eye duck. These ducks are frequently associated with the ripple part of the river, these parts more usually exposed in the river course. 86962 2 golden eyes. River variable as far as distribution of ice is concerned. 86968 Have observed that the alluvial fans at mouth of small canyons are dissected by streams from these canyons as if grading to river rather than alluvial fans thus: . 86969 2 golden-eye ducks. 86971 3 golden eye ducks. In the last three miles have noted 4 water ouzels. They are on the ^{edge of the} ice along the river and appear to be feeding there. They are conspicuous. At about this point the utility power plant empties water into the river bed, beyond the river is almost reduced to bedrock and water remains is completely frozen and there is no ducks actively until the retaining dam further up canyon. This interference of man changes the distribution of animals. 86975 Shoshone dam and intake of water for power plant recently passed farther down canyon. Almost all water is taken from this river. Some should be allowed to by-pass. Photos (661231-8) and (9) of red colored cliffs, water frozen. 86979 open water now. 86980 goldeneye. 86982 4 golden eyes. Water '13 frozen and carrying ice. 86984 Leaving Colorado River. About 1 foot of snow on roof tops. Now going up Eagle River. Temp. 18°F, 4:00 P.M. Sky clear but clouds to E. 86991 Gypsum magpie. 86998 Eagle City 4:10; Temp. 17°F. 87005 photos (661231-15) and (16) of red cliffs and snow, magpie. 87008 magpie. Walcott 87009, 6 horned larks. 87014 noted that there is brush instead of trees where snow cornices are usually formed on ridges ~~at~~ brush & cornice. 2 mallard ducks. 87016 Edwards. Temp 12°F, 4:30 P.M. 87019 9 horned larks, 2 magpies. 87026 Junction 6 & 24 now no. 6. Vail 87031 lights fading and end of complete census. Temp 12° at 4:50. Skung are completely taken over valley & slope. Vail Pass 5:12 P.M at 10,603 elev. and 4°F. Loveland Pass, 11,992 at 6:15 P.M at -3°F. Georgetown 15°F. Idaho Springs at 7:10 A.M, temp 22 at 87113. Half hour out for dinner. Arrived at Denver (E Colfax) ^{Driftwood Hotel} at 8:50 P.M, temp 32° at 87148 mileage. (end of journal for 1966). (see 1967 for summary of the Utah Trip)