

**BLANCHARD'S CRICKET FROG SURVEY  
OF SOUTHEASTERN MINNESOTA  
1990/1991**

REPORT SUBMITTED  
TO  
THE MINNESOTA DEPARTMENT OF NATURAL RESOURCES  
NONGAME WILDLIFE PROGRAM

BY  
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Abstract: Auditory surveys for calling male Blanchard's Cricket Frogs, whose voice differs recognizably from other frog species, were conducted between 8:00 pm and 2:00 am along selected routes in Houston and Fillmore counties from 20 March to 31 July 1990 and 1991. Observers were upper level Biology Majors from WSU who were trained with tapes of Frog and Toad calls provided by the Wisconsin Department of Natural Resources- Non-game Division. They followed the protocol of that department's volunteer anuran survey program in data collection. A total of 3236 miles were driven and 148 student hours were spent on the surveys during the two years of data collection. Data from all locations includes all species of frog heard at each site in the surveys and their relative abundance, judged by number calling at each site. These data were recorded, compiled, mapped and provided to the Minnesota Department of Natural Resources- Nongame Office. Specific data on Blanchard's Cricket Frog breeding site selection was not able to be obtained as originally planned for lack of adequate numbers of this species found. Only three very probable sites were found where this species was thought to be present, and one possible site was recorded. None of the sites had populations large enough or loud enough to permit recording of calls above the clamor of other larger, more abundant frog species, to document presence of the Blanchard's Cricket Frog in the manner required by the Minnesota Department of Natural Resources.

Final Report on Blanchard's Cricket Frog  
Survey of Southeastern Minnesota - 1990/1991

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The field season in 1990 began late and without a great deal of lead time for survey of the recommended area. Sites were designated using maps provided by the WSU Geology department and were largely limited to routes pre-chosen by John J. Moriarty as indicated in materials provided by the Minnesota Department of Natural Resources- Non-game Division- at the time of grant approval. Those routes were modified only as necessary to reduce travel and time involved in surveys to a reasonable level for a single night, roughly 5 hours per route, including time for travel to and from the sites. This yielded four research routes, or areas with 20 sites each to begin the survey. Each of these routes was to undergo four auditory censuses of all sites for anurans during the period from late March to July at roughly three week intervals. Initial sites were chosen from the maps and included all indicated bridges and watercourses accessible from the road along the immediate routes. These were modified where possible, following on site inspection, to include the maximum quantity of suitable frog breeding habitat and as diverse a collection of aquatic habitats as possible; flowing water- both fast and slow; standing water- both permanent and temporary ponds; and wet meadow/marsh environments. Due to low budget constraints, the first surveys were used to help refine the sites initially selected and a number of sites were dropped for lack of water or due to disturbance at those sites from humans and dogs. Whenever possible, alternative sites were selected to replace those deemed unsuitable, if it could be done without too greatly adding to route length. Sites were finalized by Mid-May 1990. In 1991, the sites were redescribed with more emphasis on the "how-to-find and recognize them aspect", which should make future repetition

of these surveys easier. The sites used in 1991 were the same as those of 1990 with the exception that several sites dry in 1990 had water in 1991 and were added back into the study.

The spring of 1991 differed strongly from that of 1990 in terms of weather patterns. The first year (1990) was dry and daily temperatures rose slowly and steadily through May and June. Temperatures dropped rapidly after dark due to low humidity and anurans often quit calling very early as water and air chilled. Each species of frog began calling and breeding at or near normal predicted dates (Breckenridge, 1970. Reptiles and Amphibians on Minnesota. Minn. Univ. Press, Minneapolis, 202p. and Conant, R. 1975. A Field Guide to Reptiles and Amphibians of Eastern and Central North America. Houghton-Mifflin Co. Boston, Ma. 429p.) for these species.

The spring of 1991 was abrupt and rapid in onset with many early warm rains and thunderstorms before mid-May. Water and air temperatures rose more rapidly than they did in 1990 and tended to remain high. Nightly rainfall and high winds delayed many of the surveys during late-April and early-May when the Blanchard's would have been most clearly audible. As it was, the mid-season breeding anurans, such as American Toads (Bufo americanus), Eastern Gray treefrogs (Hyla versicolor) and Cope's Gray Treefrog (Hyla chrysoscelis) began breeding earlier than usual and ended their breeding activities weeks earlier than normal. As a result calls from these species evidenced early onset for the year and ended prematurely. Such calls tended to drown out the more subtle calls of the Blanchard's Cricket Frog (Acris crepitans blanchardi) when species overlapped extensively in breeding activities. The first three species mentioned all occur in the area in much higher numbers than the Blanchard's Cricket Frog. They all produce a louder call than the Blanchard's and their calling may have prohibited both clear identification and recording of calls by the Blanchard's Cricket Frog where the species were sympatric and calling simultaneously.

Students who collected data for the anuran survey were selected from the upper class levels of the Biology Department at Winona State University. They were trained to audibly distinguish between calls of all resident species of

frogs and toads and were trained to survey the frogs using the Wisconsin Department of Natural Resources - nongame division- survey methodology and tapes of frog calls. The students proved to be able to distinguish between species accurately with only one to two hours practice and retained that ability well, as judged by periodic field tests. Students used in 1990 and 1991 were different with a one exception. The students were initiated to their area and its sites by traveling with Dr. Whitford, the grantee. Each student was assigned a single area corresponding to one of the four survey routes created in Houston and Fillmore Counties. In 1991 a small second grant from Winona State University made it possible to send students on surveys in pairs. At this time the students were assigned to two areas, one as their responsibility and a second where they assisted with map reading and other survey duties in a buddy system for areas 1 and 2, and 3 and 4, respectively. Students were given more freedom to determine timing of their surveys in 1991, the only requirement being that surveys be completed at least once every three weeks during the required period. It was an experiment than began well, but ultimately resulted in some major gaps in data as one or two students found excuses to put off surveys repeatedly. This was compounded by the frequent rainy, windy evenings which were unsuitable for call surveys. If this survey were continued, I would set specific dates for sampling and require surveys to be completed within 3 days of those dates, whenever the weather was most favorable within that time period. The timing of the school year versus the survey also compounds the problem of getting students to do surveys. The survey begins in April but extends into June. Final exams, graduation, moves home and summer employment all began in Mid-May and combined to make it more difficult to find and communicate on a regular basis with the students doing the surveys.

At a glance, and judging from 30 year old maps, there has been a substantial change in surface water flow in the surveyed region. Many streams indicated on the maps are absent when looked for, or are represented only by dry washes in 1990. The very wet spring of 1991 served to revive some of the sites for that years survey.

The map reading and navigation skills necessary to find one's way in Houston and Fillmore Counties was slow in coming for some of the students and even for the author. Some sites were consistently missed due to errors in map reading, lack of adequate road signs and/or failure to recognize small dirt roads as public service roads. Over 3300 miles were driven in the surveys- a large part of that simply in getting to and from the observation areas, which are from 30 to 50 miles away from Winona at their nearest points. The first group of students involved in this project, Tom Lisota, Zachary Boudreau and Kent Kruckeberg spent a total of 49 hours involved in the process of data collection. The second year's group included one repeater, Kent Kruckeberg, plus three new members, Joe Hegy, Pat Schultz, and Boyd Rassmussen. Overall, more than half of all surveys were run with the grantee- Dr. Philip Whitford - present to define and refine survey routes and train, supervise or assist students.

To date I can provide no approved documentation of the Blanchard's Cricket Frog having been found in the specified areas of Houston and Fillmore counties. Several sites in area 4 (1990 only) and in area 3 (1991 only), provided very good auditory evidence that the Blanchard's Cricket Frogs were present. Attempts were made in both 1990 and 1991 to document these sightings by recording the calls as specified in documents provided by Minnesota Department of Natural Resources. The presence of large numbers of spring peepers, chorus frogs and leopard frogs in full call completely drown out the Blanchard's call on these tapes. The very early hot weather and heavy rains of 1991 seemed to bring all the frogs out and into breeding condition much earlier and in greater synchrony than in 1990 and that contributed to this problem of excess background noise from other species. At other times the species was heard, but under conditions where recording was not possible due to wind noise. Return visits on calm nights failed to relocate the species and so I could not confirm their presence by recording. At other sites in these counties I or my students heard portions of calls which might have been the Blanchard's, but which were more doubtful. Often the presence of large numbers of other species of anurans, all in full song, made it unlikely that the weak-

voiced call of the Blanchard's could be heard at all over the din, even if it were present. All sites, both of suspected and more certain observation of the species, are marked in blue on the enclosed maps and the specific description of the sites can be found on the appended data sheets.

The data is insufficient at this time to draw any conclusions about the habitat used by the Blanchard's frog species in this region. The sites where I'm fairly certain I've heard the species were quite diverse: one a low pasture (with observations in both study years) was along a slow river just west of La Crescent- though flooded at the time of observation; a second was a shallow grassy marsh of several acres with a small stream through it; still another was a shallow "perched" half acre wetland surrounded by typical bluff-side mixed deciduous forest and drained by a fast stream three feet wide in a coulee several miles west and south of Reno; the last in shallow, very slow flowing, water of a broad flood plain full of marsh grasses 2 miles south and 4 miles west of La Crescent. The only possible sighting for Fillmore county was reported by a student in 1990 who felt that he heard a distant call by a Blanchard's Cricket Frog, often repeated, but which I was unable to hear clearly and identify, though I was present. If this was a Cricket Frog, it was in the dampest portion of a wet pasture, heavily used by cattle, below a slope of oaks in open farm country. The most consistent feature about all these areas where the species was presumed heard was that they were all areas of more-or-less permanent water, less than 10 inches water depth and they evidenced relatively dense vegetation of cattail, reed canary grass and/or sedges. In three of the sites the water was only 3-5 inches deep, but of spring fed origin with little flow and colder than temporary ponds measured. These areas strike me as very susceptible to loss by tiling and draining of fields which would reduce the number of small shallow seep ponds available by increasing the water flow from fields and other superficial aquifer recharge areas. This then might give some explanation of why the species is declining in the area surveyed, if indeed they selectively breed in such sites, for tiling and drainage has certainly been extensive in the surveyed area.

Much more detailed descriptions were intended for areas of confirmed

habitation by Blanchard's Cricket Frogs. Such were to be provided, along with details of water temperature, flow and depth when confirmable populations of this species were found. At present a wide range of water types- potholes, streams and rivers - are included in this survey, as are a broad range of habitat types grading from forest to field. None of these water or terrestrial habitats, other than that described above, has been identified as better than the others as sites to look for this elusive frog species as yet. Perhaps further study will provide greater insight into the where-abouts and habits of this species in southeast Minnesota. Proximity of the best sites for the species to the town of

La Crescent makes it likely that these sites will be subjected to development in the next decade. As such, it may be necessary to limit building in this area to protect the species if it's presence is further documented there.

Data collected about other species present at all sites for all areas indicates that viable populations of northern spring peepers (Hyla crucifera crucifera), chorus frogs (Pseudacris triseriata), leopard frogs (Rana pipiens) and green frogs (Rana clamitans melanota) exist at almost all sites. Woodfrogs (Rana sylvatica) and Pickerel frogs (Rana palustris) were found at only a few scattered locations. Bullfrogs (Rana catesbeiana) were encountered only in the southernmost sloughs along the Mississippi River in Houston County. As a final note, it should be pointed out that data derived from this study provides a good baseline of more-or-less quantified data about numbers of each species present at each described site. Such data may be used to assess long term increase or decrease in populations which may accompany future changes in land use near these sites. This data may also be useful to assess long-term population trends for all the species of anurans which were found at these sites. Caution should be used in interpreting long term comparisons of species populations unless the surveys are conducted at the same times of year and under the same weather patterns as those used in the preliminary surveys reported here. Both seasonal and daily weather patterns were found to have major influences on the timing and levels of breeding call activity observed for these species. Even the precise time of initiation of sampling may have a



profound impact on the data collected as documented at site 1, area 4 on 26 March 1991. On this occasion, surveys half an hour before sunset and three hours after sunset yeilded vastly different estimates of anuran species populations at the same site. It is recommended that multiple year data from the same sites be compared to draw long term conclusions about population fluctuations.

New Site Descriptions Area 1: First run, 1991. 4/ 21/1991 Temp 66 F wind calm  
Start 9:00pm, mileage 80000.0: end 2:20am, 80160.9mi.  
Follow Rte 30 out of Chatfield (east) to Hy 11, right turn (south) to site one.  
Site 1 Large new bridge on hwy 11, over root River.

Site 2 Small hollow and creek bed (wet in 91, dry in 90)

Site 3 " " distant stock pond.

Site 4 Wet flat meadow 1/4 mi from base of hill, small creek.

Site 5 Dry creek bed under small bridge

Site 6 bridge and tile spout just south of road. Nothing heard.

6B (new) weight restriction bridge past road to right, just inside park.

Site 7 Iron bridge over Root River in State park.

Site 8 Dry creek bed

Site 9 Bridge over Root River

Site 10 Small bridge in hollow past turn for mystery cave, missed on all runs '91.

Site 11 New site '91. Pass next Root River Bridge and go up hill to 2 ponds on right.

Site 12 Water course on south Edge of Etna - Dropped in 90, has water in 91.

Site 13 Bridge over Root River, houses ahead on hill.

Site 14 waterway short of left turn on hwy 12 -(may differ from '90s site).

Site 15 Small bridge short of gravel road (hwy 8).

Site 15A Small bridge after sharp bend on hwy 8.

16A Bridge before T.

Site 16 Bridge just before Fillmore.

Site 17 Bridge just before road to left.

Site 18 " "

Site 19 large bridge at Root River.

Site 20 Iron bridge over creek.

Comment: Area appears to have been heavily tiled and drained since the date our maps were produced. Most small streams indicated on maps are dry in spite of a very wet spring. Tiled areas evidence few frogs in our limited study.



Area 1 Date 5/11/91 Observers Boyd Rasmussen, Kent Kruckeberg  
 Temperature Air 75 Water 57 Wind speed <5 MPH  
 Time and Mileage at start 8:20pm 42977 Time/milage end 2:50 43132  
 Cr F Toad Sprg Chor Cope East Pick Leop Grn Wood Bull  
 Cr F Toad peep frog GTF GTF frog frog frog frog frog

Site	Cr	F	Toad	Sprg peep	Chor frog	Cope GTF	East GTF	Pick frog	Leop frog	Grn frog	Wood frog	Bull frog
Site 1			3		2		1					
Site 2			2				2					
Site 3			2	1	1		2					
Site 4			3		1		2					
Site 5			2	1			2					
Site 6			2	2			1					
6A			3	1								
Site 7			nothing									
Site 8			2	2	2	1	2					
Site 9			3	2			1					
Site 10			missed									
Site 11			3	2	1		2					
Site 12			3	1	1							
Site 13			3		2		1					
Site 14			3		3							
Site 15			3		2		1					
15A			nothing									
Site 16A			3	2			1					
16B			2	2			2					
Site 17			3	2	1		2					
Site 18			3	2			2					
Site 19			3									
Site 20			2				2					

Area 2 Description of sites 4/25/91

- Site 1 - new bridge over Root River on 16, first bridge west of Rushford
- Site 2 - across from hatchery left 1 mile on hy 25 near Peterson.
- Site 3 - On 16, 2 miles west of 25/16 intersection. Stop where shoulder is nearest point to river.
- Site 4 - Long new bridge on 16, house on SW side, roughly 3 mi short of Whalan.
- Site 5 - Bridge 1/2 mile short of Whalan, lights in sight, river on right.
- Site 6 - Leave Lanesboro S on 16. Turn right after 1st small bridge onto a gravel road and go forward 1/2 mile. Stop before drive of 2nd house. Wet low ground with small pond to right serves as the site.
- Site 7 - Just north of Whalan on dirt road where park trail begins. Low field to left of road.
- Sites 8 and 9 don't exist for lack of water at chosen sites.
- Site 10- Small bridge over creek where road bends sharply right and uphill.
- Site 11 - Small bridge just short of farmyard with mercury vapor light.  
( go past farm to marshy area on right side of road)
- Site 12 - No water found at indicated site, 1990. Water present 1991.
- Site 13 - Take 1st right off #27. Take gravel past state forest campground (1st Rt) and on to next right on minimum maintenance road. Follow it into river basin to District # 8 Town hall. Marsh is to your right.
- Site 14 - (Bridge in Money Creek just past RV park if you miss earlier road). Intended site 14 is where 76 begins to turn left a short distance beyond where the guardrail begins on the right side of 76.
- Site 15 - no such site found
- Site 16 - Root River Bridge on N. side of Houston. Cross bridge and turn right to grain bins where frogs are calling from.
- Site 17 - First bridge west of Houston on 16 (3-4 mi, with house on right)
- Site 18 - 1/3 mi. beyond 17, house way back on left.
- Site 19 - Next bridge on 16, small, water intermittent
- Site 20 - " "
- Site 21 - Marsh by Dakota Saloon
- Site 22 - Right before Rushford, stop by Rushford sign and listen.

Area 2 Date 4/4/91 Observers K. Kruckeberg and B. Rasmussen  
 Temperature Air 70 Water ? Wind speed calm  
 Time/Mileage start 6:50pm 36168 Time/milage end 11:40pm 36300  
 Blan Amer Sprg Chor Cope East Pick Leap Grn Wood Bull  
 Cr F Toad peep frog GTF GTF frog frog frog frog frog

Site 1	2									
Site 2										
Site 3										
Site 4		Dogs barking at site								
Site 5	1									
Site 6	2				1				1	
Site 7	1									
Site 8		nothing								
Site 9		nothing								
Site 10		nothing								
Site 11	2									
Site 12		nothing								
Site 13		nothing								
Site 14	2	(Money Creek pond rather than proper site 14)								
Site 15	2	near three farms on hy 76, 2 on west one on east side								
Site 16	1	3								
Site 17		nothing heard (dogs barking at site)								
Site 18	2				1					
Site 19		nothing- running water present in two square culverts								
Site 20		nothing indicated on site record								
Site 21*	3	3			1					
Site 22*	2	1			1					

\* site 21 small marsh near Dakota Saloon, just short of bar  
 \* site 22 by Rushford sign at east edge of Town of Rushford. Both new sites for route and first records for them



Area 2 Date 6/25/91 Observers Hegy and Whitford

Temperature Air 92 Water 79 Wind speed 5-MPH

Time and Mileage at start 8:30pm/24499 Time/milage end 1:00am/24610

Blan	Amer	Sprg	Chor	Cope	East	Pick	Leap	Grn	Wood	Bull
Cr F	Toad	peep	frog	GTF	GTF	frog	frog	frog	frog	frog

Site 1										1
Site 2		1								1
Site 3	nothing									
Site 4		1								
Site 5										1
Site 6										1
Site 7										1
Site 8	none exists									
Site 9	" "									
Site 10	nothing									
Site 11										2
Site 12	not found, missed turn for sites									1
Site 13	" "									
Site 14	" "									
Site 15	doesn't exist									
Site 16	too windy to hear									
Site 17										1
Site 18										2
Site 19										2
Site 20	missed site									
21										1
22		1								

Comment: Winds negligible in sheltered areas, 10-15 miles per hour on ridges and exposed areas of open river valley.



Site descriptions/directions to sites in **Area 3**. Begin at La Crescent, leaving town on Highway 6, westbound.

Site 1 Bridge over deep draw on west edge of La Crescent, many houses still present - just 1/2 block past Gopher State Sportsmens Club sign

Site 2 Hollow with 3-4 acre marsh on left, concrete bridge and small river, about 1.5 miles past first site on hy 6.

Site 2.25 small marsh on left about 1 mile beyond site 2. No bridge present. Go 3-4 miles on hy 6 to Evans Hill Road on left. Follow it . Turn right at stop sign at top of hill, left onto hy 25 and follow to site beyond sharp left bend and electric substation.

Site 2.5 farm pond 1/4 mi S. of 25's bend to south. Follow 25 to 21. Turn right, go about 1 mile to big marsh on right on downslope of road.

Site 3 Site 3 is big marsh on right about 1 mile east of 25/21 intersection Follow 21 east for bout 5 miles.

Site 4 Large wet marsh 1/2 mile west of intersection 16 and 21 on 21. Stop where ~~pool~~ is near on right and lights of Hokah are across the valley from you.

Site 5 1/2 mi east of intersection of 16/21 on 16. Small marsh and open water on ~~in~~ of road.

Go ahead on 21 to intersection with 26, turn Right on 26, cross river and turn right onto Hy 7.

Site 6 1/3 mi. West of 7 and 26 intersection small shallow wetspot on left in field/marsh adjacent to road. Follow 7 to site seven.

Site 7 1/2 mi. short of Hokah on 7. Large, long area of open water near road on ~~right~~, surrounded by marsh.

Go through Hokah and out on Hy 16 which is next to the Kwiktrip. Go about 4.5 mi.

Site 7.5 -added 1991- is a small marsh just past a small farm and road to left.

Site 8 is about 1/2 mile beyond site 7.5. It is a wet area several hundred feet long and 20-40 feet wide, left of the road in a hollow between the trees and the road- a wetland created by road building apparently.

Site 9 Large concrete bridge 1/2 mi short of Hy 22 on hy 16.

Site 10 Fast stream near road in a pasture, about 1 mi past road to left. Two large Cottonwoods are at the edge of the pasture and a stock pond should exist about 50 yards to the left of the stopping point at the site.

Follow Hy 22 to 76, turn right and go down hill.

Site 11 No water at site- does not exist

Site 12 Concrete bridge on Hy 76, fast running stream with small marsh to right.

Site 13 River bridge just before highway 4 turns off from 76.

Turn left onto Hy 4.

Site 14 Stop about 3 miles down Hy 4 just beyond bend to right, frogs on left of road in a shallow marsh. House and dogs about 300 yards ahead on right.

Site 15 Deep fast stream passing through culvert between 2 roads to right, about 25 miles beyond last site.

Site 16 Deep fast stream two miles beyond last site and just past road to right.

Site 17 Bridge just past road to right

Site 18 New concrete bridge, loud running water

Site 19 new concrete bridge, loud running water

Site 20 Take right on dead end just past bridge, go .5 mile to a single large tree along the fenceline on the right, standing water visible on right of road.

To Sites 17-20 follow second road to right beyond Yucatan. Return through Rushford. Take 3rd road to left after Yucatan and go left at stop sign at the top of the hill and then turn right at first gravel road (a very sharp right turn) and follow to Hy 16. Go left on 16 to reach Rushford. Then go right (north) at Rushford and follow to I90. Take I90 east to Winona.

Area 3 Date 4/3/1991 Observers Joe Hegy ,Pat Schultz, P. Whitford, Lynn K.  
 Temperature Air 69 Water Broke Thermometer      Wind speed 5 MPH  
 Time and Mileage at start 5:40pm/98020.0 Time/milage end 10:20pm, 98138.0

Blan Amer Sprg Chor Cope East Pick Leap Grn Wood Bull  
 Cr F Toad peep frog GTF GTF frog frog frog frog frog

Site	Blan Cr	Amer F	Sprg Toad	Sprg peep	Chor frog	Cope GTF	East GTF	Pick frog	Leap frog	Grn frog	Wood frog	Bull frog
Site 1	Nothing- noisy											
Site 2	1			2	1							
2.25*	1			3	1				1			
2.5				2	1							
Site 3				3	1				1			
Site 4				2								
Site 5				1								
Site 6				2	3							
Site 7				1	1							
7.5*				2	1			1			1	
Site 8				3							3	
Site 9				2					1			
Site 10				3					1			
Site 11	Dry- nothing											
Site 12	Nothing- fast water											
Site 13				2	2-3							
Site 14				2	3							
Site 15	nothing fast running, deep, steep edged											
Site 16	"											
Site 17	- dry											
Site 18	dry											
Site 19	dry											
Site 20	dry											

Comments: Began early and found some new areas of water visible from road. Blanchard's at site 2, three or four voices drowned out be peepers for recording purposes but audible. Site is a small marshy permanent seep near stream. Site 2.25 is about 1/2 mile beyond bridge with 2-3 acre marsh right along highway 6 only one or two Blanchard's though heard from unapproachable location in center of marsh. Site 3 has been moved to 1/2 mile east of junction Co. Hy 21 and 25. Site 7.5 is a small marsh on right just past farmhouse and road to left, about 1/2 mile short of original site 8.

Area 3 Date 4/24/91 Observers Pat Schultz , Joe Hegy

Temperature Air 66 Water 58 Wind speed 5 MPH

Time and Mileage at start 6:25/28255.0 Time/milage end 12:05/28383

Blan Amer Sprg Chor Cope East Pick Leap Grn Wood Bull  
Cr F Toad peep frog GTF GTF frog frog frog frog frog

Site 1 nothing

Site 2 2 1

Site 2.25 1 3 1

Site 2.5 3 2

Site 3 3 1

Site 4 1 1 1

Site 5 1

Site 6 2 3

Site 7 1 1 location uncertain

Site 7.5 2 1

Site 8 3 1 No wood frogs this time

Site 9 2 1

Site 10 2 1

Site 11 nothing

Site 12 1

Site 13 1 2

Site 14 1 1 1 1

Site 15 nothing

Site 16 1

Site 17 nothing

Site 18 nothing

Site 19 nothing

Site 20 1 1 1

First run for new locations beyond Yucatan, right road finally found! new descriptions added for these sites.



March 26, 1991. Sites descriptions Area 4 SE Houston County.  
Begin south of Reno on Mn Hy 16

Site 1 Turn right onto Hy 249, go 100 yards. Permanent water and marsh on right.

Site 2 Small stream and wetland about 1/2 mile beyond last site.

Site 3 Dry wash.

Site 4 Bridge just below church. (no flow this year where stream was last year)

Site 5 Low spot just past road on right.

Site 6 Bridge just past Freeburg.

Site 7 3rd Bridge west of Freeburg.

Site 8 Turn right on Hy 32 for about 1/2 mi to next intersection. Stop there. Return to original road and direction to go on to next sites.

Site 9 All Bridges for 5 mi south of Caledonia on hwy 5 Dry.

Site 10 Past Camp Winnebago and 15mph curve, approx. 1/2 mile past small bridge,  
Stop near noisy stream on right.

Site 11 Narrow bridge before sharp bend. Dry wash.

Site 12 Big new concrete bridge just before hwy 23.

Site 13 Next narrow bridge after 12.

Site 14 Small pond on left of road just short of dead end road to left (road not indicated on map), cattail marsh to right side.

Site 15 Red Iron Bridge about 2 mi past last site in low ground.

Site 16 Town lights in sight- river and marsh to left of road  
Go to town turn left onto HY 16.

Site 17 Just north of 249, large slough on right side of road.

Site 18 Just south of Brownsville- pond on left of 26 just beyond sign for wildcat slough.

Area 4 Date March 26, 1991 Observers Whitford, Kruckeberg, Schultz, Hegy  
 Temperature Air 25 C Water -standing pool- 21 C Wind speed 5 MPH  
 Time and Mileage at start 4pm, 97760.0mi. Time/milage end 8:15pm, 97885.0  
 Blan Amer Sprg Chor Cope East Pick Leap Grn Wood Bull  
 Cr F Toad peep frog GTF GTF frog frog frog frog frog

Site 1

Site 2

Site 3

Site 4 3

Site 5 2

Site 6 too much background noise today

Site 7 skipped

Site 8 nothing

Site 9 dry

Site 10 nothing

Site 11 nothing

Site 12 2

Site 13 nothing

Site 14 3 1 1

Site 15 1 2

Site 16 2 1

Site 17 3 1

Site 18 3 (borderline between 2 and 3 for chorus F.)

Site 19 none exists

Site 20 none exists

Comments: Much less flow at site 4 this year than last. Most calling from extensive flooded pasture/marsh 1/2 mi west and north of site along river. Saw a leopard frog and tadpole in shallow temporary pond at site 2, where water temperatures were taken. Many dead leopard frogs on highway along Mississippi River. Day was unusually warm and sunny. The run was begun early and may have resulted in lack of calling at earliest sites. Frogs were calling as dusk approached. Site one had frogs audible from site 17 after dark.



Area 4 Date 6/1/1991 Observers Joe Hegy  
 Temperature Air 75 Water 66 Wind speed 5 MPH  
 Time and Mileage at start 8:00pm/28782 Time/milage end 12:15/28910  
 Blan Amer Sprg Chor Cope East Pick Leap Grn Wood Bull  
 Cr F Toad peep frog GTF GTF frog frog frog frog frog

Site	Blan Cr	Amer F	Sprg Toad	Chor peep	Cope frog	East GTF	Pick GTF	Leap frog	Grn frog	Wood frog	Bull frog
Site 1						1			1		
Site 2						2					
Site 3	nothing										
Site 4					1	2					1
Site 5						1					
Site 6			1			2					1
Site 7									1		
Site 8						1					
Site 9						1					
Site 10			1			1					
Site 11	nothing										
Site 12			1	1		1					
Site 13			1								
Site 14			1		1	1	2				
Site 15			1		1	1	1		1		
Site 16			1		2	2	1		1		
Site 17					1	2			1		
Site 18					1	1	3				
Site 19	none exists										
Site 20	none exists										



Frog Survey Area 1 1990-data repeated in later 1-3 level form on following sheets to facilitate comparisons between years of data

Begin April 16, 1990 With Fillmore County initial run  
Temp 40 F Wind 6-8 increasing to near 20 mph.  
Mileage at start 78101.8, time 7:25pm. End 78261.2, 1:30 am. (115mi)  
\*\*\*\* This Area broken into areas 1 and 2 for all later runs.

Sites changed for following runs

Site 1 New bridge 2 miles west of Rushford over Root River - nothing

Site 2 Fish hatchery SE of Peterson - nothing

Site 3 Pull off 1.5 mile SW of Peterson along Root River - nothing

Site 4 Small stream bridge 3 mile E of Whalan- nothing

Site 5 River bridge in sight of Whalan's lights- distant calls of spring peepers to NW and SE- only occasional

Site 6 Lost Lake state game refuge border- 1/2 mile up first dirt road outside of Lanesboro- nothing

Site 7 Camp creek 2 mile SE of Preston- Nothing

Site 8 Bridge 1/4 mile N on 11 from 118/12- Several spring peeper and chorus frogs in sheltered creek bed

Site 9 Root River Bridge 1 mi. W. of start 118- nothing

Site 10 Bridge over Root River at Forestville State park- nothing

Site 11 Root River Bridge 3/4 mi. W on hwy 5 from intersection 5 and 12

Site 12 Root River Bridge near Mystery Cave Entrance- nothing

Site 13 Root River Bridge 1 mi. north of Etna- nothing

Site 14 Bridge 2 mi. SE Spring Valley- dry- nothing

Site 15 Bridge 1/4 mi S. of Hwy 8 2 mi. NE of Spring Valley- nothing

Site 16 Bridge 1/2 mile W of Fillmore on Carters Creek.- nothing

Site 17 Bridge Carson Creek hwy 5 - nothing

Site 18 Bridge Upper Bear Creek hwy 5 Nothing

Site 19 Bridge N. Branch Root River Hwy 52 Nothing

Site 20 Rice Creek Bridge Hwy 6 nothing

Subsequent stops not listed as sites. Frogs not heard. Suspect cold has stopped activity

Area 1 April 16, 1990 Data here converts and repeats preceeding page

Temp 40 degree F, Wind 5mph increasing to 20. Start 7:25 end 1:30am.

Blan Amer Sprg Chor Cope East Pick Leop Grn Wood Bull  
Cr F Toad peep frog GTF GTF frog frog frog frog frog

Site 1	nothing										
Site 2	nothing										
Site 3	nothing										
Site 4	nothing										
Site 5			1								
Site 6	nothing										
Site 7	nothing										
Site 8			1	1							
Site 9	nothing										
Site 10	nothing										
Site 11	nothing										
Site 12	nothing										
Site 13	nothing										
Site 14	nothing										
Site 15	nothing										
Site 16	nothing										
Site 17	nothing										
Site 18	nothing										
Site 19	nothing										
Site 20	nothing										

Suspected that cold has caused frogs to stop calling

New Site 1 First run. Original split to reduce distance.  
Zach Boudreau and Philip Whitford May 21, 1990 Temp 66 F wind calm  
Start 9:00pm, mileage 80000.0: end 2:20am, 80160.9mi.

- Site 1 Large new bridge on hwy 11, over root River. Nothing heard.
- Site 2 Small hollow and dry creek bed "
- Site 3 " " distant stock pond chorus frog (1)
- Site 4 Wet flat meadow 1/4 mi from base of hill, small creek. A possible single Blanchard's distant to east, spring peeper (1)
- Site 5 Dry creek bed under small bridge, spring peeper (1) distant to West.
- Site 6 bridge and tile spout just south of road. Nothing heard.
- Site 7 Iron bridge over Root River in State park. Nothing heard
- Site 8 Dry creek bed "
- Site 9 Bridge over Root River, peepers (1) Chorus frogs (1)
- Site 10 Small bridge in hollow past turn for mystery cave. peepers(1) Chorus (1)
- Site 11 Bridge over Root River - peepers (2)
- Site 12 Edge of Etna - too many dogs, no water drop from future runs-no frogs
- Site 13 Bridge over Root River, houses ahead on hill. Amer. toads (3). spring peepers (1)
- Site 14 dry creek bed short of hwy 12 - no water no frogs
- Site 15 Small bridge short of hwy 8 peepers (1) Chorus (1)
- Site 15A Small bridge after sharp bend on hwy 8 distant peepers (1) and chorus frogs (1)
- Site 16 Bridge just before Fillmore, peepers (1)
- Site 17 Bridge just before road to left peepers (1)
- Site 18 " " " chorus frogs (1)
- Site 19 large bridge at Root River " "
- Site 20 Iron bridge over creek Peepers (2) Chorus (1) Amer Toad (3)\*\*  
\*\* lost shortly hereafter, site may not be that on map.

Comment: Area appears to have been heavily tiled and drained since the date our maps were produced. Most small streams indicated on maps are dry in spite of a very wet spring. Tiled areas evidence few frogs in our limited study.



Area 1 June 29, 1990

Post rain, partly cloudy, temp. and winds not recorded. Zach Boudreau as observer, 152 miles.

Blan	Amer	Sprg	Chor	Cope	East	Pick	Leap	Grn	Wood	Bull
Cr F	Toad	peep	frog	GTF	GTF	frog	frog	frog	frog	frog

Site 1 nothing

Site 2 "

Site 3 1 1

Site 4 1 1

Site 5 1

Site 6 nothing

Site 7 "

Site 8 1

Site 9 1 1

Site 10 1 2

Site 11 nothing

Site 12 "

Site 13 1 1 1

Site 14 nothing

Site 15 1

Site 16 1

Site 17 1 2

Site 18 1

Site 19 1 1 1

Site 20 2 2

Area 2 May 15, 1990. Air temp 60F wind 6-8mph. First run of new area 2. Sites changed again to reduce distance and when planned sites were dry.

Lisota, Kruckeberg and Whitford observers. Start 8:30pm 71204 mi.

End 1:30am 71325 mi.

	Blan Cr F	Amer Toad	Sprg peep	Chor frog	Cope GTF	East GTF	Pick frog	Leap frog	Grn frog	Wood frog	Bull frog
--	--------------	--------------	--------------	--------------	-------------	-------------	--------------	--------------	-------------	--------------	--------------

Site 1		3	1			1					
--------	--	---	---	--	--	---	--	--	--	--	--

Site 2		2	1								
--------	--	---	---	--	--	--	--	--	--	--	--

Site 3 nothing

Site 4					1						
--------	--	--	--	--	---	--	--	--	--	--	--

Site 5			2								
--------	--	--	---	--	--	--	--	--	--	--	--

Site 6		2	2			1		1			
--------	--	---	---	--	--	---	--	---	--	--	--

Site 7 site dropped for future - very noisy shallow river with no frog calls

Site 8 no water

Site 9 no water

Site 10									1		
---------	--	--	--	--	--	--	--	--	---	--	--

Site 11			2						1		
---------	--	--	---	--	--	--	--	--	---	--	--

Site 12 Money creek 2 Accidental site

Site 13 Missed site-- on wrong road ended in Money Creek

Site 14	"						"				
---------	---	--	--	--	--	--	---	--	--	--	--

Site 15	"						"				
---------	---	--	--	--	--	--	---	--	--	--	--

Site 16		2	2			1		1			
---------	--	---	---	--	--	---	--	---	--	--	--

Site 17 Failed to recognize sites in fog

Site 18	"					"					
---------	---	--	--	--	--	---	--	--	--	--	--

Site 19	"		2			"					
---------	---	--	---	--	--	---	--	--	--	--	--

Site 20	"					"					
---------	---	--	--	--	--	---	--	--	--	--	--

Area 2 June 5, 1990 Temp 65F, calm, very foggy. Observers Kruckeberg, Boudreau, passenger-- Paul Sutter. Begin 9:30 pm 30056mi.

End 2:45 am 30203mi.

Blan	Amer	Sprg	Chor	Cope	East	Pick	Leap	Grn	Wood	Bull
Cr F	Toad	peep	frog	GTF	GTF	frog	frog	frog	frog	frog

Site 1 nothing

Site 2 nothing

Site 3 nothing

Site 4 nothing

Site 5 1

Site 6 3 1 2

Site 7 eliminated by change of route

Site 8 " "

Site 9 " "

Site 10 nothing

Site 11 nothing

Site 12 Money Creek again

Site 13 Failed to find proper road out of Rushford - sites missed

Site 14 " "

Site 15 " "

Site 16 2 1 1

Site 17 2

Site 18 nothing

Site 19 none

Site 20 none





Area 3 first run 4/19/90

temp. 50 F calm winds P. Whitford sole observer

Start 9:05pm, 78413.2 miles End 1:58am, 78552.5 mi (139mi)

- Site 1 Bridge over deep draw on west edge of La Crescent, many houses still present - peepers only
- Site 2 Hollow with 3-4 acre marsh on left- Many peepers 1 leopard frog and 2-3 or more Blanchard's cricket Frogs. Not recordable.
- Site 2.5 farm pond 1/4 mi S. of 25's bend to south. Peepers and Chorus frogs .
- Site 3 peepers 1/4 mile south of bridge. Dogs at near house make site impractical for future use
- Site 4 Large wet marsh 1/2 mile west of intersection 16 and 21 on 21 many peepers and leopard frogs
- Site 5 1/2 mi east of intersection 16/21 on 16. Small marsh and open water on north of road. Many peepers and possible Blanchard's though calls not strongly serial.
- Site 6 1/3 mi. W 7 and 26 intersection on left in field/marsh. Many peepers, 1 leopard, 1 chorus 1 possible Blanchard's CF
- Site 7 1/2 mi. short of Hokah on 7 - peepers, chorus and leopard frogs on right in open water and marsh.
- Site 8 Small marsh on left of road with trees- wetlands created by road building apparently. Scattered chorus, wood and leopard frogs plus many peepers.
- Site 9 Bridge 1/2 mi short of 22/16. Scattered peepers only
- Site 10 Fast stream near road about 1 mi past road to left. Two large Cottonwoods and pond at site. Peepers only present
- Sites 11 and 12 no water or frog habitat found will revise.
- Site 13 Bridge before highway 4 turns off from 76. Peepers only
- Site 14 on rise beyond bend to right, frogs on left of road- Peepers and chorus frogs only
- Site 15 Deep fast stream between roads to right. No calls.
- Site 16 " just past road to right. " "
- Site 17 Deep fast stream crossed by road- no calls
- Site 18 " " "
- Site 19 " " "
- Site 20 " " "

Area 3 April 19, 1990 data here converts and repeats that on preceeding page

	Blan Cr F	Amer Toad	Sprg peep	Chor frog	Cope GTF	East GTF	Pick frog	Leop frog	Grn frog	Wood frog	Bull frog
Site 1			2								
Site 2	1		3					1			
2.5			2	2							
Site 3			2								
Site 4			3					2			
Site 5	(1)?		3								
Site 6	(1)?		3	1				1			
Site 7			2	2				2			
Site 8			3	1				1		1	
Site 9			1								
Site 10			2								
Sites 11 and 12	no water, later revised										
Site 13			2								
Site 14			2	2							
Site 15	nothing										
Site 16	nothing										
Site 17	nothing										
Site 18	nothing										
Site 19	nothing										
Site 20	nothing										



Area 3 June 18, 1990. Zach Boudreau and P. Whitford observers  
 Air temp 74 degree F, wind calm, Water (standing) was 64 degrees F. Start at 8:40pm, 127778.0  
 mi. End 1:40am, 127910.0 mi.

	Blan	Amer	Sprg	Chor	Cope	East	Pick	Leop	Grn	Wood	Bull
	Cr F	Toad	peep	frog	GTF	GTF	frog	frog	frog	frog	frog

Site 1	nothing-----										
Site 2		1						2			
Site 3					2	2					
Site 3.5**new					3	3			2		
Site 4		1	1		2	2			1		
Site 5					2	2					
Site 6					2	2			1		
Site 7		2		1	3	3			1		
Site 8	omitted for lack of water										
Site 9		1			1	1					
Site 10		1							3		
Site 11	doesn't exist, no water										
Site 12	had water for first time from					1	recent rain-				
Site 13					3	3					
Site 14					3	3					
Site 15	nothing										
Site 16					1	1					
Site 17							1 (distant)				
Site 18									1		
Site 19	omitted as not worthwhile since they are too near 18 for significant differences in habitat.										
Site 20	ibid.										

Area 3.5 - large marshy areas 1 mi. east of 25/21 intersection  
 \*5 dense pond algae scum over whole surface, no calls from stock pond but some from south side of road

April 18, 1990. Sites 1-20 Area 4 SE Houston County. Initial run.  
Temp 52F Wind 4-5 start 8-10 end  
Beginning mileage 78281.9, time 9:10pm End 78401.1 1:15am (119mi)  
Data on this sheet is repeated on the following page in modified form to correspond with later used format.

Site 1 10:10pm Pull off just onto 249. Permanent water and marsh. Numerous spring peepers and 6-8 leopard frogs.

Sites 2 and 3 failed to recognize bridges/creeks may not be adequate for future sampling.

Site 4 Bridge just below church. Numerous spring peepers and 3-4 \*\*\*Blanchard's cricket frogs. Positive ID. Too distant to record.

Site 5 10:35 Low spot just past road on right. Many peepers, 1 chorus Frog

Site 6 Bridge just past Freeburg- 20-30 spring peepers

Site 7 3rd Bridge west of Freeburg. Spring peeper's along stream.

Site 8 New concrete bridge just past hy 32 on Crooked creek. - nothing

Site 9 All Bridges for 5 mi south of Caledonia on hwy 5 Dry.

Site 10 Past Camp Winnebago and 15mph curve, approx. 1/2 mile past small bridge, noisy stream near on right, peepers only.

Site 11 Narrow bridge before sharp bend. Dry wash. Nothing

Site 12 Concrete bridge just before hwy 23. Peepers only, to side in low area.

Site 13 Next narrow bridge after 12- nothing

Site 14 Small pond on left of road just short of dead end road to left (road not indicated on map), cattail marsh to right side. Many spring peepers heard and 2 pickerel frogs- more rapid and higher pitch than leopard frogs.

Site 15 Red Iron Bridge about 2 mi past last site in low ground- scattered calling by peepers

Site 16 Town lights in sight- river and marsh to left of road numerous spring peepers and leopard frogs calling

Site 17 Just north of 249, large slough on right side of road. Several scattered peepers, a few wood frogs, many leopard frogs.

Site 18 Just south of Brownsville- pond on left of 26 just beyond sign for wildcat slough. Several chorus frogs, many peepers, too many leopard frogs to count

Area 4 April 18, 1990 data here converts and repeats preceeding page  
 Temp 52 degrees F, Wind 5mph at start (9pm), 10 at end (1:15 am).  
 Blan Amer Sprg Chor Cope East Pick Leap Grn Wood Bull  
 Cr F Toad peep frog GTF GTF frog frog frog frog frog

Site	Blan	Amer	Sprg	Chor	Cope	East	Pick	Leap	Grn	Wood	Bull
Site 1			3								1
Site 2	not found on this run										
Site 3	not found on this run										
Site 4	***1		3								
Site 5			3	1							
Site 6			2								
Site 7			2								
Site 8	nothing										
Site 9	dry wash										
Site 10			1								
Site 11	nothing										
Site 12			2								
Site 13	nothing										
Site 14			3				1				
Site 15			1								
Site 16			3					2			
Site 17			1					2		1	
Site 18			3	1				3			
Site 19	none exists										
Site 20	none exists										



Area 4 May 22, 1990 Water 48 degree F at stream, 54 F in stock pond  
 P. Whitford, T. Lisota, R. Baker observers. 5 hour 20 min. from Winona and return. Air temp  
 68 degree F.

	Blan Cr F	Amer Toad	Sprg peep	Chor frog	Cope GTF	East GTF	Pick frog	Leop frog	Grn frog	Wood frog	Bull frog
Site 1		2	1		1	3		1			
Site 2		2	1			3					
Site 3			2			3					
Site 4		2	2			3		1			
Site 5		3	2			3					
Site 6		3	3			1					
Site 7		2	2			2		1			
Site 8			2		1	2					
Site 9	no site										
Site 10			1								
Site 11	water in ditch from today's rain										
Site 12		2	2		1	3					
Site 13	no sounds at iron bridge over stream										
Site 14		3	2			1					
Site 15		3	1	1		1		1			
Site 16		3	1	1		1		1			
Site 17		1	1		1	3		1	1		
Site 18		1	1	1		3					
End of run. No sites 19 or 20 exist											



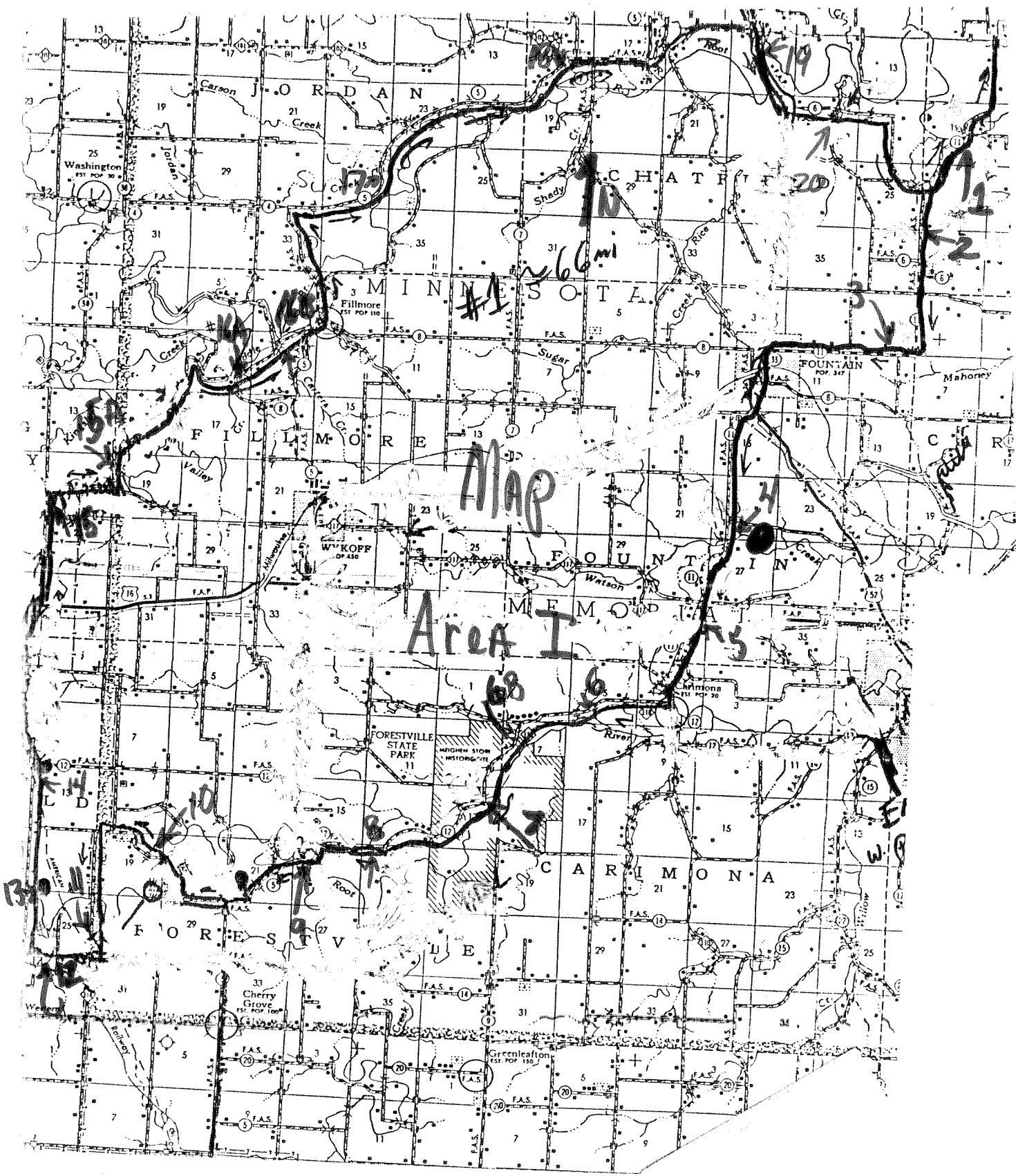
Area 4 June 13, 1990. Water temps 54 F in stream. Night foggy and calm, 74 F air temp.  
 P. Whitford sole observer. Start 9:45pm 81411.1 mi. End 2:00am 81530.3 mi.

	Blan Cr F	Amer Toad	Sprg peep	Chor frog	Cope GTF	East GTF	Pick frog	Leap frog	Grn frog	Wood frog	Bull frog
--	--------------	--------------	--------------	--------------	-------------	-------------	--------------	--------------	-------------	--------------	--------------

Site 1		1			3	3			3		1
Site 2					1	1					
Site 3					2	3					
Site 4	missed site in fog										
Site 5	" "										
Site 6		1			1	3					
Site 7	missed in fog										
Site 8					1	3					
Site 9	no site										
Site 10	missed in fog										
Site 11		1			1	1					
Site 12		1				1					
Site 13	nothing heard										
Site 14	missed in fog										
Site 15		1		2	1	2			1		
Site 16		1			1	2			1		
Site 17		1				2			3		1
Site 18		1		1		2			1		

End. No site 19, 20 exist.

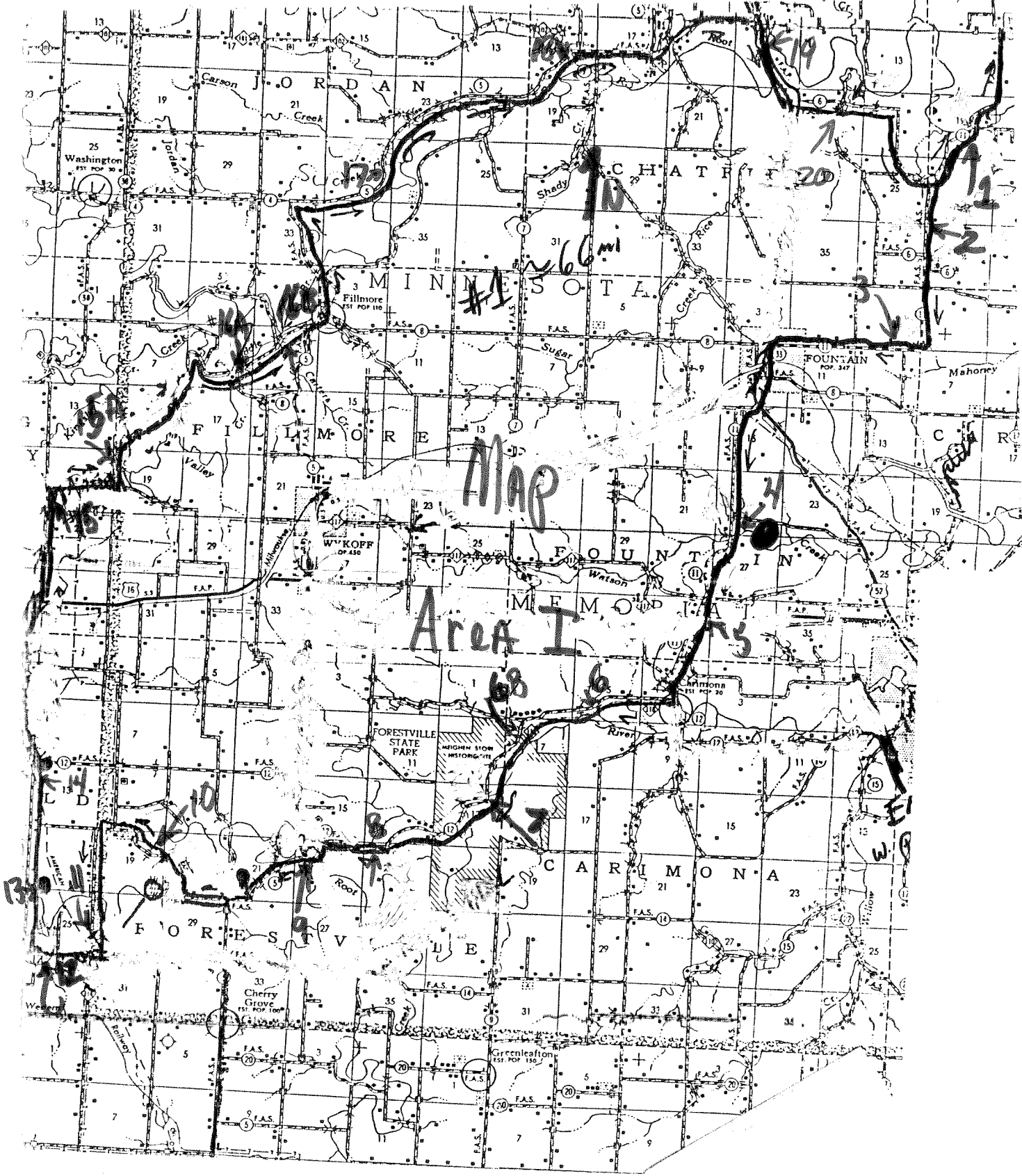
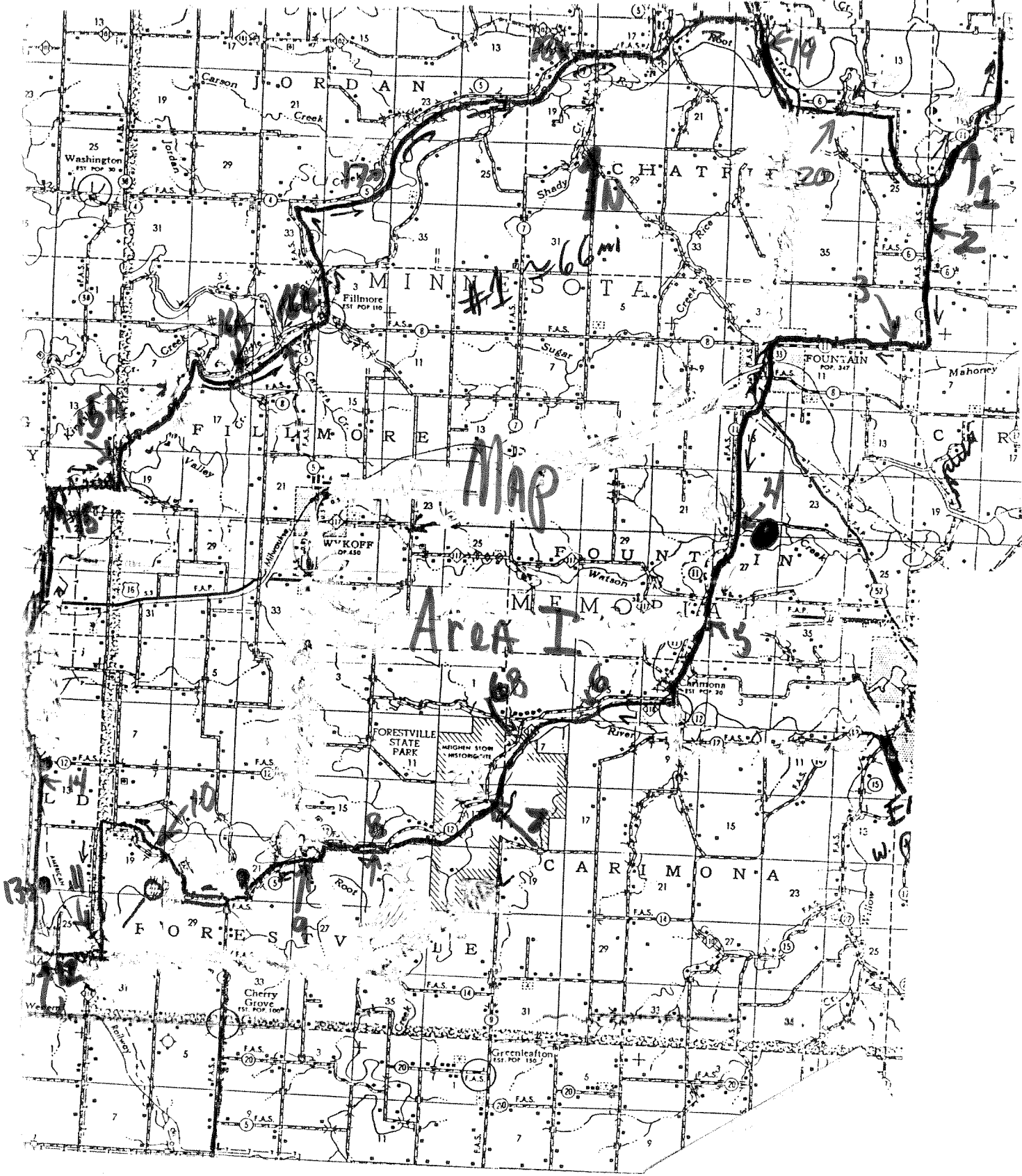
Comment some confusion about site location and numbers in fog and with route revisions. Final sites and data are corrected for errors on this form

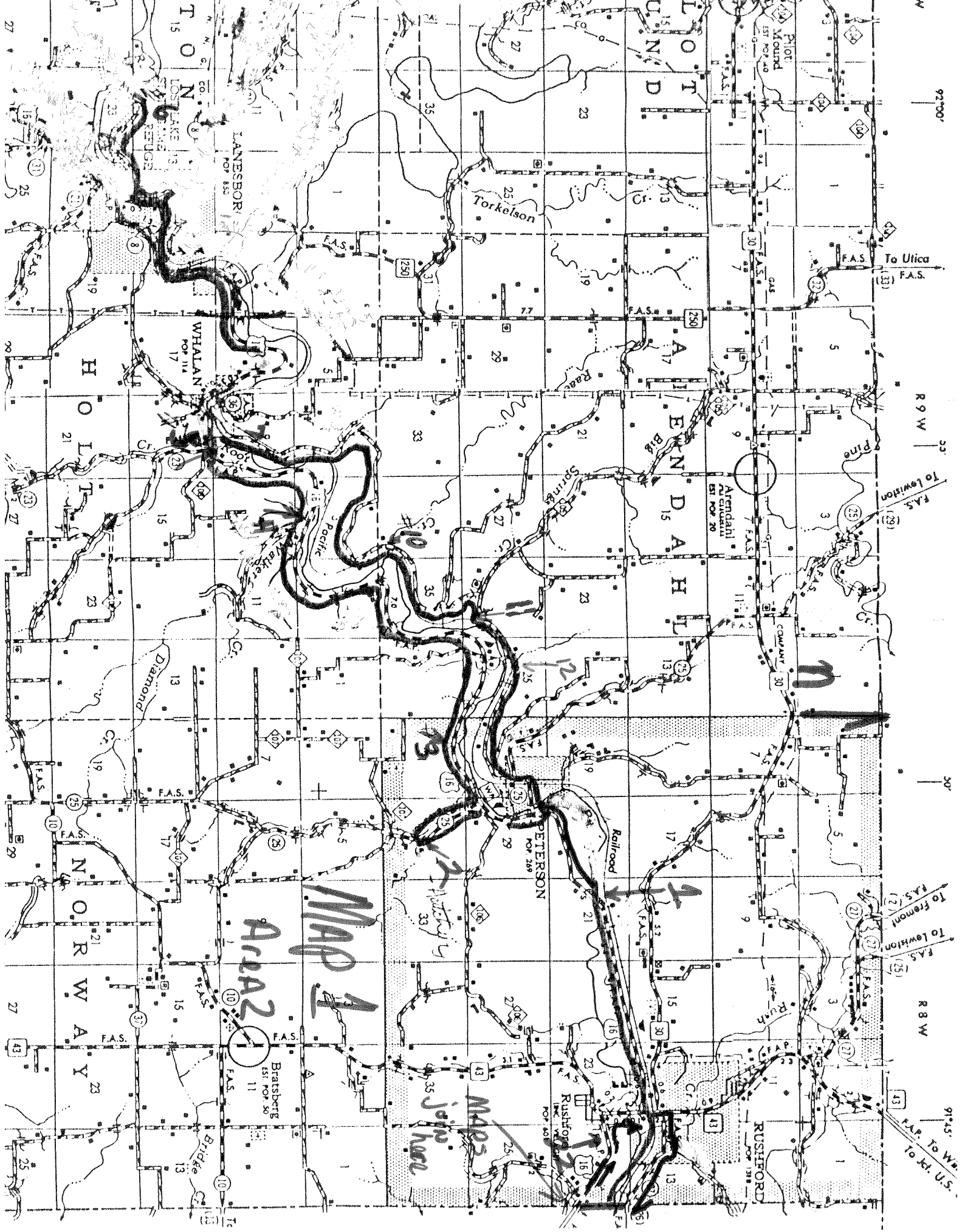


MAP

Area I

6.6 mi





92°00'

R 9 W

30'

R 8 W

91°45' W  
To Mt. U.S.

To Ulica  
F.A.S.

To Lewiston  
F.A.S. (2)

To Fremont  
F.A.S. (2)

To Lewiston  
F.A.S. (2)

To Mt. U.S.

N

Pilot  
Mounted  
Est. Pop. 40

Ardenah  
Ardenah  
Est. Pop. 20

PETERSON  
Pop. 269

RUSHFORD  
Pop. 181

LANESSBOR  
Pop. 852

WHALAN  
Pop. 114

Bratsberg  
Est. Pop. 50

Rushford  
Pop. 40

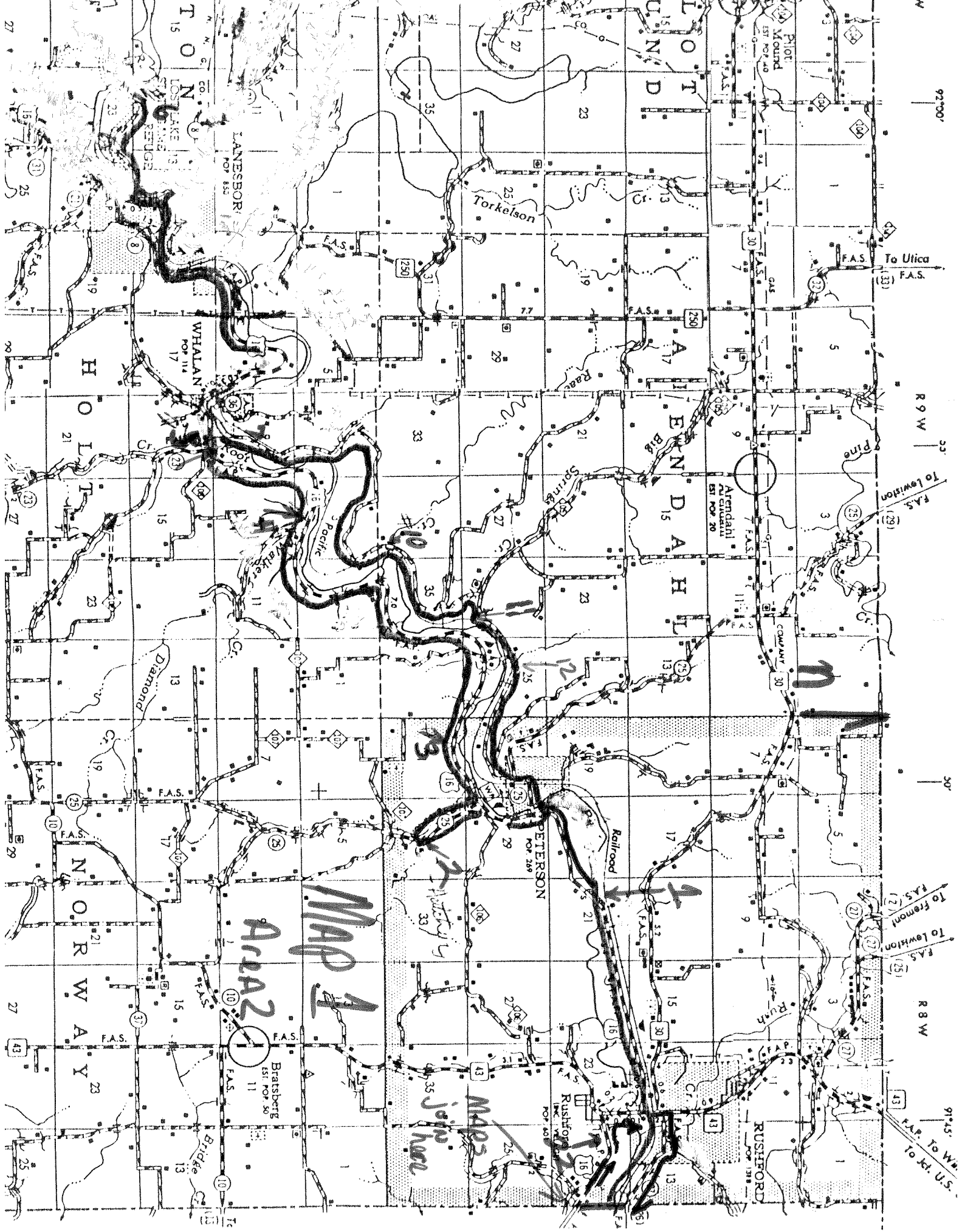
Torkelson

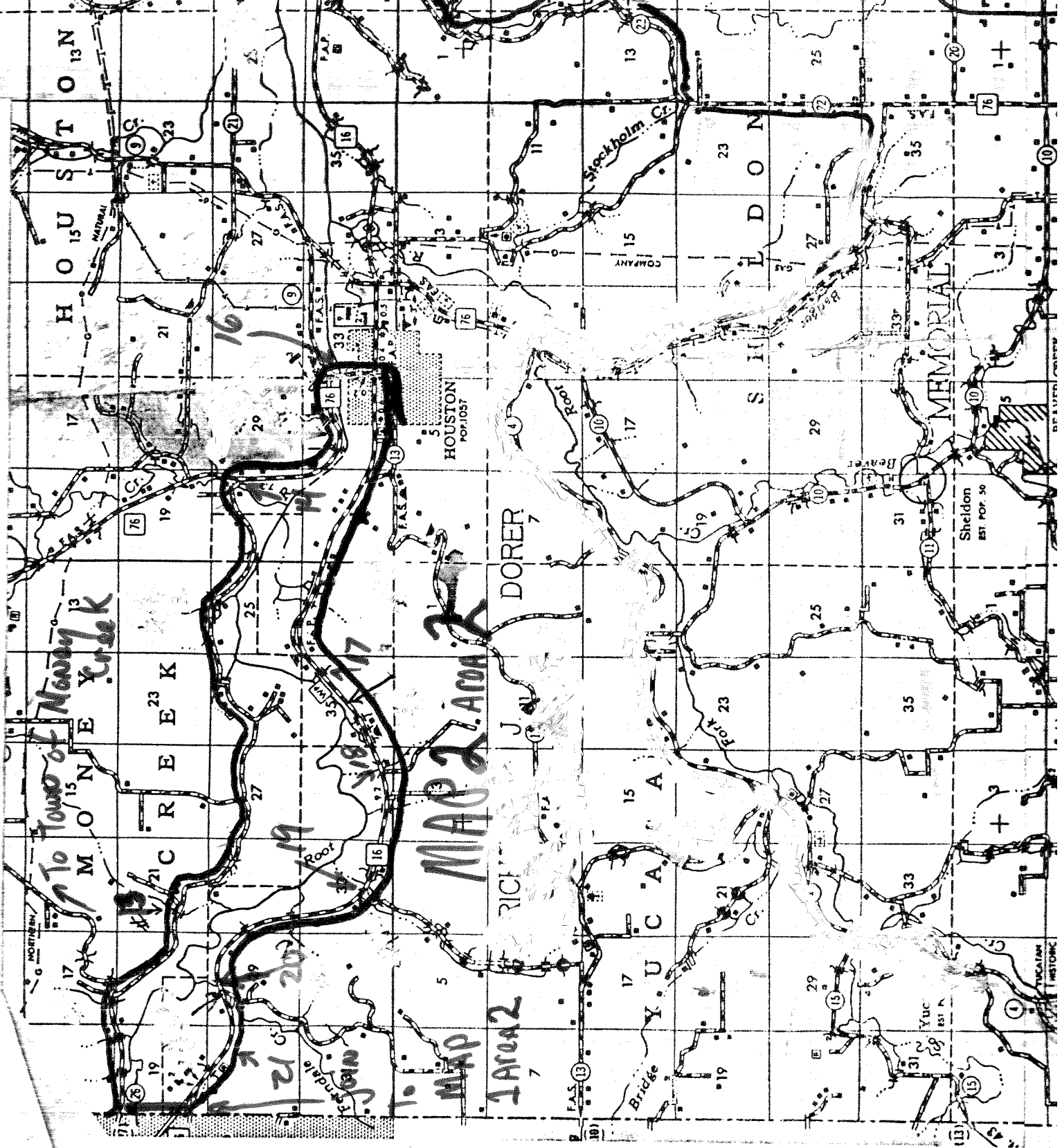
ERNDAHL

MAP 1

Area 2

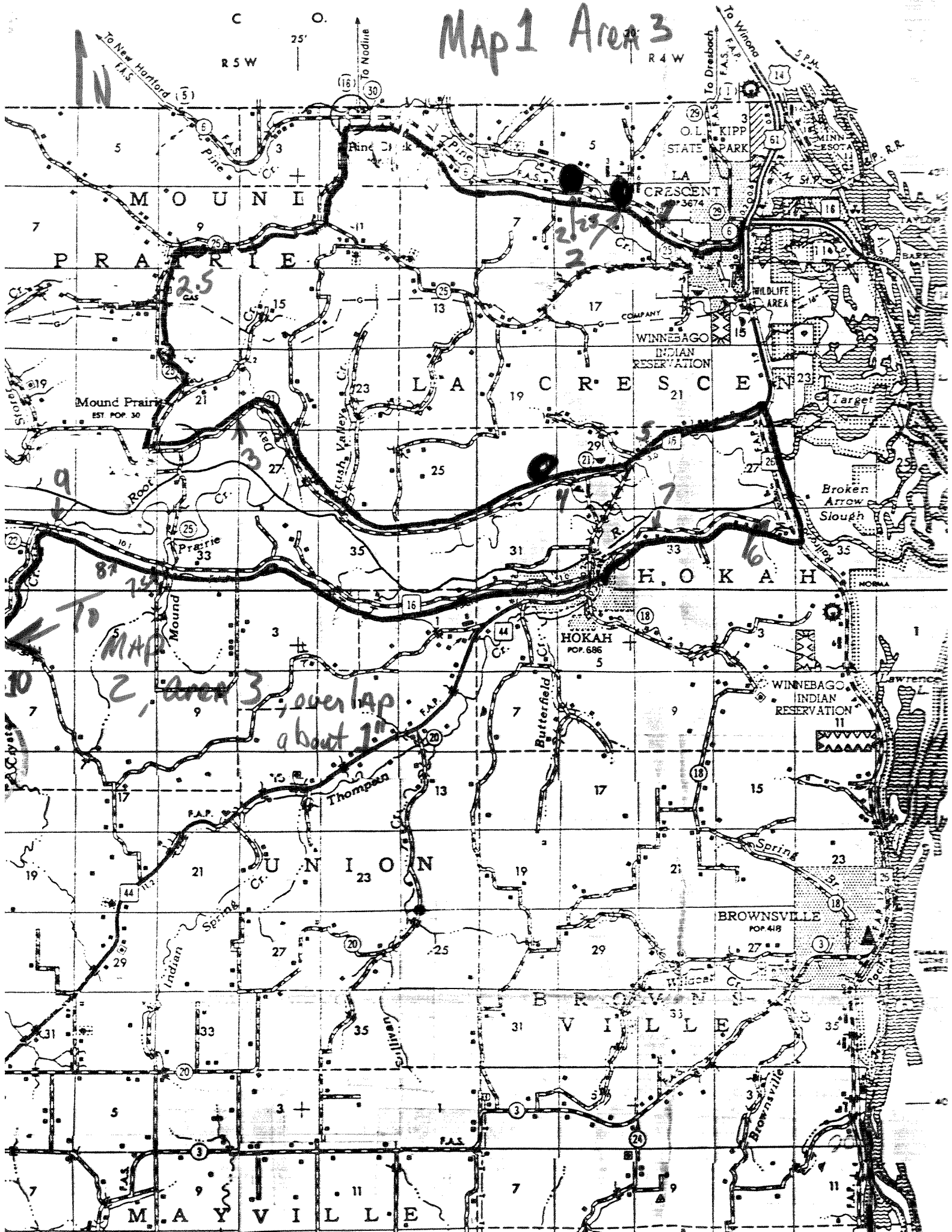
MAP 2  
Jep's home





To 1/1

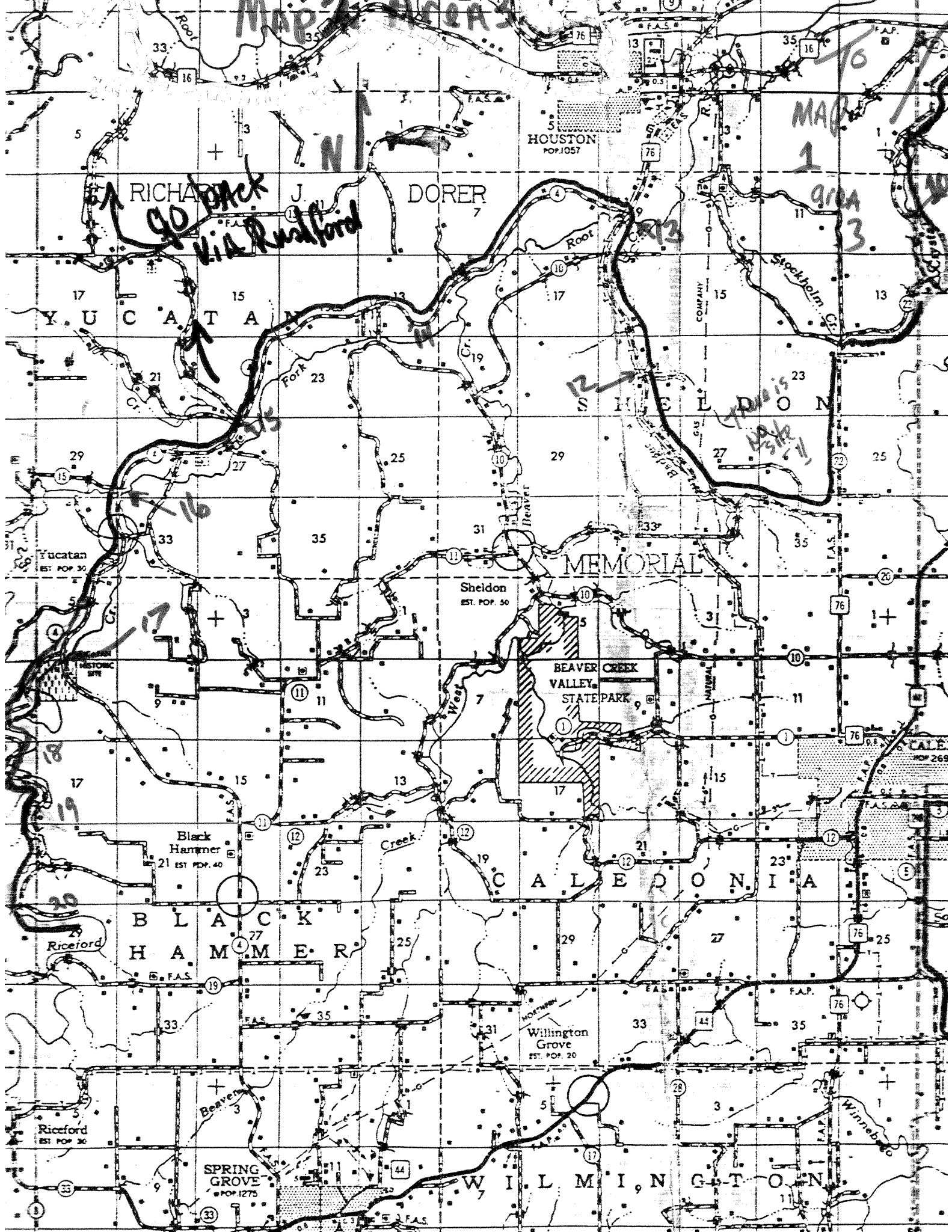
# Map 1 Area 3



To New Hartford  
F.A.S.  
R 5 W  
25'  
To Nodine  
R 4 W  
To Dresbach  
F.A.S.  
To Winona  
S.P.M.  
MINN-ESOTA  
R.R.  
WILDLIFE AREA  
COMPANY  
WINNEBAGO INDIAN RESERVATION  
MOUND PRAIRIE EST. POP. 30  
MOUND  
PRairie  
HOKAH POP. 685  
WINNEBAGO INDIAN RESERVATION  
BROWNSVILLE POP. 418  
MAYVILLE

9  
10  
2, area 3, overlap about 1/2

12/22/71



MAP 2

MAP 1  
9/10A  
3

GO BACK  
via Riceford

12

HOUSTON  
POP. 1057

RICHARDSON

DORNER

YUCATAN

MEMORIAL

Sheldon  
EST. POP. 50

BEAVER CREEK  
VALLEY  
STATE PARK

Yucatan  
EST. POP. 30

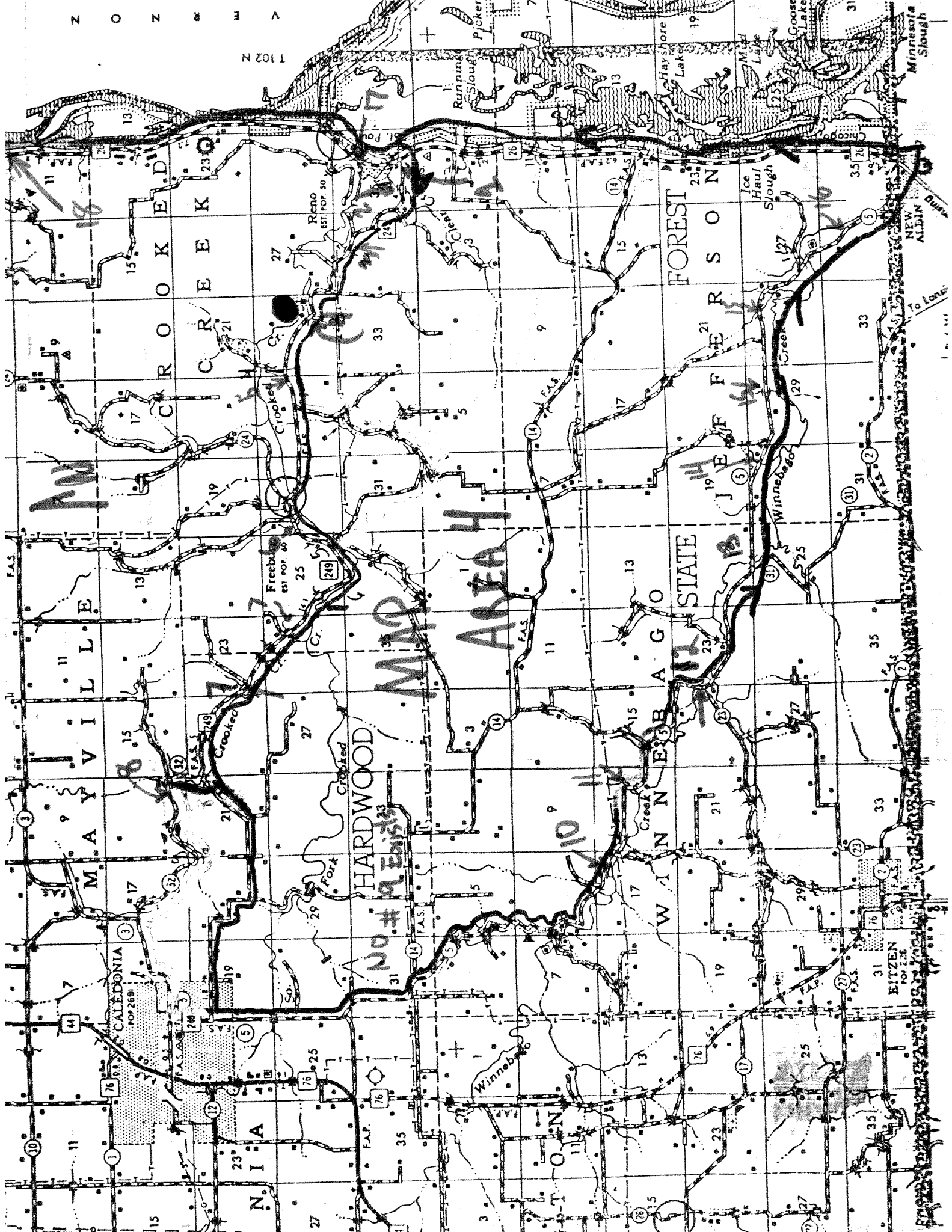
Black  
Hammer  
EST. POP. 40

BLACK  
HAMMER

Wilmington  
Grove  
EST. POP. 20

SPRING  
GROVE  
POP. 1275

WILMINGTON



N O R T H  
T 102 N

C R O O K E E K  
C R O O K E E K

M A Y V I L L E  
M A Y V I L L E

N I A  
N I A

H A R D W O O D  
H A R D W O O D

N O # 9 E 15 S  
N O # 9 E 15 S

M A P  
M A P

A R E A H  
A R E A H

10  
10

F O R E S T  
F O R E S T

S T A T E  
S T A T E

W I N N E B A G O  
W I N N E B A G O

T O W N  
T O W N

F E R S O N  
F E R S O N

E I T Z E N  
E I T Z E N

I C E  
I C E

H A U L  
H A U L

S L O U G H  
S L O U G H

M I N N E S O T A  
M I N N E S O T A

N E W  
N E W

A L B I N  
A L B I N

D U P L E X  
D U P L E X