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Study Title: Florida Panther Movements, Social Organization and Habitat Utilization

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Abstract--A total of 1,464 radio locations were used to determine home range sizes of 10 Florida panthers in Collier and Hendry counties. Adult males averaged 507 km² and adult females averaged 184 km². A juvenile male and female used areas of 433 km² and 70 km², respectively. Frequent interactions among adult males and a female with kittens were documented as was an aggressive encounter between an adult male and juvenile male. Two panthers were treated at the Miami Zoo, one had been wounded from a gunshot, the other had been injured by a motor vehicle. Diel monitoring revealed activity peaks around sunset and sunrise with inactivity occurring during mid-day. Day use sites typically are dense saw palmetto thickets that may provide thermal advantages as well as security. An adult female panther was removed from the Fakahatchee Strand State Preserve for nutritional evaluations and captive breeding. Panther #09 has exhibited behavior typical of parturition and denning. Intensive monitoring will continue in order to document number of kittens and associated maternal behavior. A preliminary panther population model was developed. Refinements are still necessary but it demonstrates the impacts of recruitment rates, litter size, and kitten survival.

Florida panthers (Felis concolor coryi) occupy one of the largest remaining contiguous tracts of wildlife habitat in the eastern United States. Public and private lands covering parts of Collier, Dade, Broward, Palm Beach, Lee, Hendry and Glades Counties make up a contiguous system of wild lands totalling over 5 million acres. However, continued expansion of the urbanized east coast, increasing growth on the west coast and the spread of agricultural development in the interior has placed unprecedented pressures on the external and internal integrity of this system. Human population growth in Collier County alone is

expected to increase 46 percent by 1995 (Kiplinger Washington Editors 1985), and averages 28 percent for the 6-county region. Further, Broward and Palm Beach Counties will lead the state in numbers of new residents during this period.

With increasing human numbers in the region, public lands will experience comparable use pressures. Possible conflicts among public use demands, maintenance of quality outdoor experiences for users, maintenance of biological integrity of these areas, and the biological needs of the Florida panther have created a complicated management dilemma. Given the high priority for the recovery of the Florida panther (Palmer and Paradiso 1986), natural history information including movements, social organization and habitat use is essential to carrying out plans to prevent the extinction of this endangered subspecies. Information of this kind will be useful in evaluating the impacts of significant changes in land use patterns, and will serve as a basis for evaluating the success of reintroductions of panthers in currently unoccupied range. Detailed natural history data over a wide and diversified area are essential to determine the ability of the panther to adapt to changing and highly altered environments. These data will be valuable to identify and evaluate panther habitat and the factors that affect its quality for purposes of habitat protection. Further, the identification of essential components of panther habitat such as day use sites, den cover, travel pathways, and foraging grounds will be helpful in improving conditions on occupied lands and on potential release sites.

METHODS

Panthers were captured during winter using trained hounds and anesthetized using a combination of ketamine hydrochloride and xylazine hydrochloride. Panthers were reinstrumented as necessary due to growth or transmitter age. Standard measurements and indicators of physical condition and health were recorded.

Instrumented panthers were monitored approximately every other day from fixed-wing aircraft and at least 3 times each week as described by Mech (1983). Each quarter, all cats were monitored once a day on a daily basis for 2 weeks and monitored for 3 consecutive nights during this period. Loran navigation equipment was used to pinpoint nighttime locations and as an aid in plotting daytime fixes. As opportunities arose, individual cats were monitored for 24-hour periods using a digitized data processor (Telonics, Inc., Mesa, AZ) and chart recorder, or by recording radio collar pulse rate changes. Twenty-four-hour activity was sampled among seasons and sex and age classes to determine variability in diel patterns. The minimum convex polygon (Mohr 1947) was used to describe panther home ranges.

Simulation models are mathematical abstractions of the demography of populations. Given enough information, they can be useful in predicting population responses to planned or potential management actions in panther inhabited areas. There is limited information concerning litter size, age at first breeding in females, survival of juveniles, influence of density,

recruitment and dispersal and other population parameters on panther numbers and dynamics. Despite this lack of data, modeling expertise was sought and construction of a model for panthers in south Florida was initiated. A design similar to Knight and Eberhardt (1985) and Shaffer (1985) for grizzly bears was used as a guide for early stages of model development.

RESULTS AND DISCUSSION

Panther capture activities in southwest Florida during 1987 resulted in the recapture of 2 adult females and instrumentation of 4 new cats including a juvenile female kitten, an adult female, and 2 adult males. Vital statistics of panthers captured or killed in southwest Florida appear in Table 1.

Female #08 was captured 13 April 1987 in the Fakahatchee Strand and transported to Gainesville for nutritional evaluations and captive breeding. Movement data suggested frequent encounters with a radio-collared male but no evidence of reproduction. In addition, her weight and general condition had deteriorated since her initial capture in 1984. She was located 251 times since December, 1985, and used 163 km² (Fig. 1). Her movements overlapped spatially with adult female #09 and male kitten #10. An adult female killed on S.R. 84 in November 1986, also may have overlapped with these panthers. The movements of #08 were almost entirely confined within the southern half of the Fakahatchee Strand. Occasionally she left this mixed-swamp forest and was found in or near adjacent prairies and cypress forest.

Female #09 was recaptured on 8 January 1987 for the replacement of her radio collar. An examination of her condition revealed a healing yet still open

wound to the left rear foot. Existing infection and extent of damage warranted her transport to the Miami Zoo for surgery, observation and recovery. Radiographs revealed lead traces in both hind feet suggesting the injury was caused by gunshot. During her 1-month stay at the zoo, she aborted 3 developing fetuses, apparently the result of stress caused by captivity. She was returned to her home range on 11 February 1987.

Normal movement patterns since her release, close association with male #12 for a 3-day period in mid-March and recent behavioral changes suggest she has recovered fully and may have had kittens. A field inspection of panther #09 on 30 March 1987 in the Fakahatchee Strand State Preserve indicated a healthy adult female, apparently fully recovered from surgery. In attendance were DVMs S. Citino, T. Rainey and M. Roelke as well as R. McBride and D. Maehr. After a swamp buggy trip of about 2 miles, we verified a telemetry location made by air and proceeded to walk toward the cat's radio signal 3/10 mile away. The panther treed (after a 3-5 minute chase) at about 0900, 40 feet up in a cypress tree. Other vegetation in the vicinity included cabbage palm, paurotis palm, red maple, and wax myrtle in 4-12 inches of standing water. We were all in agreement that the condition of the cat was good and no complications associated with the injured left rear foot were noted. A fresh dropping, probably made by #09 was found about 1/10 mile away (containing raccoon hair). It seemed obvious that the panther is eating and has full use of the injured foot as well as both front feet (the front claws were severely worn during her stay at the Miami Zoo).

From December 1985 through February 1987, female #09 was relocated 227 times and used an area defined by the minimum convex polygon of 224 km² (Fig. 2). With the exception of one location just north of S.R. 84 (Alligator Alley) all movements were south of this highway. Her home range overlapped female #08 in the Fakahatchee Strand, an uncollared female hit by a car and killed 15 November 1986 (Table 1), a juvenile panther (perhaps the kitten of the uncollared female), and adult male #12. Tracks of an adult female found on Rookery Bay Wildlife Sanctuary 1 February 1987 may belong to another panther overlapping with #09.

Juvenile male panther #10 was located 215 times from 16 January 1986 to 27 January 1987 when he was found dead 14 km north of his natal area. He apparently was killed by adult male #12. Number 10's home range was virtually identical to his mother's (#09) through mid-November 1986. Movements north into private lands and Big Cypress National Preserve increased his home range to 433 km² (Fig. 3). His dispersal at 18 months coincides with observed ages of independence in western cougars (Anderson 1983:33). During the year that he was monitored, the cat grew from 34 lbs. to an estimated 80 lbs. at death.

After 3 November, #10 separated from his mother (they were not located together again after this date). Adult male #12 was found moving towards #09 and #10 on 5 November and on 7 November was located between the female and 18-month-old male. At this time #10 was found inside the fence of the Ford test track where he had crawled under the gate. He spent approximately 3 days

inside this 2 mi² enclosure. After this time #10 gradually moved to the north and east towards Sunniland.

From at least 24 through 26 November, #09 and #12 were found together and breeding activities were suspected. This was verified on 8 January when #09 was captured for reinstrumentation and developing fetuses were detected. On 28 November, #12 was found moving back to the north, and #10 had moved east into Bear Island. After this date, #12 often was found in the same location as #10's previous location except during a period around 10 December when #12 and female #08 were together in the southern Fakahatchee.

On 15 December, #10 and #12 were only 100 feet apart in Bear Island. After ground truthing these locations, both cats moved away from each other. From 16 January 1987 until the young male's death, both #10 and #12 were usually within 1 km of each other. The mortality signal on #10's collar was detected at 1600 hrs. on 27 January and the scavenged body was recovered at 1800 hrs.

The carcass had been dragged over a large area; across a road and into a hammock. This motion in addition to vultures feeding apparently prevented the 13 hr. mortality delay from activating (we now use 2 hr. delays). The body had been rained on so we suspect that death occurred sometime before the afternoon of 25 January (when a front passed through). Tracks found within 20 yards of the carcass indicated recent travels of an adult female and adult male (probably #12) panther. Interestingly, adult male tracks were found travelling to and away from the carcass location the day after the body was removed, suggesting a return visit by male #12 which had remained in the vicinity during

this period. Several hundred yards away tracks belonging to a young male and an adult male indicated a series of chases between the 2 cats. Extensive wounds and bite marks also were apparent on #10's remains and the right ulna was recently broken.

Telemetry data in combination with observed field sign (tracks, drag marks, bite marks on carcass) create a compelling picture of a subadult male panther being harassed and eventually killed by an adult resident male panther. It should be stressed that this is only a sample of one and that further work with dispersing juveniles is essential in our understanding of panther recruitment.

Female #11 was located 231 times from 21 February 1986 through February 1987 and had a home range area of 171 km² (Fig. 4). Shortly after her capture, intensive monitoring provided a wealth of information concerning maternal behavior and reproduction. The following details her behavior 3 months before and 6 months after parturition.

Based on apparent sexual activity with radio-collared male panther #12 from 4-9 February 1986, a 90-93 day gestation period (Anderson 1983:33), and observations of behavioral changes, female number 11 gave birth on 14 May 1986. She was seen on 4 occasions; twice by herself, and once each with one and then two kittens. The estimated size of juveniles coincide with our suggested birth date.

For 56 days following parturition her movements were centered around a 22 ha hardwood hammock surrounded by seasonally inundated fresh water marsh. During this period, locations away from this apparent den site varied from 0.2 to 8.8

km and averaged 2.4 km. Daytime telemetry fixes on 38 of the 56 days indicated she was away from the den 18 times and at the den 20 times. Combined day and night monitoring showed absences from the den up to 36 hours and den tenacity up to 27 hours. Absences coincided with peaks in activity rates (based on frequency of changes in the radio's activity switch caused by up and down head motion) (Fig. 5) which occurred between 1600 and 2100. This period also included den departures (1800-2200) and arrivals (2000-2200). Activity before departures may have been associated with grooming or kitten care behavior. Another period of arrivals was noted between 0600 and 0900. In general, these activities centered around sunrise and sunset, and were not observed at any other time.

Between 14 May and 9 July her regularity at the den site gradually decreased. This may reflect an early period of frequent nursing requirements, followed by a period of increasing dependence on solid food and an increased ability of the young to fast. Female number 11 probably began spending more time hunting to meet the increasing nutritional requirements of her offspring. These observations appear similar to early maternal care in African lions (Schaller 1972), and leopards (Seidensticker 1977).

Although numerous attempts were made to locate kills made by female #11, only 2 were found after parturition. It is of interest that a kill made by the female before 14 May was only partly eaten, while both post-parturition kills were completely consumed (all muscle tissue removed). All kills were white-tailed deer (Odocoileus virginianus); 2 were adult females, the other an

unsexable yearling. Her activities before and after a kill found 11 June may be typical of a successful hunting foray. On 10 June she had left the den by 2000 travelling across a large Panicum spp./pickerel weed (Pontederia lanceolata)/sawgrass (Cladium jamaicense) marsh to a larger island containing saw palmetto (Serenoa repens), slash pine (Pinus elliottii), cabbage palm (Sabal palmetto), cypress (Taxodium distichum) and red maple (Acer rubrum). She spent 11 hours at one location but appeared active. At 0630 she suddenly left the location making a direct 4 km return in 2 hours to the den. An inspection of her nocturnal location revealed the dismembered carcass of a freshly killed deer. Only 3 legs, hair tufts and 2 entrail caches were found. It is unknown whether panthers carry large food items to dependent young, but this may have accounted for the absence of large body parts at the kill site.

A search of the natal area on 10 July revealed a slight depression in a dense, 1-2m tall palmetto thicket located by triangulation data collected the previous night. The oval of bare earth measured 1m by 0.5m and contained a layer of scattered shed panther hairs. Numerous stems of palmettos, greenbriar (Smilax spp.), and grape vine (Vitis spp.) surrounding the bed appeared clawed and chewed. There were no feces or meal remains associated with this location. With the exception of mutilated vegetation this site was similar to day beds used by solitary adults (Maehr, unpub. data).

After 10 July, locations were made primarily by aircraft since female #11 moved her activities to private lands where access was restricted. Comparisons of pre-parturition and post-parturition use areas were made using data gathered

from aircraft (Fig. 6). The convex polygon calculated for the female's pre-parturition area of travel comprised 156.5 km². After birth, 3 discrete activity areas were observed 22.7 km², 7.7 km², and 11.3 km², for 15 May - 9 July, 10 July - 11 August, and 12 August - 15 November, respectively.

Reductions in home range size following parturition have been noted in leopards (Seidensticker 1976), and Seidensticker et al. (1973) noted smaller home ranges for female mountain lions with young (<5 months) kittens. We detected an initial reduction of 78 percent followed by an additional reduction and 2 activity center shifts. Although shifts in home range after 10 July probably reflected increased mobility of young, home range sizes were actually smaller. Visual observations before 10 July indicated female #11 traveled alone over long distances. Subsequent observations were of the female and up to 2 kittens. The increased mobility of young is supported not only by sightings, but by the lack of tenacity to a particular location. Reductions in home range probably are due to the increased nutritional and behavioral demands of developing young and concomittant attention required of the female. Wassmer (1982) noted similar home range dynamics in south-central Florida bobcats (Lynx rufus).

The post-parturition home ranges we observed may represent prey-rich areas familiar to the female. White-tailed deer, wild pigs (Sus scrofa), armadillos (Dasypus novemcinctus), raccoons (Procyon lotor), and marsh rabbits (Sylvilagus palustris) are frequently consumed food items (Belden and Maehr 1986), and all are present within these areas. Further, white-tailed deer and wild pigs are

seen with greater frequency during telemetry flights over these areas than any other occupied by radio-collared panthers. Smith et al. (1986) suggested that increased prey densities in the smaller home ranges of female tigers explained the sex-related differences in tiger (P. tigris) home ranges. Florida panthers exhibit similar sexually dimorphic land tenure patterns (Belden 1982, Maehr unpub. data) which may be magnified by female home range reduction after parturition.

Like other solitary felids, mountain lions have been shown to interact mainly for breeding (Hornocker 1970) and the female/offspring group forms the basic social unit (Kleiman and Eisenberg 1973). The first observation of the female travelling with young was made on 21 July when she crossed a gravel road with one kitten at 1830. She was seen again on 25 July at 1930 travelling with 2 kittens. On 5 occasions after parturition female #11 was found in close proximity (<1 km) to at least one radio-instrumented adult male. Four encounters (30 May, 1 June, 7 July, and 3 August) involved male #12, the suspected sire of the litter born on 14 May. The female was more than 1 km from the den on 30 May and 7 July when male #12 was less than 1 km and 50 m from the den, respectively. A second adult male (#13) was located less than 1 km away on 1 June and less than 500 m away from the den and female #11 on 16 June at 0800. On the latter date both cats moved away from each other and the den after 2100. The female left approximately 45 minutes after male #13 departed. On 3 August at 1100 female #11 and male #12 were located less than 100 m apart in a large mesic hammock. By 2000 the cats had

moved in opposite directions and were 3 km apart. Concurrent studies indicate that males often are in the company of non-estrous females. While the significance of the above encounters is unknown, it appears that close, if not direct interactions among panthers outside the female/offspring unit occur regularly. It is of interest that Seidensticker et al. (1973:40) "did not find females with kittens less than a year old in association with males". Although intraspecific strife has been documented in Florida panthers (Belden 1982), no aggressive encounters were observed or suspected.

Male #12 was located 201 times and used an area of 601 km² (Fig. 7). His movements overlapped with all the above mentioned females (n=4) and juveniles (n=2) and at least one other adult female in the north end of the Fakahatchee Strand. In addition, he has overlapped considerably with adult male #13 and to a lesser degree with 2 other males (#17 and #20). This panther crosses busy highways more frequently than any other currently collared panther. Crossings usually occur at night where buggy trails and strands intersect S.R. 84, although at least 2 crossings occurred during late afternoon in full light. This cat is the suspected father of #09's presumed litter and #11's current litter.

Male #13 was located 190 times from 2 March 1986 through February 1987 and used an area covering 732 km² (Fig. 8). This cat overlapped with male #12, female #11 and her kittens. However, the majority of locations were from private lands north towards Devil's Garden, Hendry County. Field searches on this property, primarily owned by Alico, revealed several scats containing hog

hair. This sign usually was found in areas frequented by #13 and may represent a patrolled and marked home range boundary.

Male panther #17 was captured 20 January 1987 in western Hendry County on Collier Enterprises property. He weighed 142 lbs. and was considered in excellent condition at 6-7 years old. Through May, 1987 he has been relocated 56 times and has used a 237 km² area (Fig. 9). These movements primarily are east-west in nature terminating south of the Seminole Indian Reservation to the east and in the Okaloacoochee Slough south of C.R. 846 in the west. Number 17 has spent most of this period on private ranch lands composed of a mix of improved pasture, and remaining natural habitats such as cypress swamp, oak uplands, and hydric hammock. He interacts extensively with female #18 which utilizes a subset of #17's home range.

On 22 January 1987, a 100 lb. female (#18) (7-8 years) was captured in western Hendry County, also on Collier Enterprise property. Through June 1987 she has been relocated 57 times and uses an area covering 157 km² (Fig. 10). Two activity centers appear to be the large cypress/maple swamp in the Okaloacoochee Slough (Collier Co.) and the scattered oak hammock/cypress complex in Gum Swamp (Hendry Co.). Her activities have been concentrated entirely on private lands and are frequently in the company of adult male panther #17. This observation is contrary to literature on Felis concolor in the west. The regularity of interactions between these 2 cats suggests that pregnancy has not occurred during this time period. This is in contrast to the interactions between female #11, her kittens, and males #12 and #13. It

appears that only females #08 and #09 exhibit interaction patterns similar to western mountain lions, i.e., they are solitary except during mating activities and kitten rearing.

A juvenile female kitten (#19) belonging to female #11 was captured and instrumented on 9 February 1987. Based on behavior of #11 (assumed to be denning behavior) in May 1986 and general appearance of the 50 lb. kitten, her age was estimated at 9 months. As many as 2 other siblings eluded capture attempts. Since capture, #19 has been relocated 49 times and uses a 70 km² area (Fig. 11). Generally, her home range mirrors her mother's, however, individual locations often are 1-3 km from #11. Activities are centered on a 12-section tract that is privately owned and where access is prohibited. This limits monitoring to strictly aerial searching except during her infrequent forays into Bear Island. Subsequently, natural history data collection from ground searches has been severely hampered. Nonetheless, we suspect that the kitten may be mostly independent of her mother based on infrequent simultaneous locations.

The last panther captured this year was a 148 lb. adult male (#20) captured 10 March 1987 on Alico property near Devil's Garden, Hendry Co. This is the largest Florida panther on record. He has been relocated 27 times and has used an area covering 457 km² (Fig. 12). Initially, his movements covered an area recently vacated by male #13, primarily on Alico property. A temporary shift north towards the Caloosahatchee River was followed by a long movement ($\approx$ 50 km) south to the Okaloacoochee Slough. Since moving south, he has been in

relatively close association with panthers #11, and #19. This further complicates panther interactions in this small area.

Panther #20 was hit by a 3/4-ton pickup truck at 0630 on 17 June 1987 about 1.5 miles east of S.R. 29 on C.R. 858. The driver promptly notified local Commission personnel who were on the scene before 0800. Ground telemetry indicated the panther was about .5 km from the road and still alive. Potentially life-threatening injuries necessitated capture and transport to the Miami Zoo (by 1100). Despite the 50 mph collision and being dragged about 20 m, #20 did not sustain any broken bones. Close examinations at the zoo indicated a deep puncture to the front left leg above the foot, extensive abrasions on the same leg, and some internal hemorrhaging around the lungs. These injuries have been treated and the cat was still recovering in Miami at the end of the reporting period.

During field searches for possible kills (n=78) made by radio-collared panthers, other information concerning behavior often were collected. In particular, 37 sites representing panther day beds were found and described. These areas usually occurred in dense vegetation providing considerable vertical as well as horizontal cover. A feature common to most (n=27, 73%) day beds was a prevalence of 2-3 m tall saw palmetto (Serenoa repens). Other species frequently in association with palmetto included live oak (Quercus virginianus), staggerbush (Lyonia ferruginea), wild grape (Vitis spp.), poison ivy (Toxicodendron radicans), and wax myrtle (Myrica cerifera). The bed itself usually consisted of a 1.5 X 1 m patch raked bare of litter, and often

containing shed panther hairs and occasionally live ticks probably removed during grooming. These heavily shaded locations probably are advantageous for thermoregulation as well as for security. Other day-use sites included cypress/maple/fern associations (n=6, 16%), cabbage palm (n=2, 5%), Schinus (n=1, 3%), and sawgrass (n=1, 3%). In addition to finding 13 kills, searches also revealed tracks (n=27), scrapes (n=18), and scats (n=10). On 14 (18%) occasions, no sign was found.

Diel activity patterns were determined during 3, 24-hour monitoring periods, 1, 36-hour period, 3 partial monitoring sessions and 3 capture recoveries. Continuous monitoring of pulse rate changes of the modified Model 500 transmitters with tip switches (Telonics Inc., Mesa, AZ) provided indices of activity for the periods under observation. A total of 180 hrs. was included in these efforts. Generally, activity peaks were centered around dawn and dusk with diel minima occurring during daylight, usually around noon (Fig. 13). The consistently lowest activity rates were recorded between one hour after sunrise and 2 hours before sunset. A small activity peak occurred in mid-afternoon. Activities were invariably high between sunset and 4 hours after sunset. From this time until one hour after sunrise, activity rates were highly variable and may be related to hunting success. An early evening retirement (i.e., inactivity by midnight) may reflect a successful kill. It should be pointed out that causes for the patterns observed are unknown but may be related to temperature and/or prey behavior. The small peak before sunset may be caused by micro-habitat shifts induced by heat, afternoon thunderstorms, or

pre-hunting staging or grooming. While these observations probably follow a pattern common to F. concolor throughout its range, there are no data available for comparisons (Anderson 1983:49).

Generally, our movement and social organization data are similar to findings of western subspecies of F. concolor. We suspect, however, that our observations of frequent encounters, which apparently did not involve breeding activity, among females #11 and #19 (mother and daughter) and adult males #12, #13, and #20 are unusual. It is unknown at this time whether this phenomenon is the result of demographics or sampling intensity. Ilany (1986) found that leopards in the Middle East from a population of about 20-25 adults exhibited continuous interactions among male and female adults and juveniles. It is possible that interactions among adults may increase as a function of declining total numbers. This situation may exist for panthers in some areas of south Florida.

A preliminary population model was developed for Florida panthers under a Commission contract with Dr. C. L. Abercrombie. It is similar to the extinction probability models developed by Shaffer (1985) and has been useful in demonstrating the importance of litter size, mortality, and recruitment parameters in the equation. Continued refinement of the model is necessary to produce a useful tool for panther management. At least one important additional consideration is an area component that would reflect land use trends in south Florida. In addition more complete information is needed on litter size, kitten mortality, and subadult recruitment rates.

CONCLUSIONS

Monitoring will continue of currently instrumented cats and additional animals that may be captured during FY 1987-88. The work is proceeding as scheduled.

Panthers studied during this period exhibited home range sizes, diel activity patterns and movement patterns similar to western cougars. The degree of social interactions, however, appears to be much greater than reported for other populations of Felis concolor. It is possible that the reduced numbers characteristic of this remnant population may have facilitated increased interactions among males and anestrus females.

Detailed monitoring of radio-collared panthers will continue in order to determine the extent of these higher-than-expected interaction rates and how this might influence reproduction and kitten survival. In addition, a larger sample size is necessary for determining dispersal patterns and recruitment rates of subadult panthers.

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Table 1. Vital statistics of panthers captured or killed in southwest Florida, 1979-1987.

<u>Males</u>						
Date	ID#	Weight (lbs.)	Age	Total Length (cm)	Condition	Location
03/10/87	20	148	3.5	216	Excellent	Hendry County (Alico)
01/20/87	17	142	6.5	221	Excellent	Hendry County (Collier Enterprise)
02/27/86	13	126	5.0	201	Excellent	Bear Island
01/28/86	12	122	5.0	218	Good	Bear Island
01/26/85	07	122	9.5	225	Good	Fakahatchee Strand
03/27/83	07	114	7.5	228	Good	Raccoon Point
03/02/82	07	122	6.5	213	Excellent	Raccoon Point
02/27/82	06	122	7.0	203	Good	Fakahatchee Strand ?
03/18/83	-	115	-	-	-	Palmdale
01/29/83	04	106	8.5	205	Good	Fakahatchee Conservation Club
01/27/82	04	113	7.5	205	Excellent	Fakahatchee Strand
01/29/83	02	117	12	206	Good	Fakahatchee Strand
01/26/82	02	107	11	206	Good	Fakahatchee Strand
02/20/82	02	108	10	206	Good	Fakahatchee Strand
12/14/83	01	124	13	207	Good	Fakahatchee Strand mm#18
01/10/81	01	120	10	208	Good	Fakahatchee Strand
<u>Females</u>						
02/09/87	19	50	9 mos.	170	Excellent	Bear Island
01/22/87	18	100	7	197	Excellent	Hendry Co. (Collier Ent.)
11/15/86	-	70	5	180	Fair	Fakahatchee Strand mm#16
01/21/86	11	92	4.5	186	Good	Bear Island

Table 1 (continued)

Females (continued)

Date	ID#	Weight (lbs.)	Age	Total Length (cm)	Condition	Location
01/08/87	09	77	4.5	189	Fair	Fakahatchee Strand
01/26/85	09	79	2.5	194	-	Fakahatchee Strand
01/13/86	08	72	10	191	Poor	Fakahatchee Strand
02/21/85	08	71	9		Fair	Fakahatchee Strand
02/23/82	05	98	7.5	201	Good+	W.L. Cattle Ranch
01/17/83	03	70	9.5	194	Good	Fakahatchee Strand
01/23/82	03	68	8.5	194	Good	Fakahatchee Strand
04/19/81	-	85	2.5	179	Good	Fakahatchee Strand
12/23/79	-	68	2.5	-	-	Fakahatchee Strand

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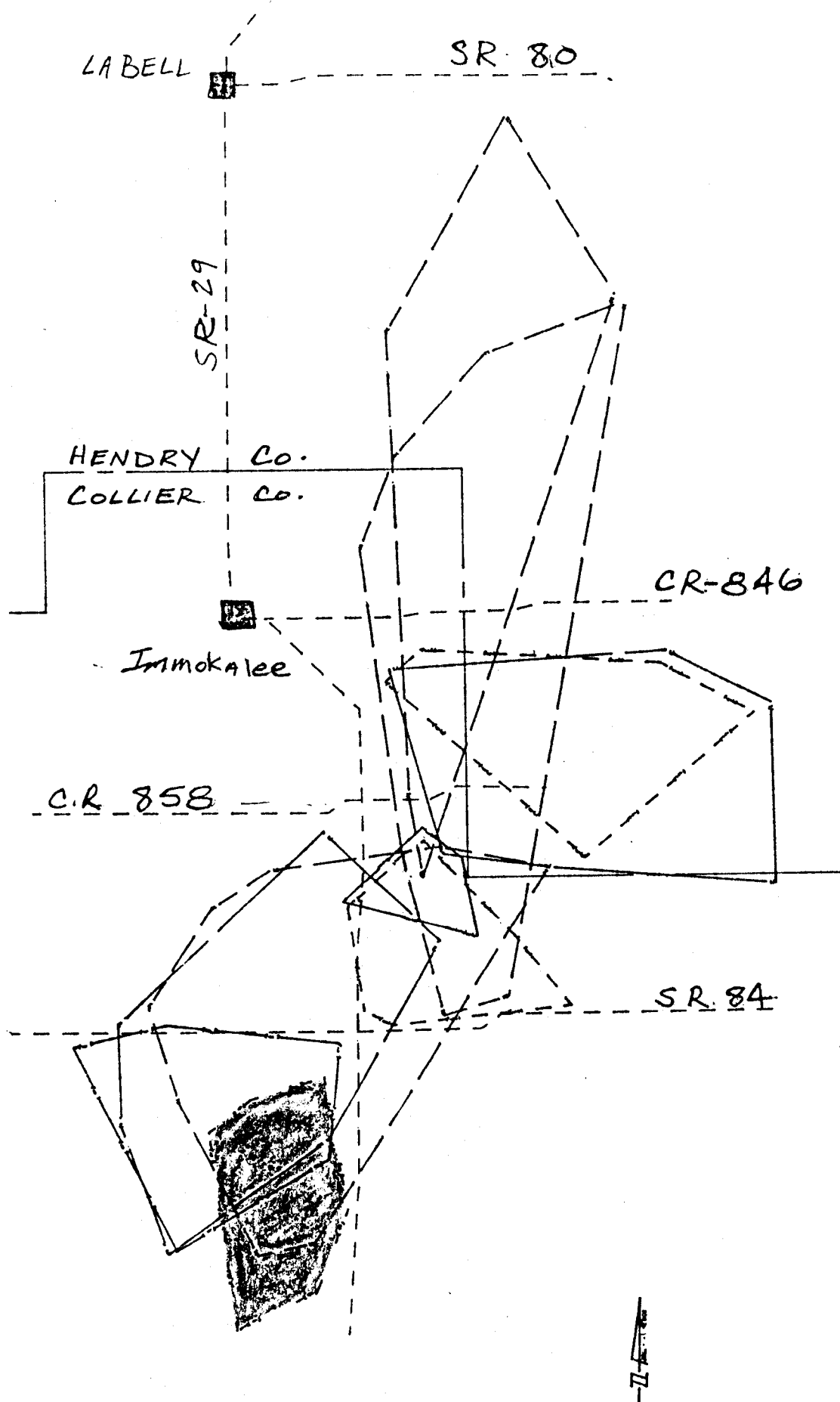


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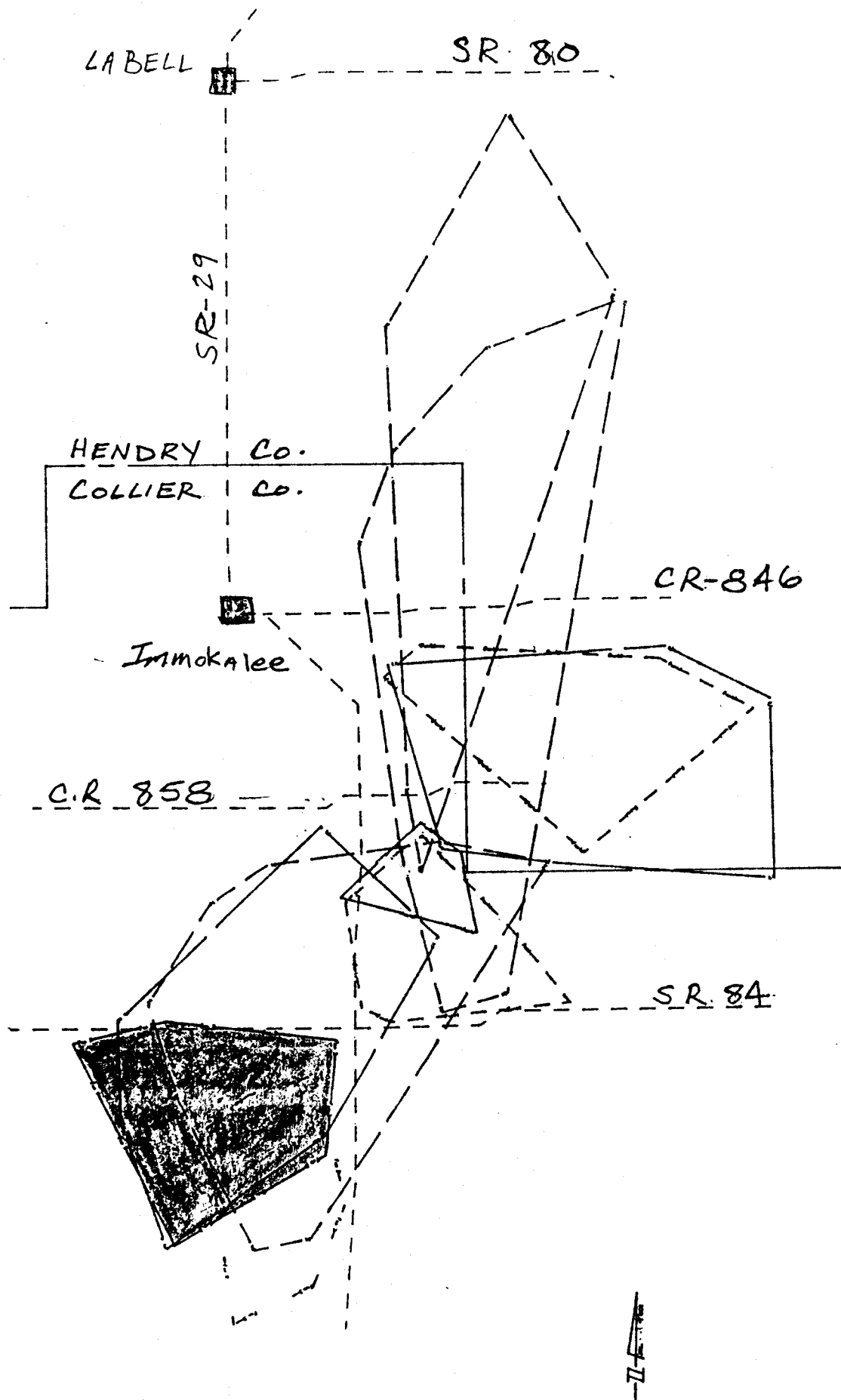


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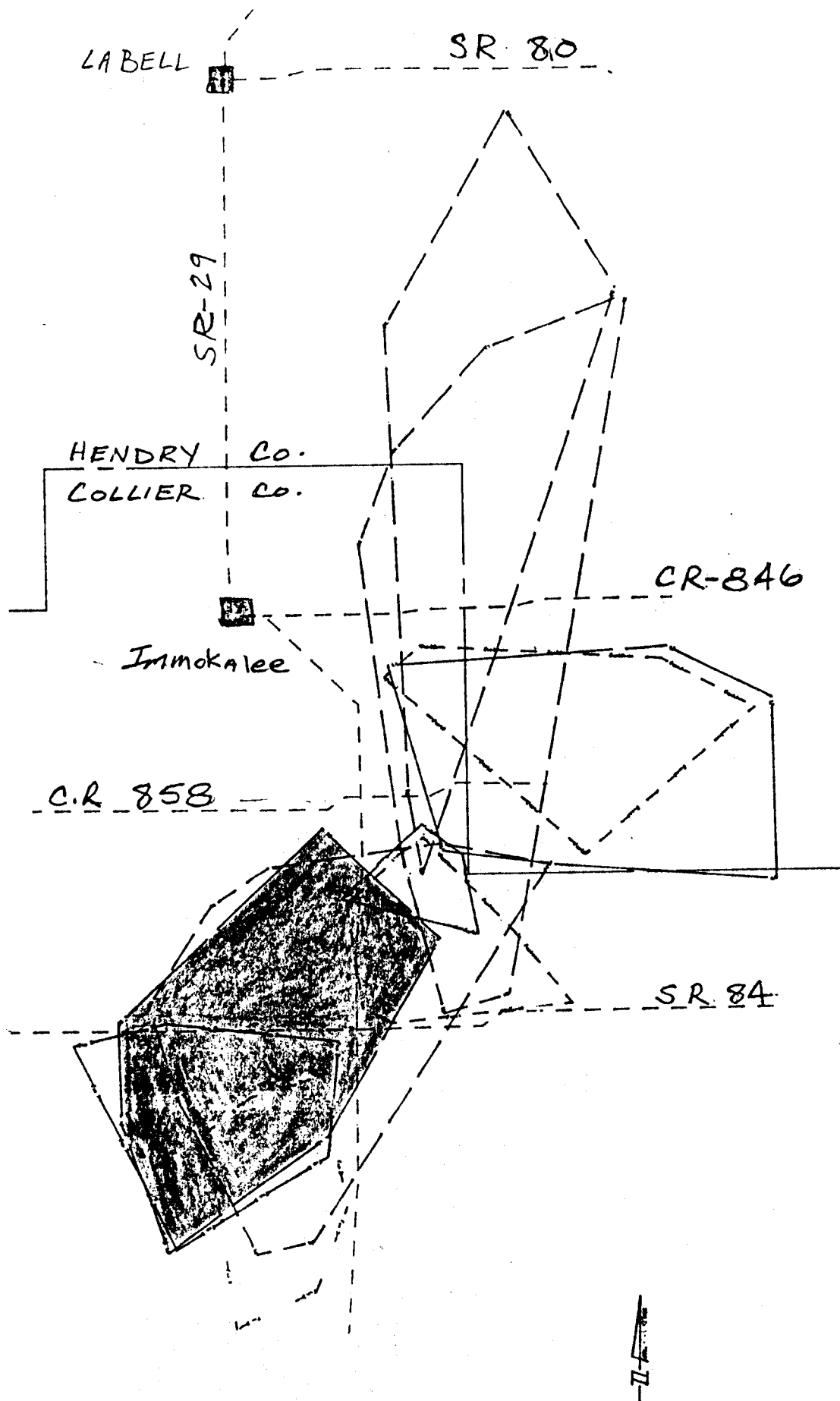


Figure 3

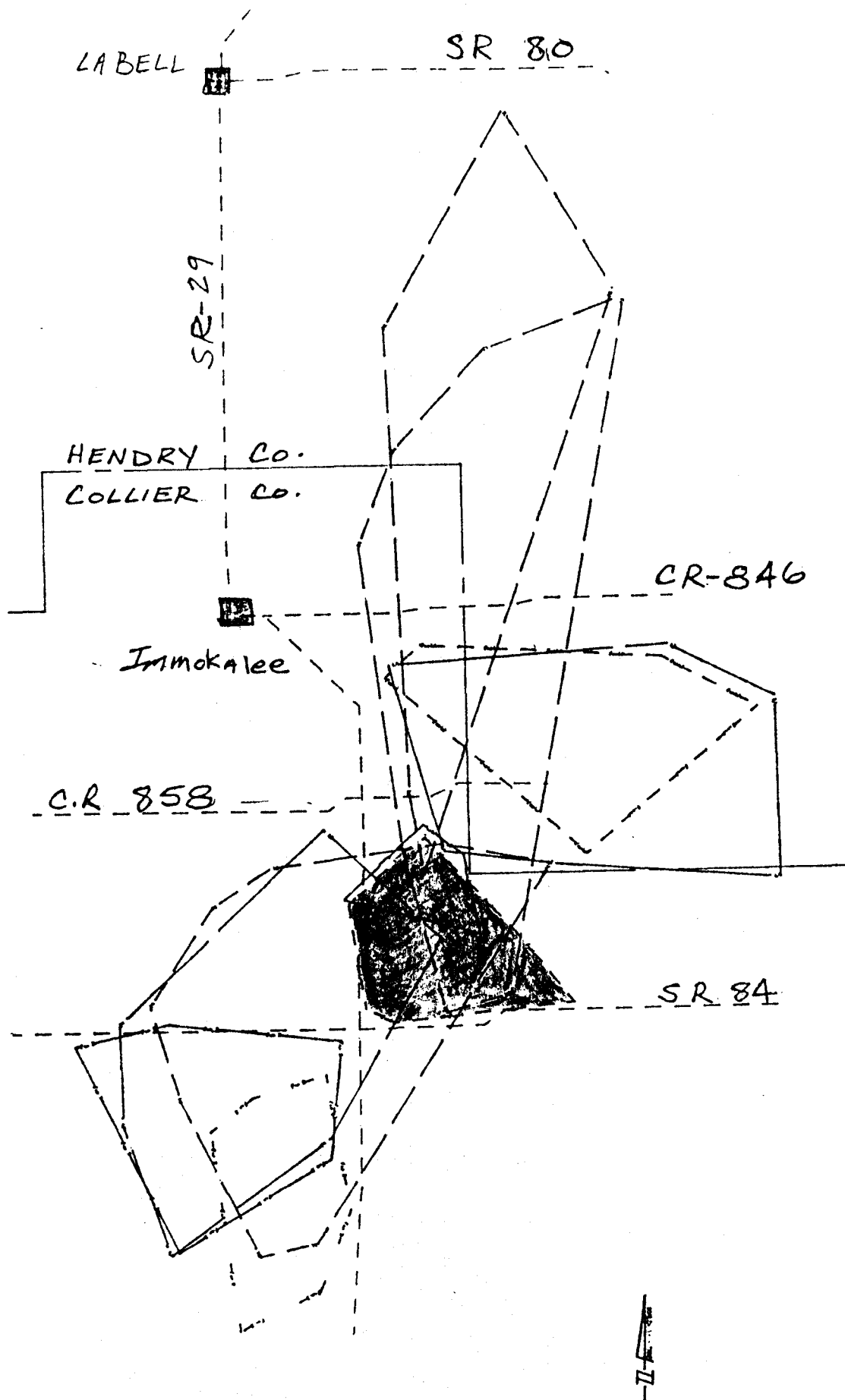


Figure 4

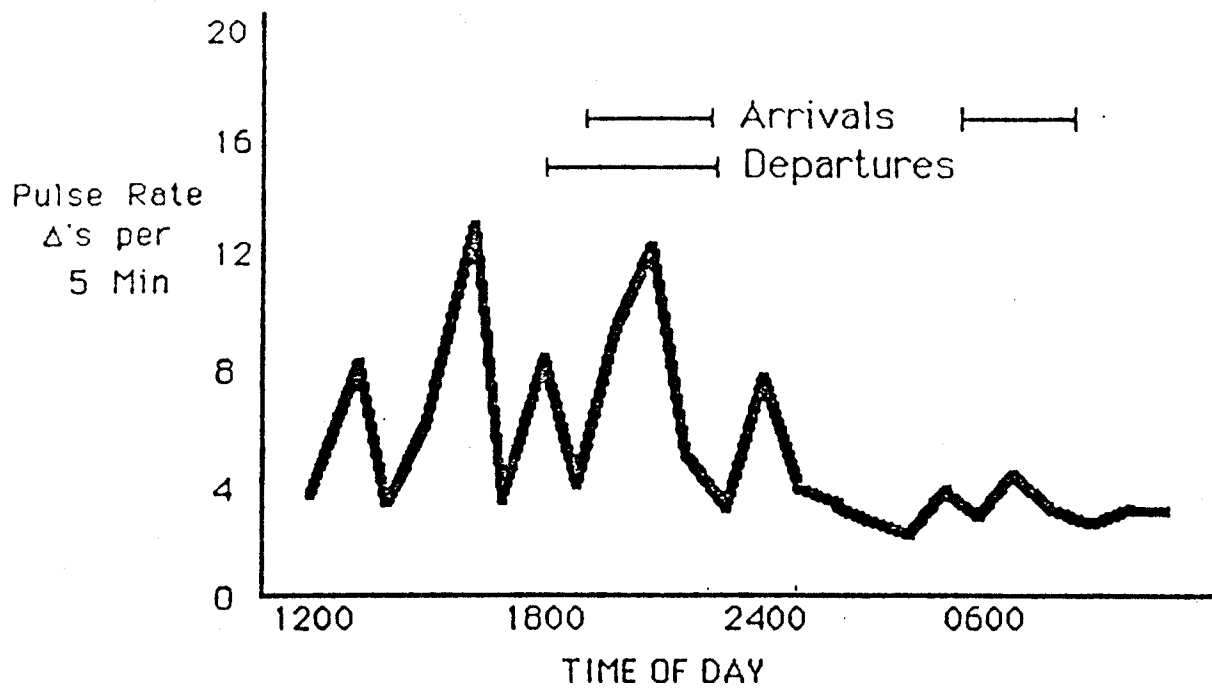


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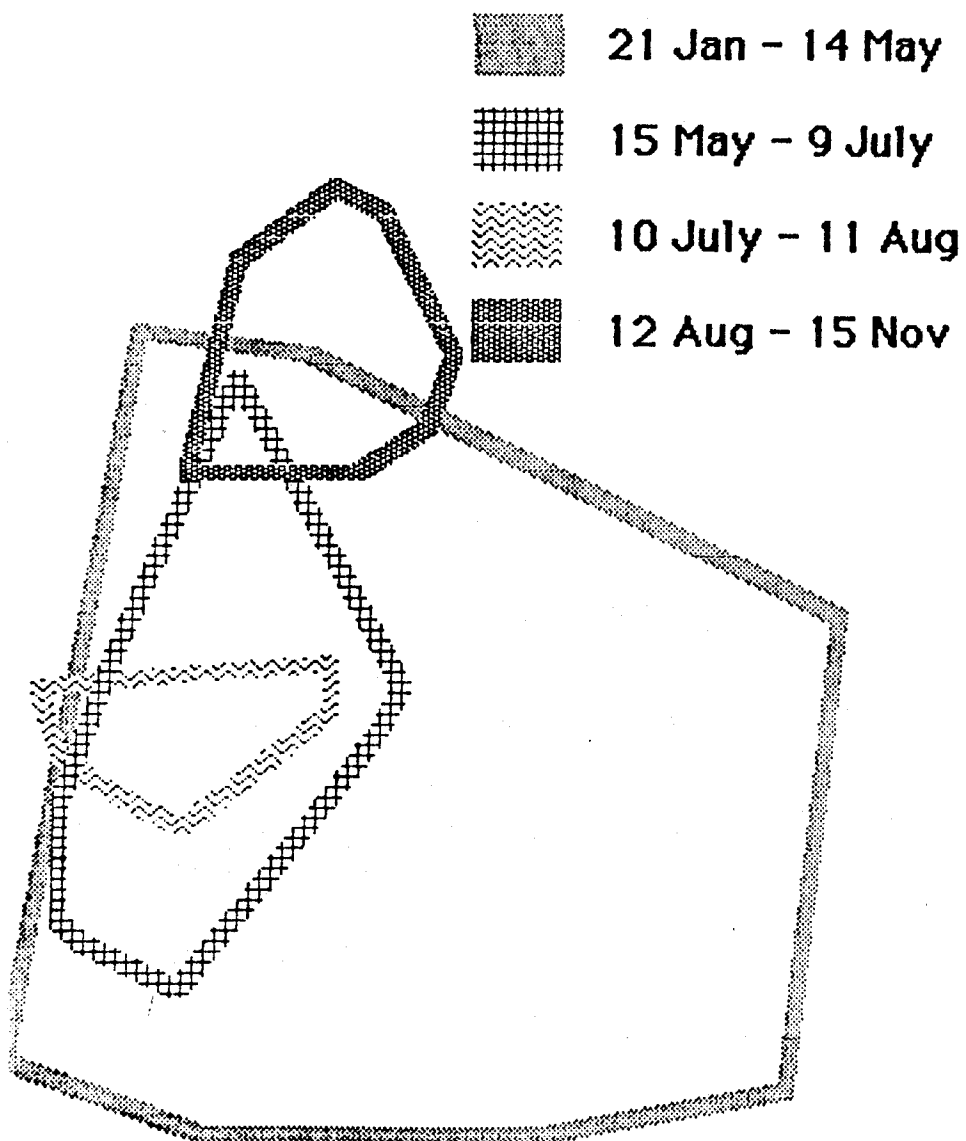


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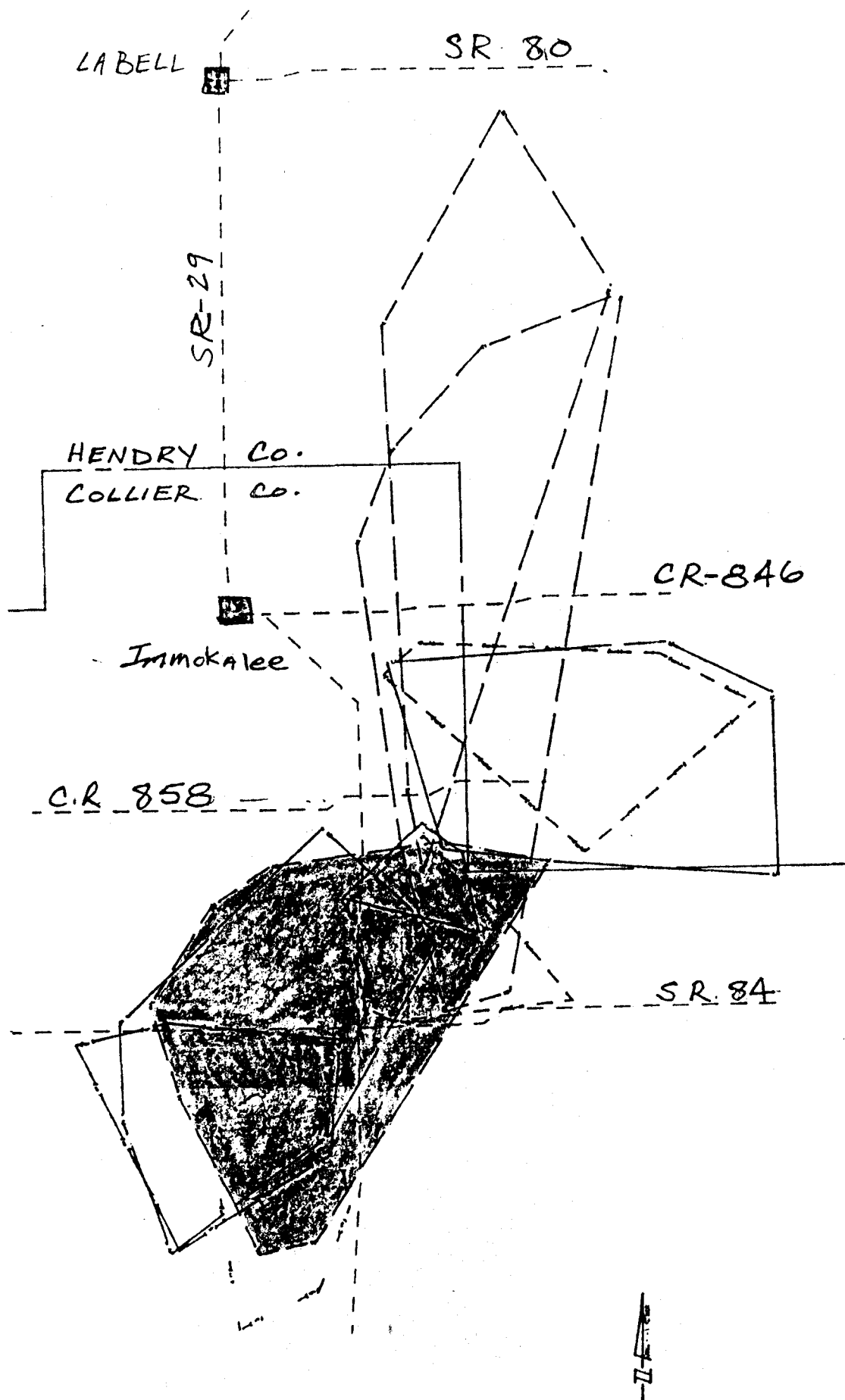


Figure 7

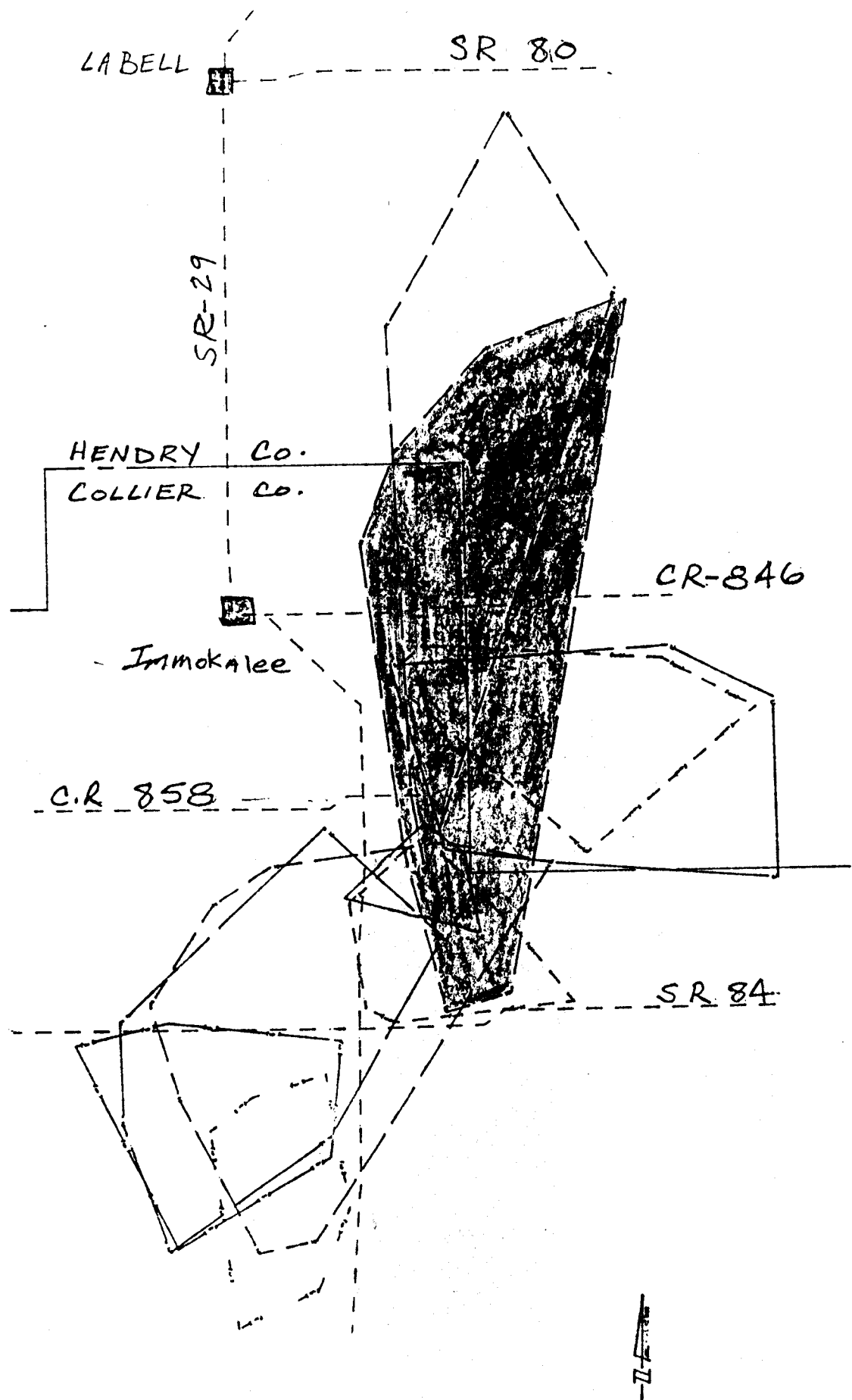


Figure 8

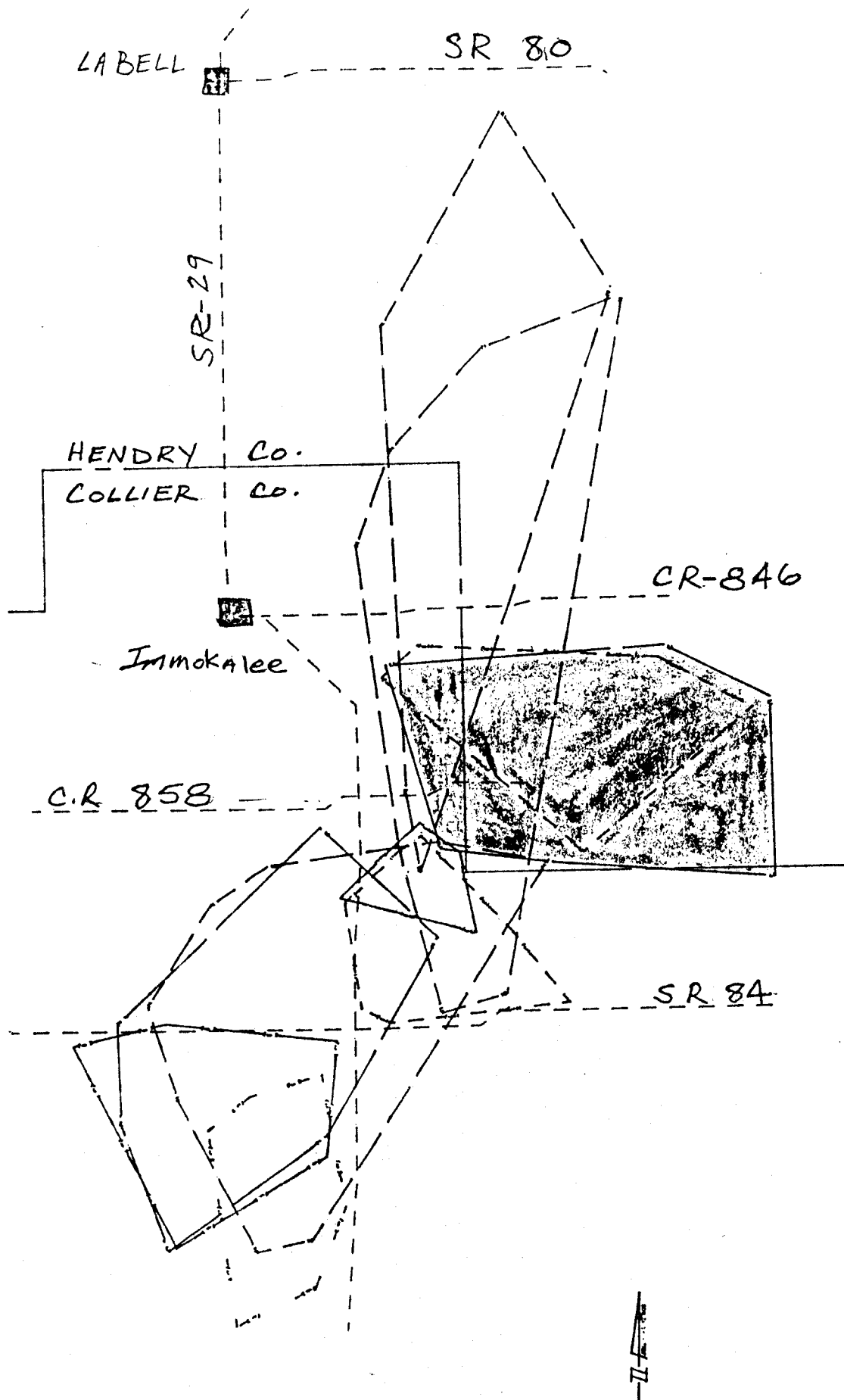


Figure 9

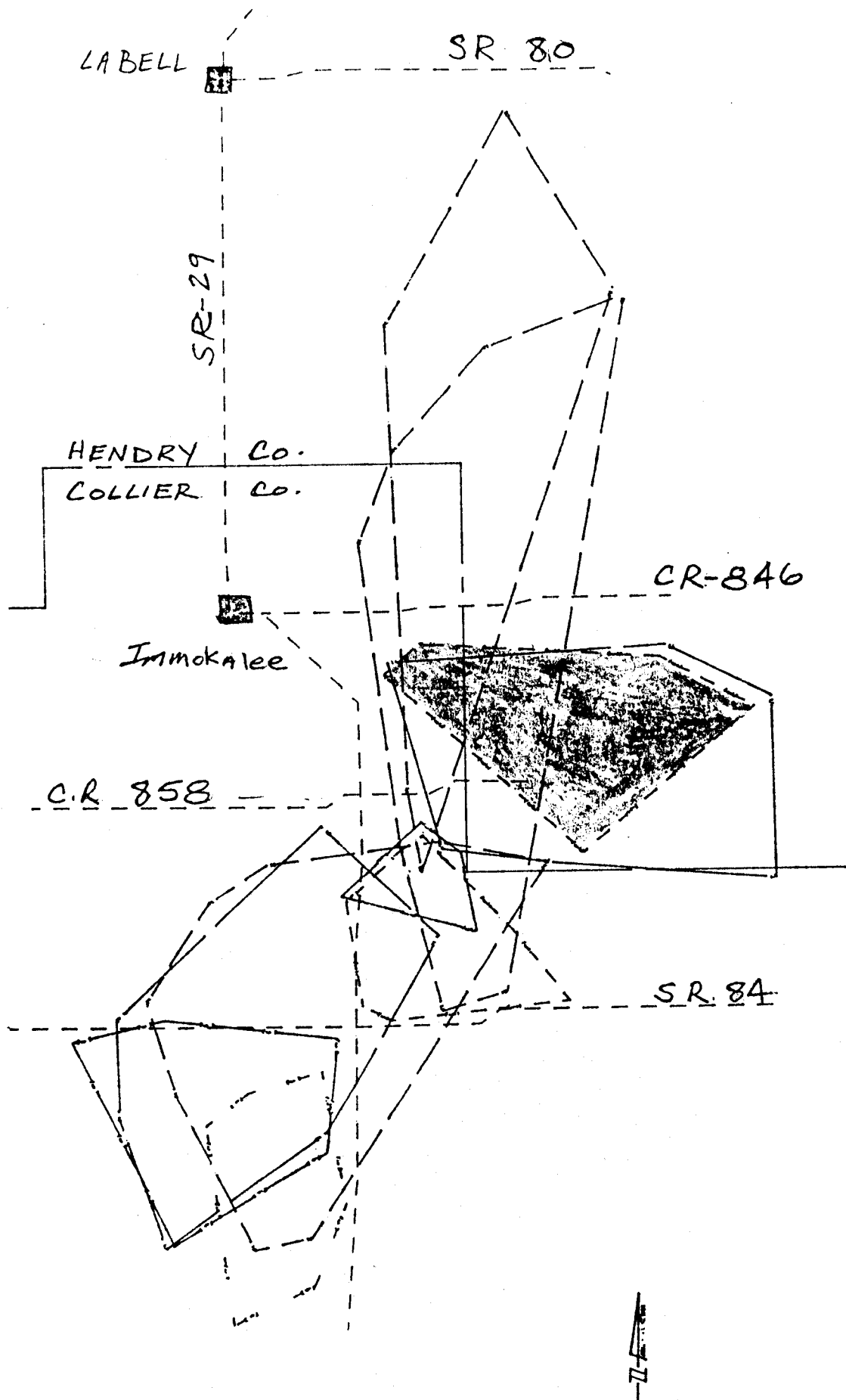


Figure 10

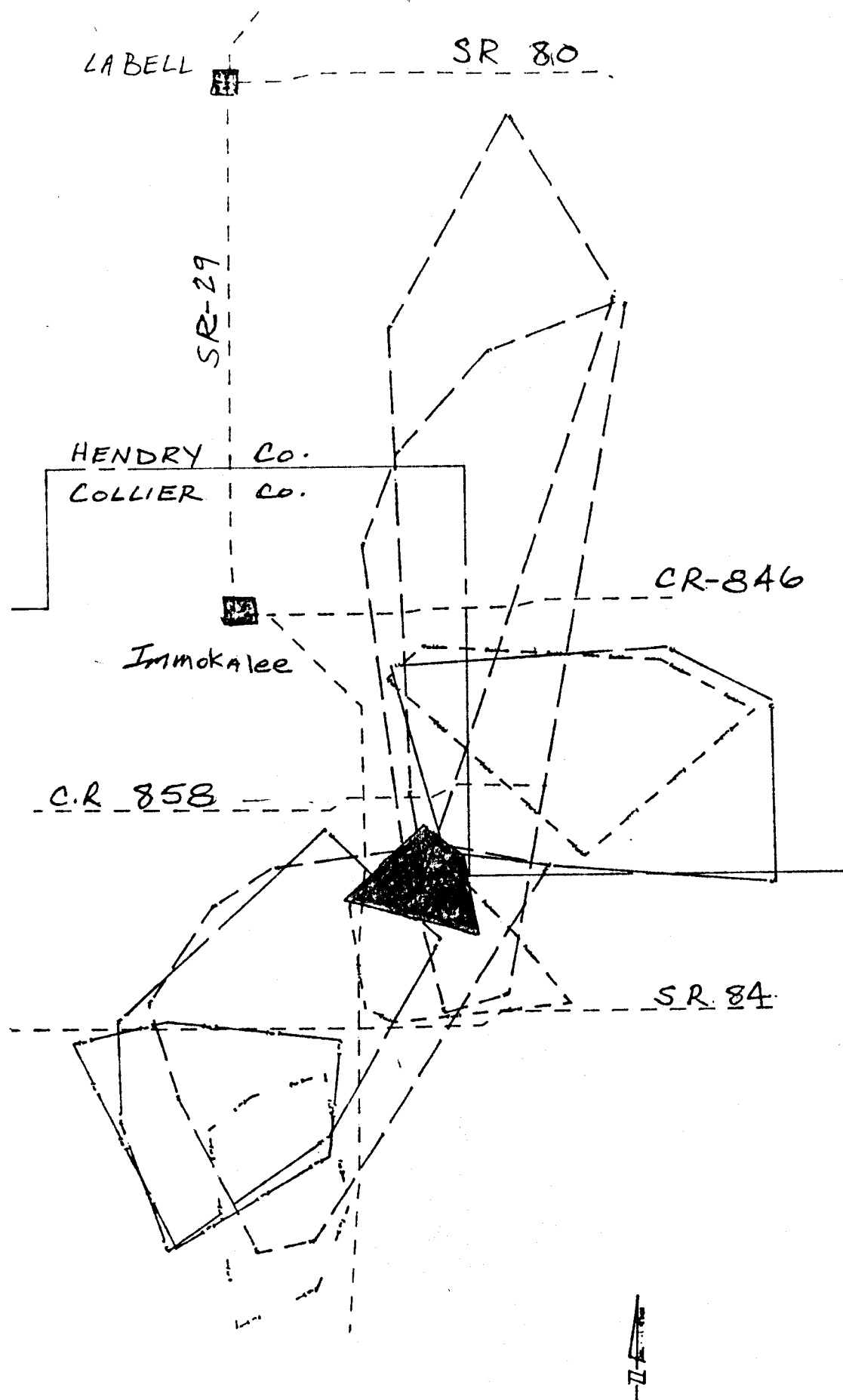


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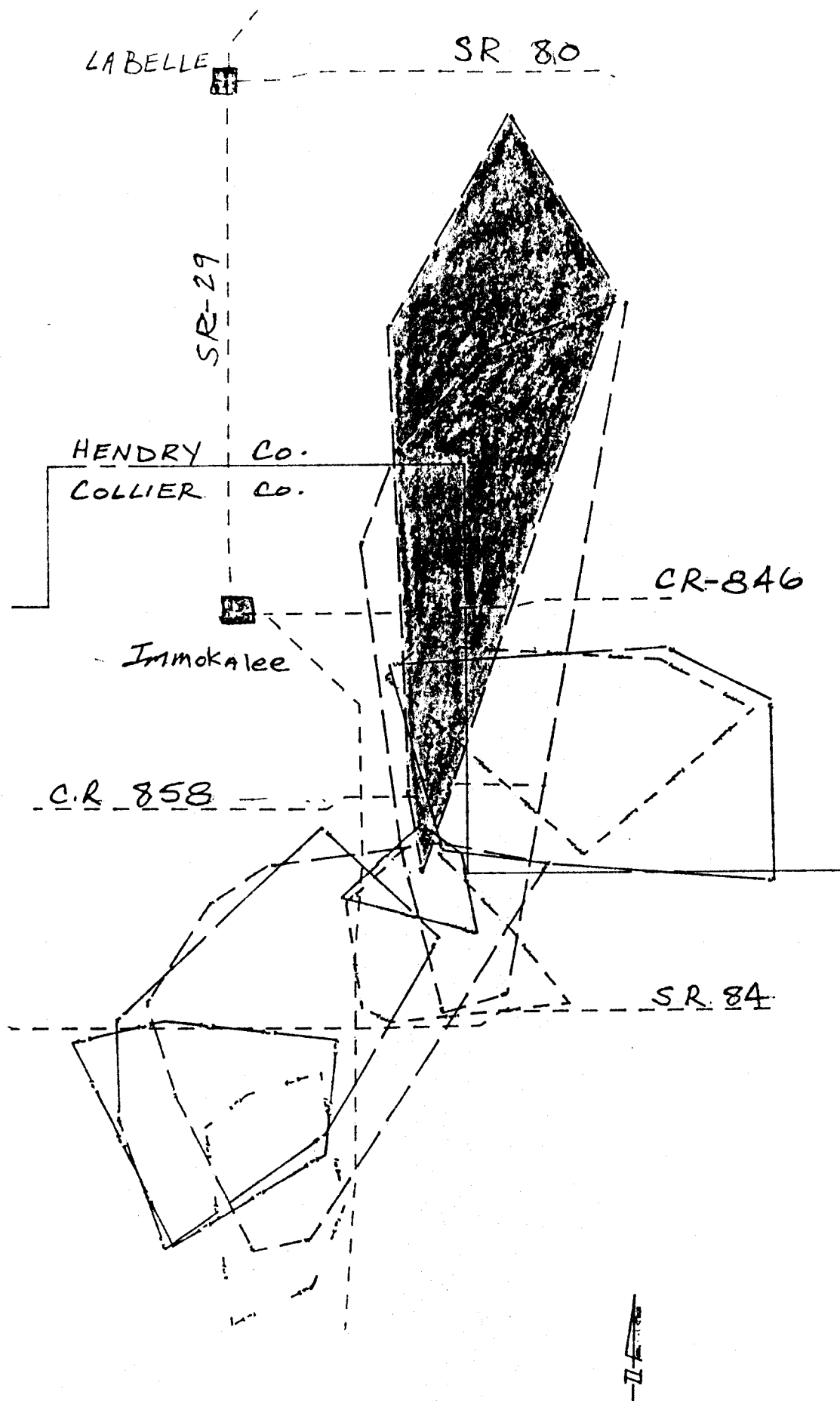


Figure 12

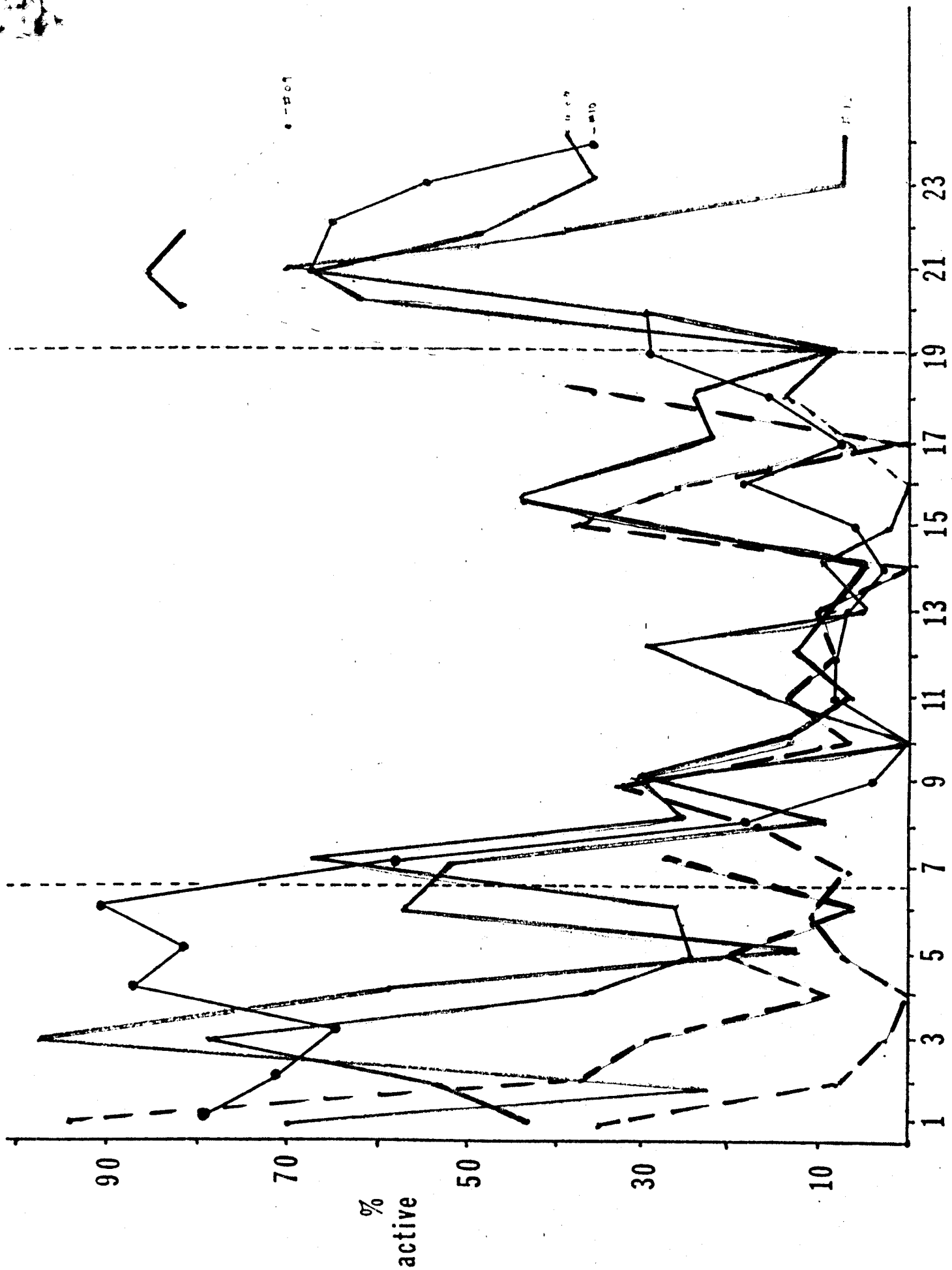


Figure 13