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THE MORRO BAY KANGAROO RAT: A SUMMARY OF CURRENT KNOWLEDGE

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ABSTRACT

DIPODOMYS HEERMANNI MORROENSIS IS AN ENDANGERED SPECIES WITH A VERY RESTRICTED RANGE. FEWER THAN 150 INDIVIDUALS ARE ESTIMATED TO SURVIVE ON ABOUT 50-60 ACRES OF REMAINING HABITAT. A RECOVERY PLAN HAS BEEN PREPARED AND IS NOW BEING IMPLEMENTED. IN THE COURSE OF PREPARING THE PLAN, A WIDE VARIETY OF SPECIMEN AND FIELD DATA WERE EXAMINED, AS WELL AS CORRESPONDING INFORMATION FOR THE CLOSELY RELATED D. H. ARENAE, D. H. JOLONENSIS, AND D. H. SWARTHI.

COMPARISONS SHOW THIS SUBSPECIES TO BE SMALLER AND DARKER THAN ITS CLOSE RELATIVES, WITH A VERY BROAD SKULL. THE HIP STRIPE CHARACTERISTIC OF MOST KANGAROO RATS IS INCOMPLETE IN 92% OF THE SPECIMENS EXAMINED. TRAPPING RECORDS INDICATE YEAR-ROUND ACTIVITY, ALTHOUGH MOST ANIMALS HAVE BEEN TAKEN FROM MARCH THROUGH NOVEMBER. MALES OUTNUMBER FEMALES BY NEARLY 2:1. JUVENILES HAVE BEEN TRAPPED FROM MARCH THROUGH NOVEMBER. SINCE GESTATION IS ABOUT 30 DAYS, AND ADULT FEATURES ARE DEVELOPED AT AN AGE OF ABOUT 4 MONTHS, REPRODUCTIVE ACTIVITY IS EXTENDED. A MARKED ANIMAL WAS RECAPTURED 13½ MONTHS AFTER IT WAS INITIALLY CAPTURED. A CAPTIVE D. H. ARENAE IS STILL ALIVE AFTER 5 YEARS.

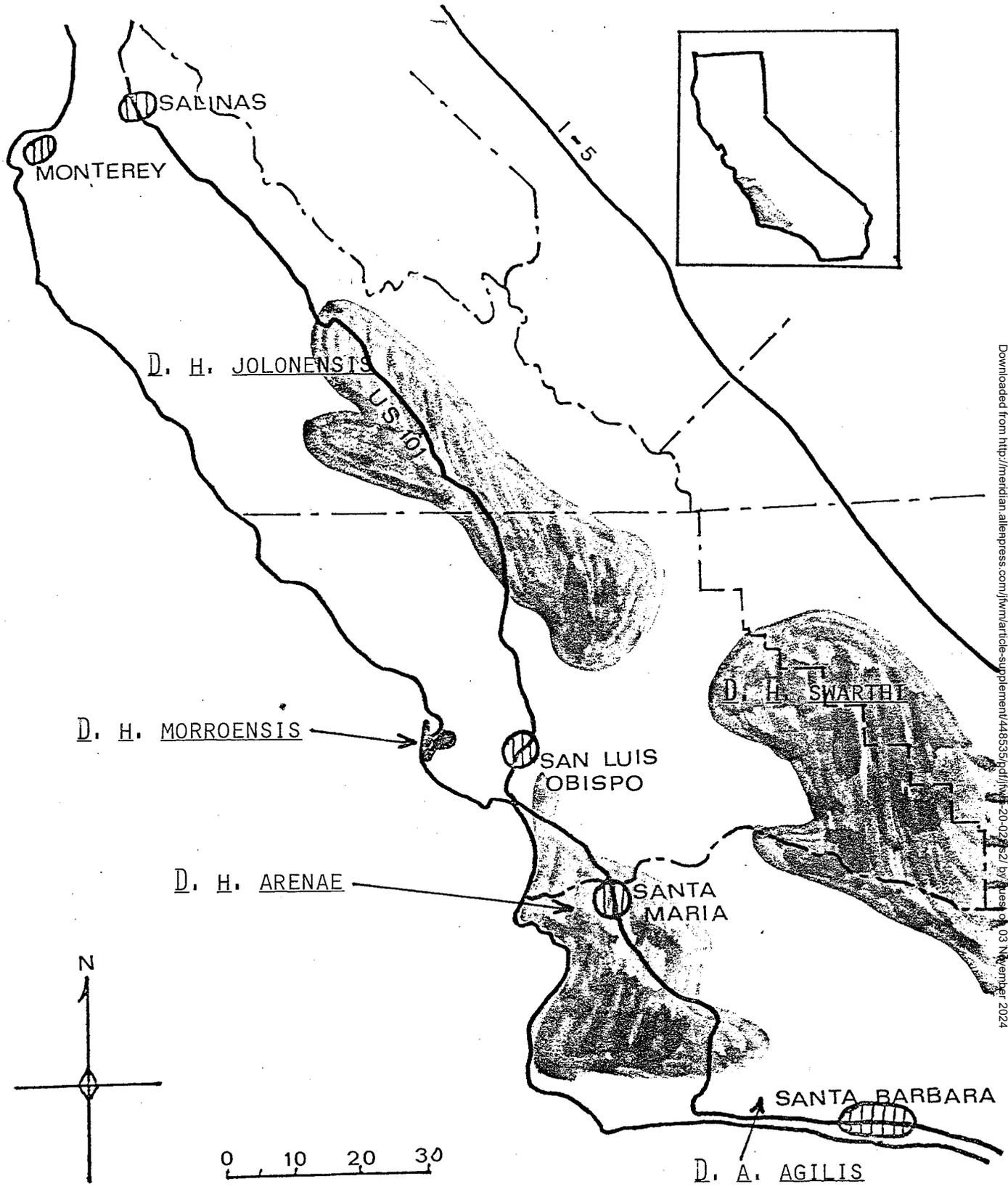


TABLE 1: DECLINE IN RANGE AND POPULATION OF THE MORRO BAY
KANGAROO RAT, DIPODOMYS HEERMANNI MORROENSIS

<u>ESTIMATE BY:</u>	<u>YEAR</u>	<u>OCCUPIED RANGE</u>	<u>POPULATION ESTIMATE</u>	<u>HUMAN POPULATION*</u>
STEWART	1958	1400 AC.	8000+	1500
CONGDON	1971	1120 AC.	3000	4700
ROEST	1977	231+AC.	1270-1470	8500
TOYOSHIMA	1977	214+AC.	300-1176	10000
ROEST	1984	55+AC.	60-150	12000+

* ESTIMATE FROM SAN LUIS OBISPO COUNTY PLANNING DEPARTMENT

THE ORIGINAL RANGE OCCUPIED BY THE ANIMALS HAS DECLINED AS THE HUMAN POPULATION HAS INCREASED AND CHANGED THE HABITAT. EVEN FORMERLY OCCUPIED AREAS WHICH HAVE NOT BEEN DEVELOPED ARE NO LONGER SUITABLE, SINCE THE LOW, OPEN, THINLY BRUSHED AREAS HAVE MATURED TOWARD A SUBCLIMAX OF HARD CHAPARRAL THAT IS TOO DENSE FOR KANGAROO RATS. AT PRESENT, KANGAROO RATS ARE KNOWN TO BE PRESENT AT ONLY ONE SITE, POSSIBLY AT TWO OTHERS; THEY ARE ABSENT FROM ALL OTHER PARTS OF THEIR RANGE.

TABLE 2: BODY MEASUREMENTS AMONG 5 SUBSPECIES OF DIPODOMYS.

SUBSPECIES	TOTAL LENGTH		TAIL LENGTH		WEIGHT (GMS)	
	N	MEAN RANGE	N	MEAN RANGE	N	MEAN RANGE
D. H. MORROENSIS	80	293 269-320	80	174 152-175	62	64.5 56-81
D. H. ARENAE	20	301 281-315	20	176 162-185	20	68.8 61-82
D. H. JOLONENSIS	10	304 295-313	10	188 175-200	10	87.7 79-94
D. H. SWARTHI	11	297 288-319	11	179 170-193	2	87.0 80-95
D. A. AGILIS	31	295 280-325	31	181 168-195	2	67.5 65-70

CHARACTERISTICALLY, D. H. MORROENSIS HAS AN INCOMPLETE HIP STRIPE: 98 OF 107 SPECIMENS EXAMINED (98%). IN D. H. ARENAE THE HIP STRIPE IS ALSO INCOMPLETE IN SOME SPECIMENS: 24 OF 95 (25%). HIP STRIPES ARE COMPLETE IN 100% OF THE OTHER SUBSPECIES.

TABLE 3: SKULL MEASUREMENTS AND PROPORTIONS OF 5 SUBSPECIES OF DIPODOMYS.

SUBSPECIES	SEX	SKULL LENGTH		MAXILLARY WIDTH		MW/SL X 100			
		N	MEAN	SD	N	MEAN	SD	N	MEAN
D. H. MORROENSIS	M	14	38.5	0.98	14	21.9	0.56	14	57%
	F	7	38.3	0.31	7	21.7	0.52	7	57%
D. H. ARENAE	M	19	39.7	1.21	17	21.7	0.79	17	54%
	F	7	38.7	0.60	7	21.2	0.87	7	55%
D. H. JOLONENSIS	M	14	41.1	0.93	13	22.7	0.63	13	55%
	F	11	39.6	1.46	11	22.1	0.76	11	56%
D. H. SWARTHI	M	5	40.4	1.27	5	22.0	1.13	5	54%
	F	4	40.1	0.61	4	22.3	0.87	4	55%
D. A. AGILIS	M	25	39.8	1.08	25	21.0	0.86	25	53%
	F	22	39.0	1.03	22	20.5	0.82	22	53%

D. HEERMANNI IS ONE OF THE 'BROAD-FACED' KANGAROO RATS, AND D. H. MORROENSIS HAS A BROADER FACE THAN ITS NEAR RELATIVES. D. AGILIS IS ONE OF THE 'NARROW-FACED' KANGAROO RATS.

TABLE 4: DISTRIBUTION OF D. H. MORROENSIS CAPTURES DURING THE YEAR.

	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JULY</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>
ADULTS CAPTURED:	1	1	12	48	34	45	43	115	33	7	81	2
FEMALES WITH EMBRYOS:	-	-	-	-	20	3	-	1	-	-	-	-
JUVENILES CAPTURED:	-	-	3	4	20	2	14	64	1	-	7	-
MOLT LINES NOTED:	2	-	-	1	-	3	1	1	1	1	1	-
MOST ACTIVITY NOTED (TRACKS, ACTIVE BURROWS, ETC.)	-	-	-	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	-	-	-

TABLE BASED ON DATA FROM BOTH MUSEUM SPECIMENS AND FROM LIVE-TRAPPING STUDIES. TO SOME EXTENT, FIGURES REFLECT TIME WHEN STUDIES WERE MADE. WINTER RAINS AND COLD WEATHER (NIGHTS MAY DROP BELOW 40°F.) OCCUR DURING NOVEMBER, DECEMBER, JANUARY, AND FEBRUARY.

TABLE 5: ADULT SPECIMENS OF D. H. MORROENSIS EXAMINED, AND SEX RATIOS.

<u>COLLECTED OR LIVE-TRAPPED BY:</u>	<u>N</u>	<u>MALES</u>	<u>FEMALES</u>	<u>M/F RATIO</u>
DIXON (1918)	46	27	19	1.42 : 1
WILLETT (1930)	8	5	3	1.67 : 1
STEWART (1957)	10	8	2	4.00 : 1
HELSEL (1962)	36	30	6	5.00 : 1
CSUTI & KELLY (1968)	14	9	5	1.80 : 1
ROEST (1977)	26	17	9	1.89 : 1
TOYOSHIMA (1978)	5	1	4	0.25 : 1
TOYOSHIMA (1979)	<u>36</u>	<u>21</u>	<u>15</u>	<u>1.40 : 1</u>
TOTALS:	181	118	63	1.88 : 1

DATA FROM SPECIMENS AT THE MUSEUM OF VERTEBRATE ZOOLOGY, BERKELEY, CA (52 SPECIMENS), THE LOS ANGELES COUNTY MUSEUM OF NATURAL HISTORY, LOS ANGELES, CA (22), THE SANTA BARBARA MUSEUM OF NATURAL HISTORY, SANTA BARBARA, CA (4), AND CALIFORNIA POLYTECHNIC STATE UNIVERSITY, SAN LUIS OBISPO, CA (24), AND FROM LIVE-TRAPPING STUDIES.

TABLE 6: DATA ON CAPTIVE-BORN D. H. ARENAE AND D. H. JOLONENSIS (*)

GESTATION:

PAIRED:	JAN 25	FEB 7	MAR 14*	OCT 13	DEC 5
PARTURITION:	<u>FEB 26</u>	<u>MAR 9</u>	<u>APR 13</u>	<u>NOV 13</u>	<u>JAN 7</u>
GESTATION TIME:	32 D.	30 D.	30 D.*	31 D.	33 D.

DEVELOPMENT:

<u>AGE:</u>	<u>WEIGHT (GMS)</u>	<u>TOTAL LENGTH</u>	<u>TAIL LENGTH</u>	<u>COMMENTS</u>
AT BIRTH:	4-5	65-70MM		PINK, HAIRLESS, EYES CLOSED
1 WEEK	8-15			DARK PIGMENT IN DORSAL SKIN
2 WEEKS	10-20	100	50	FINE HAIR; EYES OPENING
3 WEEKS	16-33	140	75	EYES OPEN; NIBBLING OATS
4 WEEKS	26-50	175	100	WEANING
5 WEEKS	30-52	210	130	MALES HAVE SCROTAL TESTES
6 WEEKS		240	145	1ST ESTRUS IN FEMALES
7 WEEKS	38-64	255	160	

10 WEEKS	45-72	270	170	

14 WEEKS	52-62	275	175	REACHING ADULT SIZE

19 WEEKS	60+	280	175	MOLTING TO ADULT PELAGE

IN ATTEMPTING TO DEVELOP LIFE HISTORY INFORMATION ON D. H. MORROENSIS, D. H. ARENAE AND D. H. JOLONENSIS WERE CAPTIVE-BRED, USED AS SURROGATES FOR MORROENSIS.

TABLE 7: RECAPTURES OF INDIVIDUALLY MARKED D. H. MORROENSIS
DURING LIVE-TRAPPING STUDIES.

<u>SEX</u>	<u>INITIAL CAPTURE AND TAGGING</u>	<u>RECAPTURED LAST</u>	<u>INTERVAL</u>
M	16 APR 1977	1 JLY 1977	104 DAYS
F	15 APR 1977	1 JLY 1977	105 DAYS
F	12 MAR 1977	1 JLY 1977	111 DAYS
F	24 MAY 1978	22 SEP 1978	121 DAYS
M	22 DEC 1978	25 JUN 1979	184 DAYS
M	1 JLY 1978	20 MAY 1979	323 DAYS
F	15 APR 1977	1 JUN 1978	411 DAYS

ONLY RECAPTURES AFTER AN INTERVAL OF AT LEAST 100 DAYS ARE
INCLUDED ABOVE.

SOURCES

LITTLE HAS BEEN FORMALLY PUBLISHED ABOUT D. H. MORROENSIS;
THE PRIMARY REFERENCES ARE:

BOULWARE, J. 1943. TWO NEW SUBSPECIES OF KANGAROO RATS (GENUS
DIPODOMYS) FROM SOUTHERN CALIFORNIA. UNIV. CALIF. PUBL.
ZOOLOGY, 46 (7): 391-396.

CONGDON, J. AND A. ROEST. 1975. STATUS OF THE ENDANGERED MORRO
BAY KANGAROO RAT. J. MAMM., 56 (3): 679-683.

GRINNELL, J. 1922. A GEOGRAPHICAL STUDY OF THE KANGAROO RATS
OF CALIFORNIA. UNIV. CALIF. PUBL. ZOOLOGY, 24 (1): 1-124.

STEWART, G. AND A. ROEST. 1960. DISTRIBUTION AND HABITS OF
KANGAROO RATS AT MORRO BAY. J. MAMM., 41 (1): 126-129.

IN ADDITION, SEVERAL REPORTS FOR THE CALIFORNIA DEPARTMENT
OF FISH AND GAME HAVE BEEN PREPARED BY:

CONGDON, J. 1971. (POPULATION ESTIMATE AND CURRENT DISTRIBUTION)

ROEST, A. 1973. (HABITAT EVALUATION)

ROEST, A. 1977. (DISTRIBUTION AND POPULATION ESTIMATE)

TOYOSHIMA, J. 1978. (SMALL MAMMAL MONITORING / MORRO BAY
ECOLOGICAL RESERVE)

TOYOSHIMA, J. 1979. (CURRENT POPULATION AND RANGE)

SEVERAL STUDENTS AT CALIF. POLY. ST. UNIV., SAN LUIS OBISPO,
HAVE ALSO CONTRIBUTED INFORMATION RELATING TO D. H. MORROENSIS:

DANIELS, A. 1979 (BREEDING); HELSEL, D. 1962 (POPULATIONS);

KOZIK, C. 1977 (BREEDING); RISSER, R. 1975 (TAXONOMY);

ROSNER, N. 1972 (BAIT PREFERENCE); STEWART, G. 1958 (LIFE

HISTORY); STUDLEY, M. 1978 (BREEDING).