

CORPORATION FALCONBRIDGE COPPER
MOUNT SICKER PROJECT

ENVIRONMENTAL PROGRAMS
Water Quality Sampling Procedures
Manual, Hydrology and Wildlife Logs

————— 827318

Prepared For

CORPORATION FALCONBRIDGE COPPER
6415, 64th Street,
Delta, B.C., V4K 4E2

Prepared By

HATFIELD CONSULTANTS LIMITED
#201-1571 Bellevue Avenue
West Vancouver, B.C.
V7V 3R6

March, 1987

CORPORATION FALCONBRIDGE COPPER
MOUNT SICKER PROJECT

ENVIRONMENTAL PROGRAMS
FIELD HYDROLOGY AND WATER QUALITY
MONITORING PROCEDURES

1.0 WATER QUALITY MONITORING

HATFIELD CONSULTANTS LIMITED will supply an adequate number of water quality sample bottles and necessary equipment free of charge each time a field program is being carried out at the adjacent Abermin Property. FALCONBRIDGE COPPER field staff will be advised by telephone approximately one week in advance of each field program.

There will be four bottles to be filled at each sample location. The sample locations are shown on the attached map and the sample bottles are to be labeled as follows:

1 litre plastic bottle

- label GENERAL, FALCONBRIDGE COPPER, date and sample location number.
- rinse three times with the creek water being sampled
- rinse cap in creek water and fasten securely

1 litre plastic bottle

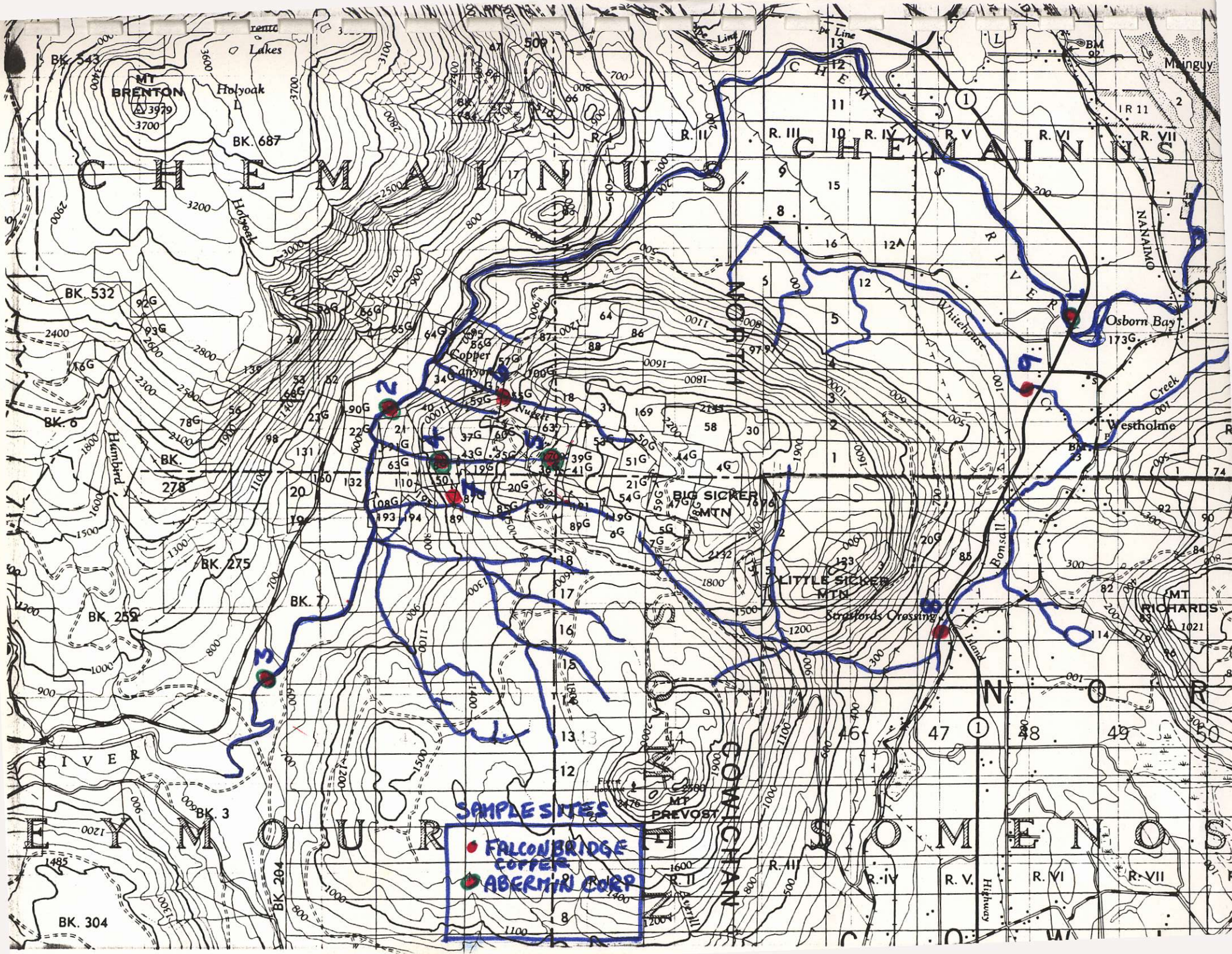
- label CYANIDE, FALCONBRIDGE COPPER, date and sample location number.
- these bottles already contain some NaOH pellets as preservative
- DO NOT RINSE
- fill to the top, rinse cap and fasten securely

250 ml plastic bottles

- label TOTAL METALS, FALCONBRIDGE COPPER, date and sample location
- rinse three times with creek water being sampled
- rinse cap and fasten securely

250 ml plastic bottles

- label DISSOLVED METALS, FALCONBRIDGE COPPER, date and sample location number.
- rinse three times with creek water being sampled
- return cap and secure.



Place all samples securely into coolers. These will be picked up and return Vancouver for analyses at:

ASL Analytical Services Limited
1650 Pandora Street
Vancouver, B.C.
V5L 1L6

Attention: Mr Allan Maynard ,

Test results will be sent directly to Mr. Alex Davidson at
FALCONBRIDGE COPPER's Delta office.

2.0 HYDROLOGY MONITORING

The discharge of a stream may be measured using Rhodamine WT dye and related to a specific elevation on the staff gauge. In this way the staff gauge can be calibrated for a range of flows. An accurately known quantity of dye is injected into the stream at a location sufficiently distant upstream to ensure its complete horizontal and vertical mixing. The resultant dye cloud or plume is sampled at a downstream location every 5 seconds (precisely) to properly characterize the plume. Sampling must start before the plume arrives and for a short time after the plume has passed. The combined samples are subsequently analyzed in a laboratory to determine the relative concentration of dye and then indirectly related to the instantaneous discharge of the stream and the staff gauge measurement.

- 1) First, record the Date, Station Number and the Staff Gauge reading on the label of a 1 litre bottle.
- 2) Do a trial run. Have someone go upstream about 200 feet and add a small amount of Rhodamine dye with the hypodermic syringe. Make sure that the amount used is injected all at once and is just enough to make the creek slightly pink as it passes you. If it is too much, reduce the amount accordingly.
- 3) Allow the creek to clear before you start the actual test. Record the actual amount of dye used at each Station.
- 4) Start sampling just before the dye plume arrives. Take a new sample every 5 seconds (precisely) until after the plume has passed and you have filled the larger bottle.
- 5) Be sure the lid is on securely.
- 6) Record the sampling frequency and total sampling interval with the Station Number.

Caution: Rhodamine Dye causes immediate staining and is reported to be a carcinogen. Wash hands thoroughly after use. Stained cloths will come clean after three washes.

Record the following information:

Station Number	Gauge Reading	Amount of Dye	Bottle Numbers	Sample Frequency & total time every 5 sec
Example	0.14	2 mls	2	1 min 15 sec
Staff Gauge Station #6	0.86	5ml	6	5 sec interval Per 3.5 min
Staff Gauge Station #7	0.18	—	7	* 0.33 L/sec
Staff Gauge Station #8	0.76 ¹	5ml	8	5 sec interval 250 sec.
Staff Gauge Station #9	1.94	5m	9	5 sec interval Per 200 sec
Staff Gauge Station 5				

These samples are to be securely boxed up and returned to Vancouver with the above data and analysed by HATFIELD CONSULTANTS LIMITED. Stream discharges will be calculated and the information returned to FACONBRIDGE COPPER field staff.

* measured in bucket + stopwatch

1. from top of cement pad (measured down from 2)

Data phoned in by Bob Halim

Station	Flow Rate
6	0.67 ft ³ /sec
7	0.3 L/sec
8	4.9 ft ³ /sec
9	14.0 ft ³ /sec

CORPORATION FALCONBRIDGE COPPER
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ENVIRONMENTAL PROGRAMS
HYDROLOGY LOG

1. - measured from "2" resting on top of cement wall.

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ENVIRONMENTAL PROGRAMS
HYDROLOGY LOG

1-2 times weekly

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Date	Weather	Staff Gauge Station Number (ft)				
		NUGGET CRK # 6	TRAILINGS # 7	BONSAIL # 8	WHITE HOUSE # 9	# 5
Example	Cool, rain sun, warm *	0.25	1.32	0.55	2.01	0.48
MJG 26 MAR '87	SUNNY, CLEAR, WARM	0.86	0.18	0.76 ¹ (from top of cement wall)	1.94	
HG 31 MAR '87	Sunny, clear, warm	0.73	0.17		1.85	
HG 02 April '87	Sunny, clear, warm	0.66	0.16	0.70	1.84	
MJG 12 April '87	Overcast, cool	0.75	0.16	0.75	1.85	
HG 11 April '87	Overcast, cool	0.81	0.16	0.76	1.88	
MJG 22 April '87	Clear, warm	NEW DATUM 0.48	—	0.74	1.79	
MJG 26 April '87	Sunny, Clear, warm	0.25	0.15	0.72	1.67	
MJG 5 May '87	Sunny, Clear, warm	harolds hammer 0.00	0.17	harolds hammer 0.67	1.72	
PAM 11 May '87	Cloudy, cool, raining	minor flowage 0.00	—	1.33 ?	1.70	
MJG 16 MAY '87	Sunny, Clear, warm	0.00	minor flowage 0.00	0.70	1.64	
MJG 28 MAY '87	Cloudy, warm	—	—	0.57	1.68	
MJG 04 JUNE '87	Cloudy, warm	—	0.00	0.54	1.70	
PM 05 June '87	Sunny, warm	minor flowage 0.00	0.00	0.58	1.70	
PM June 11 '87	cloudy, cool	0.00	0.00	0.55	1.67	
PM June 16 '87	Sunny, warm	0.00	0.00	—	1.65	
PM June 26 '87	Sunny, hot	0.00	0.00	0.61	1.30	
MJG 2 JULY '87	Cloudy, hot	0.00	0.00	0.50	1.30	
MJG 10 JULY '87	Sunny, hot	0.00 trickle	0.00	0.52	1.40	
MJG 17 JULY '87	Sunny, hot	0.00 trickle	0.00	0.51	1.14	

* H.R. (Heavy Rain), L.R. (Light Rain), I.R. (Intermittent Rain)
F(Freezing), C(Cold), W(Warm), H(Hot), S(Sunny), O(Overcast)

HYDROLOGY LOG

Date	Weather	Staff Gauge Station Number (ft)			
		NUGGET CRK #6	TAILINGS #7	BONSAIL #8	WHITEHOUSE #9
C. Higgins 24 JULY	sunny, hot	sm trickle 0	0	C. Higgins	0
M.J.G. 31 JULY '87	sunny, hot	sm trickle 0	0	—	0
M.J.G. 7 AUG '87	sunny, hot	sm trickle 0	0	0.54	0
M.J.G. 12 AUG '87	S/o, hot	0	0	0.52	0
M.J.G. 25 AUG '87	S, hot	0	0	0.50	0
M.J.G. 30 AUG '87	S, hot	0	0	0.51	0
J.N. 13 Sept '87	S, warm	0	0	0.49	0
J.N. 24 Sept '87	S, warm	0	0	0.52	0
J.N. 2 Oct '87	O/s, warm	0	0	0.51	0
J.N. 11 Oct '87	S, warm, dry	0	0	0.49	0
J.N. 25 Oct '87	O/s, cool, dry	0	0	0.51	0
J.N. 3 Nov '87	O/s, cool	0	0	0.54	0
J.N. 18 Nov '87	O cool	0.0	0	0.55	1.5
J.N. 25 Nov '87	S/cool	0.65	0	0.58	1.95
J.N. 3 Dec '87	O/cool ^{heavy rain} Dec 2	1.3	0.5	1.0	2.75
J.N. 11 Dec '87	S/cool ^{heavy rain} all week	1.12	0.2 ^(creek bed moved)	1.15	3.0 ft
J.N. 17 Dec '87	S/cool ^{1/2 snow} on Mt.	—	road impassable.	0.81	2.5 ft
M.J.G. 10 JAN '88	I.R. COLD	—	road impassable due to snow	0.82	2.7
J.N. 25 JAN '88	clean ^S /cool	new setting on flat rock. 0.47	0.2	0.88	2.8
M.R.F. 08 Feb '88	low clouds cool Rain	.50	0.15	.83	2.69
J.N. 18 Feb '88	sunny/cool	0.65	0.20	0.82	2.83
J.N. 1 March '88	cloudy/cool	0.55	0.15	0.82 MRF 0.83	3.05

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HYDROLOGY LOG

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Date	Weather	Staff Gauge Station Number (ft)			
		NUGGET CR #6	TAILINGS #7	BONSAIL #8	WHITEHOUSE #9
					5
GR- Mar 8/88	raining, cool	0.68 ft.	0.2 ft.		
GR- Mar 21/88	showers, cool	0.27 ft	0.16 ft	0.74	2.71
MRF Mar 28/88	Overcast, cool	0.85	0.20	1.0	3.15
APR 1/88	Scattered cloud, showers	0.90	0.18	.90	3.35
GR- April 11/88	overcast, cool	0.50 ft	0.19 ^{new location}	0.88	2.63
MRF April 18/88	clear, cool	0.35	0.15	0.80	3.38
	April 30 overcast, showers			0.75	2.38
MRF May 2/88	overcast, showers	0.50	0.09	0.70	3.48
N May 19/88	overcast	0.45	0.05	-	2.45
N May 31/88	cool, partly cldy	0.25	zero!	0.55	2.20 1.55
MRF June 13/88	Clear, Hot	0.20	Zero	0.55	3.15
MF July 6/88	clear, warm.	0	0	0.7	2.7
GSW July 22/88	CAVU warm-hot	0	0	0.56	1.94
GSW Aug 6/88	overcast dry	0	0	0.56	1.80
GSW Aug 25/88	Sunny warm dry	0	0	0.54	0
GSW Sept 14/88	Sunny hot/dry	0	0	0.54	0
GSW Oct 6/88		0	0	0.55	2.01
PB Oct 17/88	Sunny, Cool	0	0	0.6	2.14
PB Oct 31/88	overcast showers	0	0	0.65	2.4
GW PB Nov 8/88	H.R. during past week	1.1	0.1	0.9	2.65
PB Nov 18/88	Misty. V. cool.	0.4	0.05		
PB Dec 12/88	Heavy Rain	0.65	0.2		

* H.R. (Heavy Rain), L.R. (Light Rain), I.R. (Intermittent Rain)
F(Freezing), C(Cold), W(Warm), H(Hot), S(Sunny), O(Overcast)

HYDROLOGY LOG

Date	Weather	Staff Gauge Station Number (ft)				
		NUGGET 1	TAILINGS 2	BONSAI 3	WHITEHORN 4	5
GW PB Dec. 13/88	heavy rain yesterday			1.17	2.96	
Jan 15/89	snow, rain	not accessible due to snow		1.0	2.8	
PB Feb 16/89	light snow	Not accessible due to snow		0.7	2.3	
PB Feb 27/89	cool overcast	Not accessible		0.95	2.80	
PB March 8	Patchy cloud showers	Not accessible		1.07	2.86	
March 16	PATCH CLOUD SHOWERS SNOW HIGHER ELEV.	"	"	1.15	3.35	
March 29	partly cloudy scattered showers	0.92	0.35	0.90	2.70	
April 7	Sunny, warm heavy rain in past week	1.21	0.40	1.11	2.91	
April 18	sunny	0.38	0.23			
April 26	overcast				2.42	
April 30	Sunny, warm	0.18	0.18			
May 7					2.43	
J.P. May 19	sunny, warm.	0	0	0.56	1.88	
June 13	overcast warm no rain			0.54	2.1	
June 28	L.R.	—	—	0.56	2.15	
July 10	L.R.	—	—	0.54	2.25	
July 24	Sunny warm	—	—	0.52	2.30	
Aug 3	overcast warm	—	—	0.52	2.20	
Aug 11	patchy cloud warm no rain	—	—	0.52	2.15	
"	Sunny			0.52	Nil	

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 F(Freezing), C(Cold), W(Warm), H(Hot), S(Sunny), O(Overcast)

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WILDLIFE OBSERVATION LOG

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MOUNT SICKER PROJECT

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WILDLIFE OBSERVATION LOG

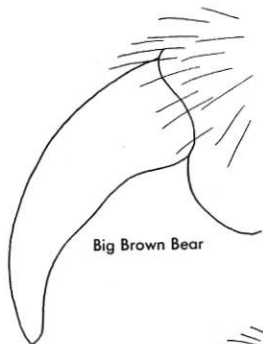
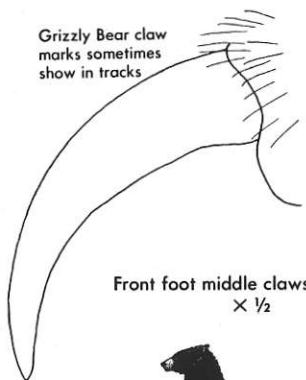
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Date	Location	Species	Comments
Example	Drill Hole 28-78	2 Black Bears	Mother and cub
28 th MAR '87	Station 6 (Nugget Crk)	2 Grouse	Adults in trees
03 th APR. '87	Plum Claim L23+00E 9+00N	1 Woodpecker	Red Crested
" " "	" " L25+00E 10+50N	1 Whitetail Deer	Doe, grazing
10 APR. '87	Meade Crk - Chemainus R.	2 Elk	From rear, brief view
10 APR. '87	" " - " "	1 Coyote	Brief Glimpse
26 APR. '87	Whitehouse Crk Gauge Station	1 Swamp Rabbit	Bush next to Hwy
18 MAY '87	Copper Canyon	1 Squirrel	-
18 MAY '87	SE Corner Mt. Sicker	1 Hawk	Flying
14-15 MAY '87	NE Copper Area	Black Bear	Feces, Fresh
30 MAY '87	COPPER CANYON	1 Whitetail Deer	On M&B Main Mi 7
1 JUNE '87	E SIDE MT. SICKER L38E, 3S	Black Bear	3 year old
4 JUNE '87	E SIDE MT. SICKER,	1 Wt. Deer + 1 Fawn (spotted)	
4 JUNE '87	"	2 WOODPECKERS	
8 JUNE '87	TAILINGS POND AREA	1 BLACK BEAR	LARGE & HEALTHY LOOKING
8 JUNE '87	NEAR CHEMAINUS RIVER TURNOFF FROM HWY # 19	1 RED FOX (?)	SMALL, ON ROAD
26 JUNE '87	Mt. Prevost Rd. near base	2 Deer	Mother + fawn
11 JULY '87	LOW, ~ 8N, Rd.	2 Deer	2 fawns
12 AUG '87	COPPER CANYON 1700W, BL	1 SQUIRREL	-
1 April 88	Tailings Pond	1 Black Bear	
April 20/88	Postluk-Fulton Area approx 4E 500N	Black bear sow and 2 possibly 3 cubs	very healthy looking
June 5/88	Mines Rd / MTS 57rd. turnoff	Black bear cub	No mother in sight.

Plate 4

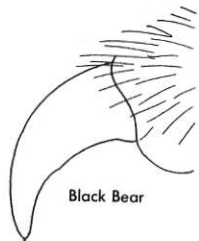
BEARS

Grizzly Bear claw marks sometimes show in tracks



Big Brown Bear

Front foot middle claws of bears
× 1/2



Black Bear

ALASKAN BROWN BEAR *Ursus middendorffi*

Hump on shoulders; large size; face dishd; moderate front claws. NW.

Map 48 Text 47

GRIZZLY BEAR *Ursus horribilis*

Hump on shoulders; face dishd; large front claws. NW.

48 46

POLAR BEAR *Thalarctos maritimus*

White, sometimes with pale yellowish wash. Arctic, Subarctic.

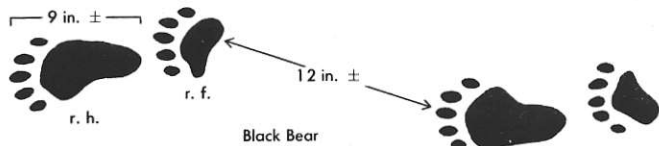
49 50

BLACK BEAR *Ursus americanus*

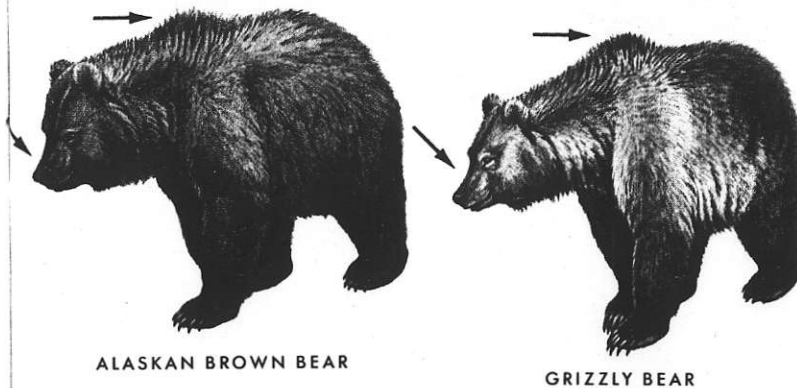
Blue phase, cinnamon phase, black phase. Nearly white on Gribble I., B.C.

No hump on shoulders; face brown, not dishd; claws small. N, S, E, W.

49 46



Black Bear

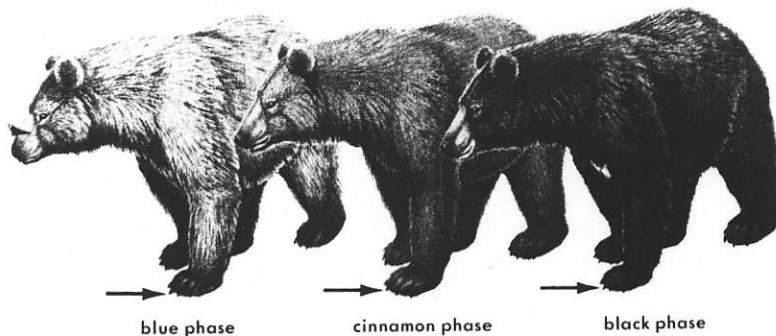


ALASKAN BROWN BEAR

GRIZZLY BEAR



POLAR BEAR



blue phase

cinnamon phase

black phase

BLACK BEAR

Plate 5

FUR-BEARING MAMMALS

	Map	Text
MARTEN <i>Martes americana</i>	55	54
Yellowish brown to dark brown; pale buff on breast; bushy tail. N.		
FISHER <i>Martes pennanti</i>	55	54
Blackish brown; frosted with white-tipped hairs on head and shoulders. N.		
WOLVERINE <i>Gulo luscus</i>	62	63
Dark brown; broad yellowish stripes from shoulders to rump. N.		
SEA OTTER <i>Enhydra lutris</i>		63
Head and neck grayish or yellowish; floats on back; seacoast. W.		
RIVER OTTER <i>Lutra canadensis</i>	61	60
Rich brown upperparts, silvery underparts; tail thick at base. N, S, E, W.		

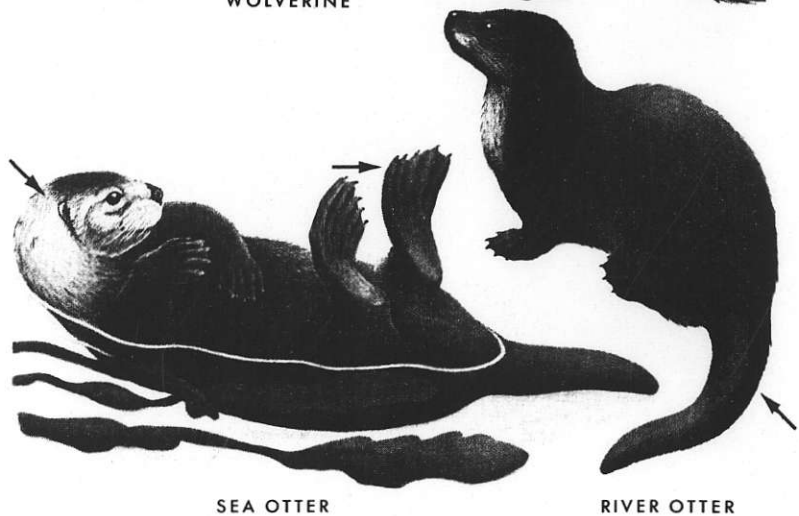
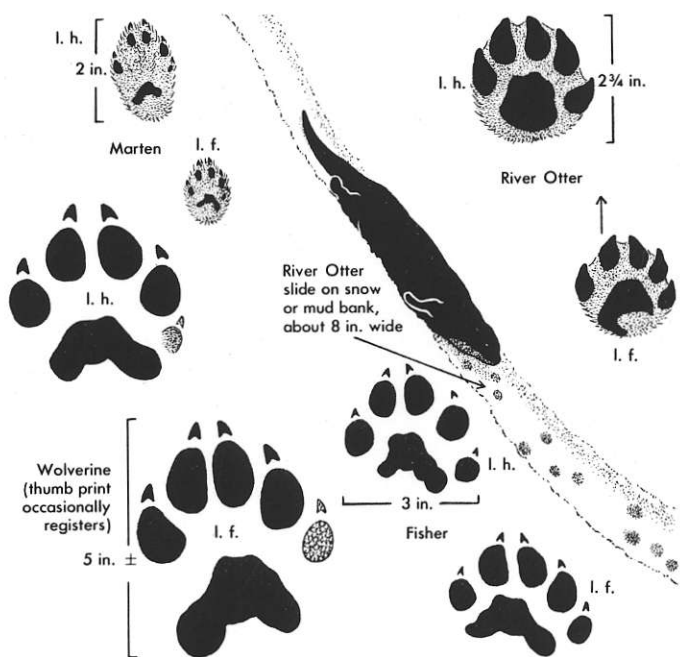


Plate 6

WEASELS AND MINK

LEAST WEASEL *Mustela rixosa*
No black tip on short tail. N.

Map 57 Text 56

SHORTTAIL WEASEL *Mustela erminea*
Winter: White; medium-sized; tail with black tip.
Summer: Brown; white down hind leg to foot. N.

57 55

LONGTAIL WEASEL *Mustela frenata*
Hind legs brownish; black tip on long tail. N, S, E, W.
Northeast: No white on face.
Southwest: White on face.

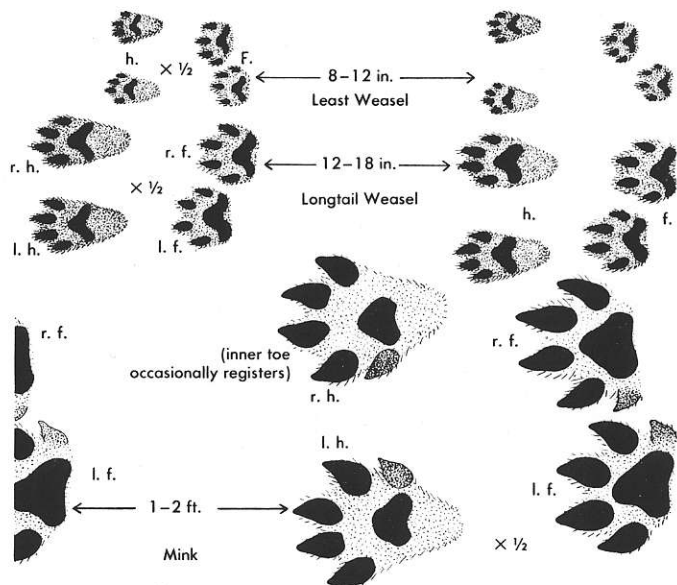
59 58

BLACK-FOOTED FERRET *Mustela nigripes*
Yellowish-brown to buffy body; black forehead and feet. W Central.

61 58

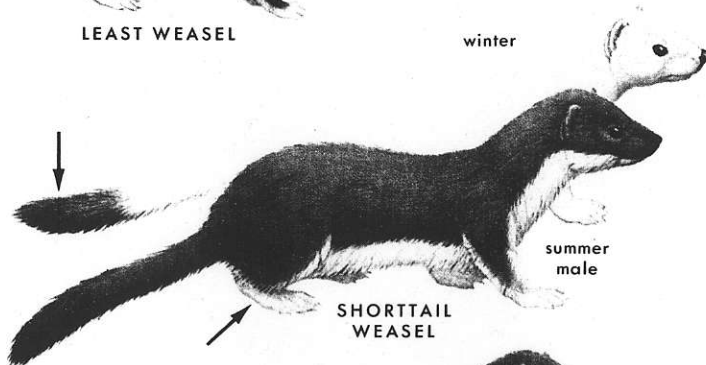
MINK *Mustela vison*
Rich dark brown; white on chin. E, NW.

59 60



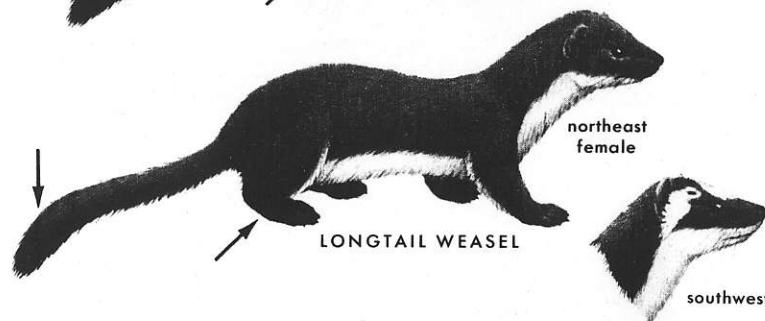
LEAST WEASEL

winter



SHORTTAIL WEASEL

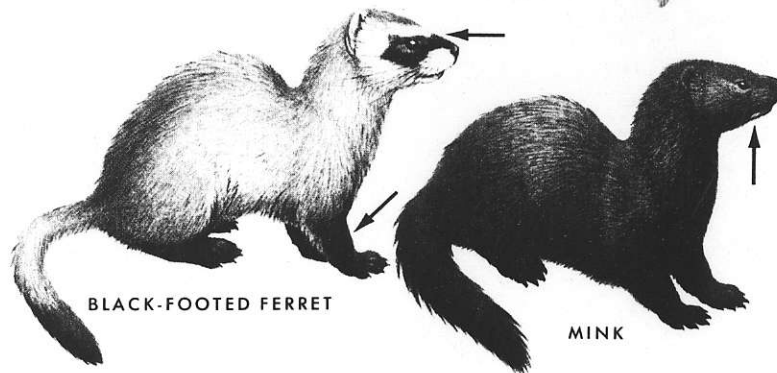
summer male



LONGTAIL WEASEL

northeast female

southwest



BLACK-FOOTED FERRET

MINK

Plate 7

DOGLIKE MAMMALS

RED FOX *Vulpes fulva*

White tip on bushy tail. N, S, E, W.

Red phase: Reddish yellow; feet black.

Black phase: Black with white-tipped hairs.

Cross phase: Reddish yellow to brown; dark cross over shoulders.

Map Text
74 72

GRAY FOX *Urocyon cinereoargenteus*

Black stripe down top of tail; feet and legs rusty. S, E, W.

76 75

ARCTIC FOX *Alopex lagopus*

Blue phase: Bluish brown; no white tip on tail.

White phase: White.

Arctic, Subarctic.

76 75

SWIFT FOX *Vulpes velox*

Black tip on tail. W Central.

74 73

COYOTE *Canis latrans*

Rusty legs, feet, and ears; nose pad less than 1 in. (25 mm) wide; tail down when running. W, NE.

69 69

GRAY WOLF *Canis lupus*

Usually gray; nose pad more than 1 in. (25 mm) wide; tail high when running. N, W.

71 70

RED WOLF *Canis niger*

Reddish or blackish; tail high when running. SE.

71 72

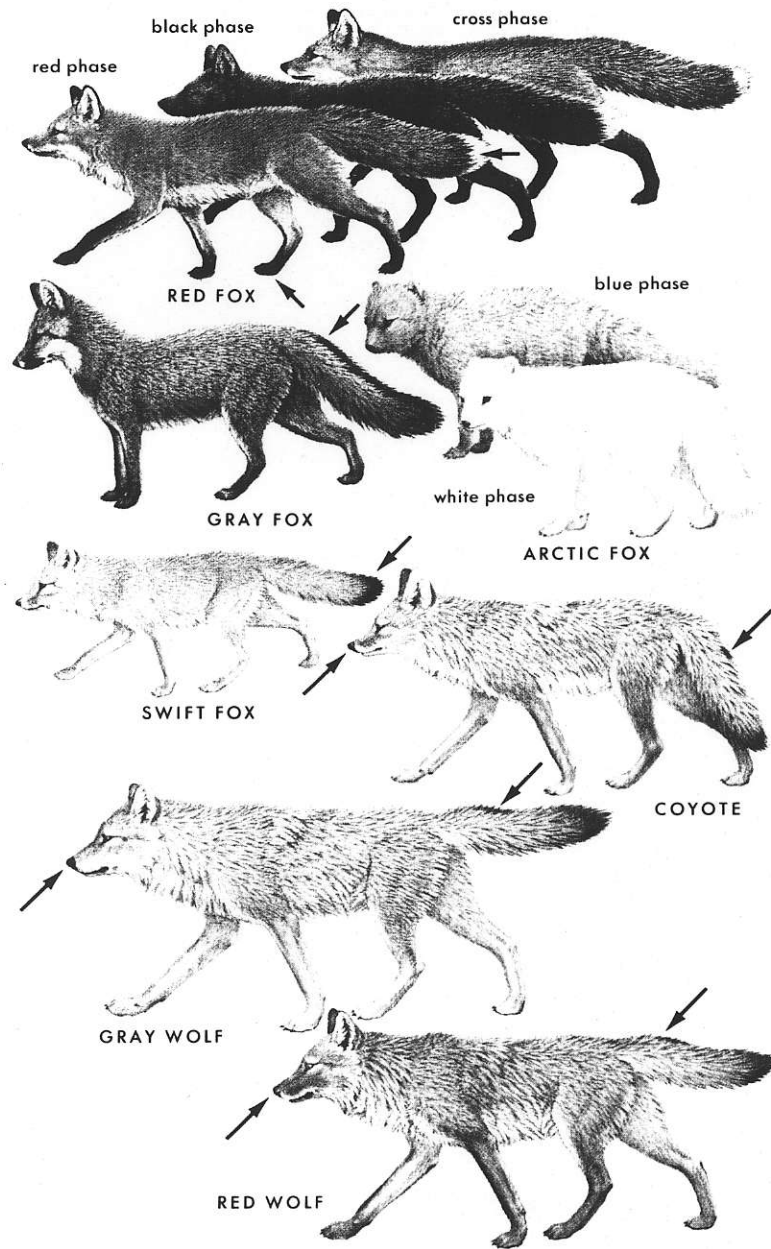
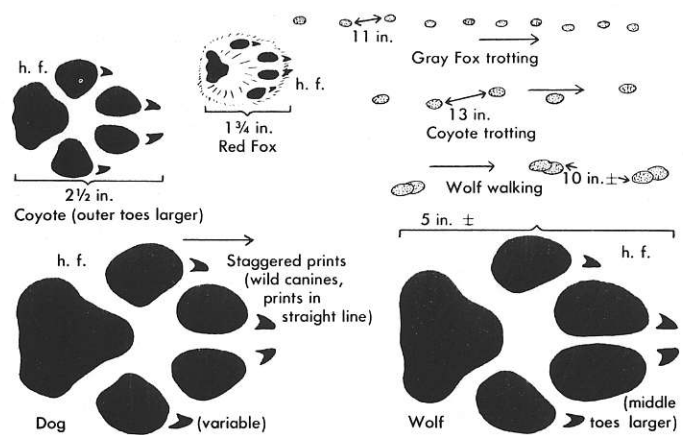


Plate 8

CATS

	Map	Text
LYNX <i>Lynx canadensis</i> Short tail with tip black all way around. N.	81	80
BOBCAT <i>Lynx rufus</i> Short tail with tip black only on top. N, S, E, W.	81	81
MOUNTAIN LION <i>Felis concolor</i> Young: Spotted. Adult: Tawny to grayish; large; long tail with dark brown tip. W, SE.	78	77
OCELOT <i>Felis pardalis</i> Spots arranged in rows; long tail; small size. S.	79	78
JAGUARUNDI CAT <i>Felis yagouaroundi</i> Long tail; short legs. SW. Red phase: Reddish. Gray phase: Bluish gray.	79	80
JAGUAR <i>Felis onca</i> Spots in form of rosettes; large size. SW.	79	77

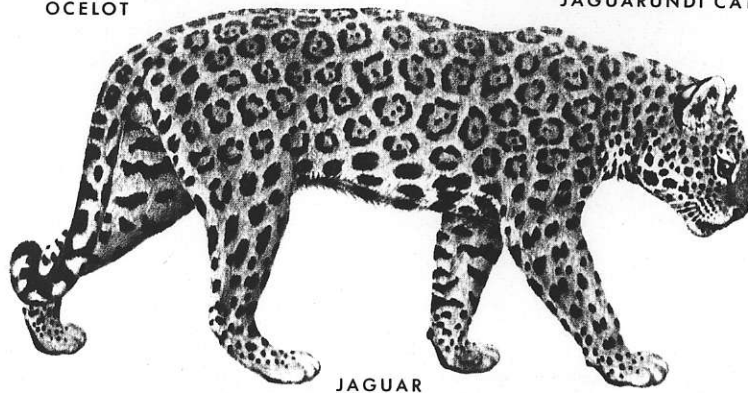
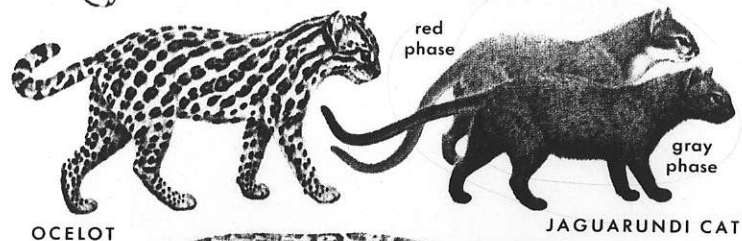
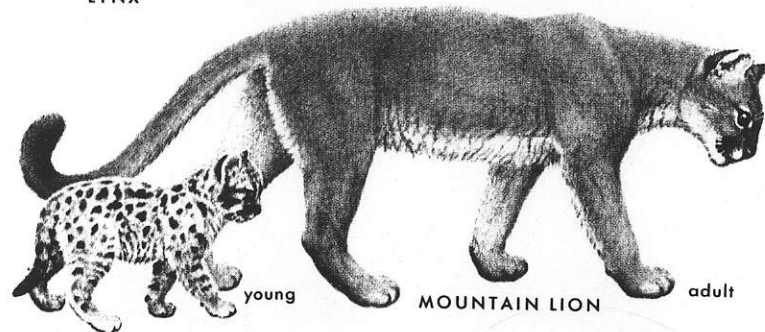
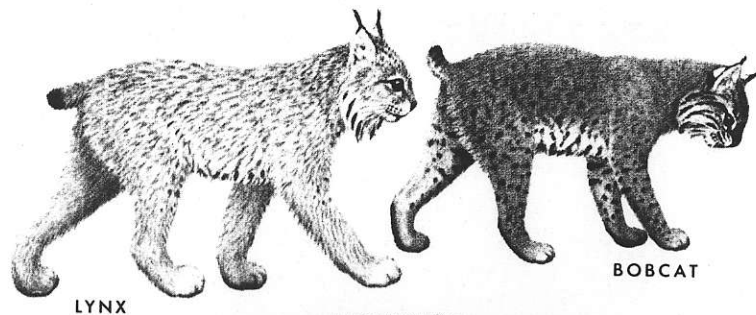
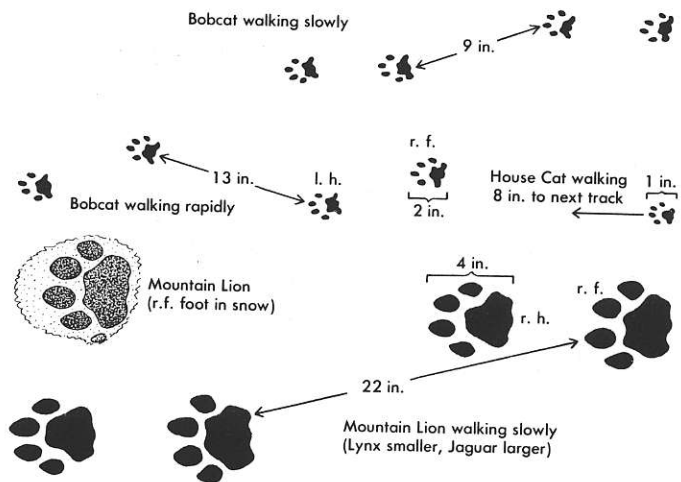


Plate 9

MEDIUM-SIZED MAMMALS

	Map	Text
WOODCHUCK <i>Marmota monax</i>	93	92
Yellowish brown or brown, frosted; feet dark brown or black. NW, E.		
YELLOWBELLY MARMOT <i>Marmota flaviventris</i>	93	92
Belly yellow; white between eyes. W.		
HOARY MARMOT <i>Marmota caligata</i>	91	94
Head and shoulders black and white; feet black. NW.		
RINGTAIL <i>Bassariscus astutus</i>	53	52
Yellowish gray; long tail with rings. SW.		
RACCOON <i>Procyon lotor</i>	51	50
Black mask; tail with rings. N, S, E, W.		
COATI <i>Nasua narica</i>	53	52
Grizzled brown; white spots above and below each eye; long tail; long snout. SW.		
BADGER <i>Taxidea taxus</i>	62	64
Yellowish gray; white stripe on forehead; feet black. W, N Central.		

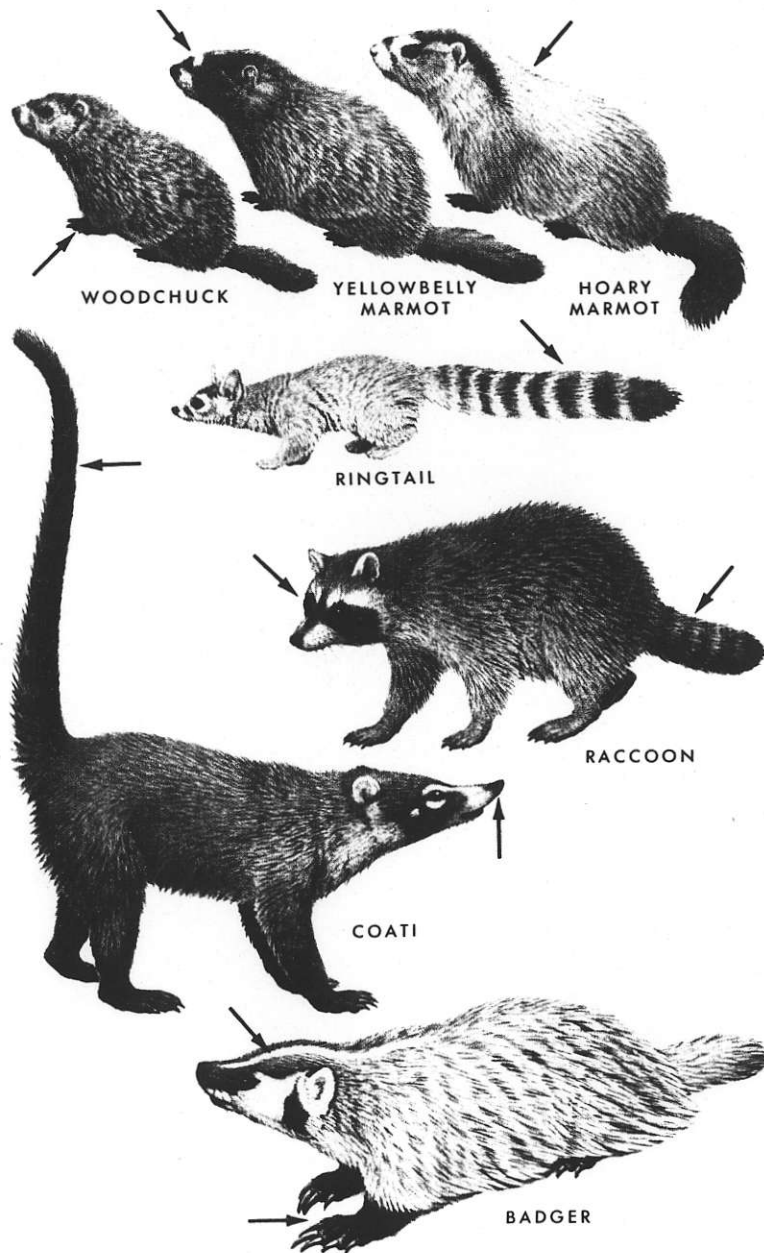
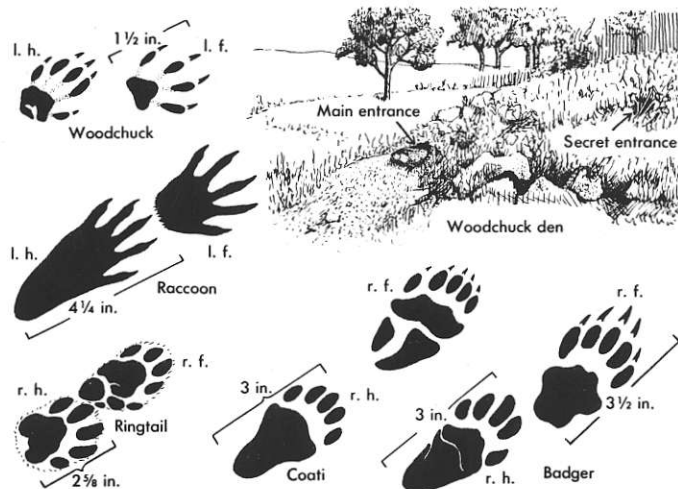


Plate 11

SQUIRRELS WITH STRIPES

	Map	Text
RED SQUIRREL <i>Tamiasciurus hudsonicus</i>	121	120
Upperparts yellowish or reddish; belly white. N, SW. Winter: Ear tufts. Summer: Black line along side.		
CHICKAREE <i>Tamiasciurus douglasi</i>	122	121
Upperparts reddish olive; belly yellowish or rusty. NW. Winter: Ear tufts. Summer: Black line along side.		
CLIFF CHIPMUNK <i>Eutamias dorsalis</i>	112	111
Gray; indistinct dark stripes down back and sides. SW.		
COLORADO CHIPMUNK <i>Eutamias quadrivittatus</i>	115	114
Bright colors; stripes distinct; white behind ear. SW.		
LEAST CHIPMUNK <i>Eutamias minimus</i>	109	110
East: Stripes on face; back stripes to base of tail. West: Pale yellowish gray; small size. W, N Central.		
EASTERN CHIPMUNK <i>Tamias striatus</i>	109	108
Stripes on face; body stripes end at reddish rump; bushy tail. E.		
TOWNSEND CHIPMUNK <i>Eutamias townsendi</i>	112	110
Dark brown; stripes on face and body indistinct. NW.		
MERRIAM CHIPMUNK <i>Eutamias merriami</i>	112	113
Stripes indistinct; stripe below ear brownish. SW.		
YUMA ANTELOPE SQUIRREL	106	107
<i>Ammospermophilus harrisi</i> Pinkish cinnamon to mouse-gray; white stripes on body only. SW.		
WHITETAIL ANTELOPE SQUIRREL	106	107
<i>Ammospermophilus leucurus</i> Pinkish gray, with white stripes on body only; tail white beneath. SW.		
GOLDEN-MANTLED SQUIRREL <i>Citellus lateralis</i>	104	105
Stripes on body only; coppery head. W.		

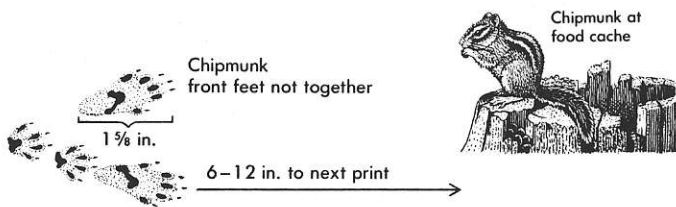
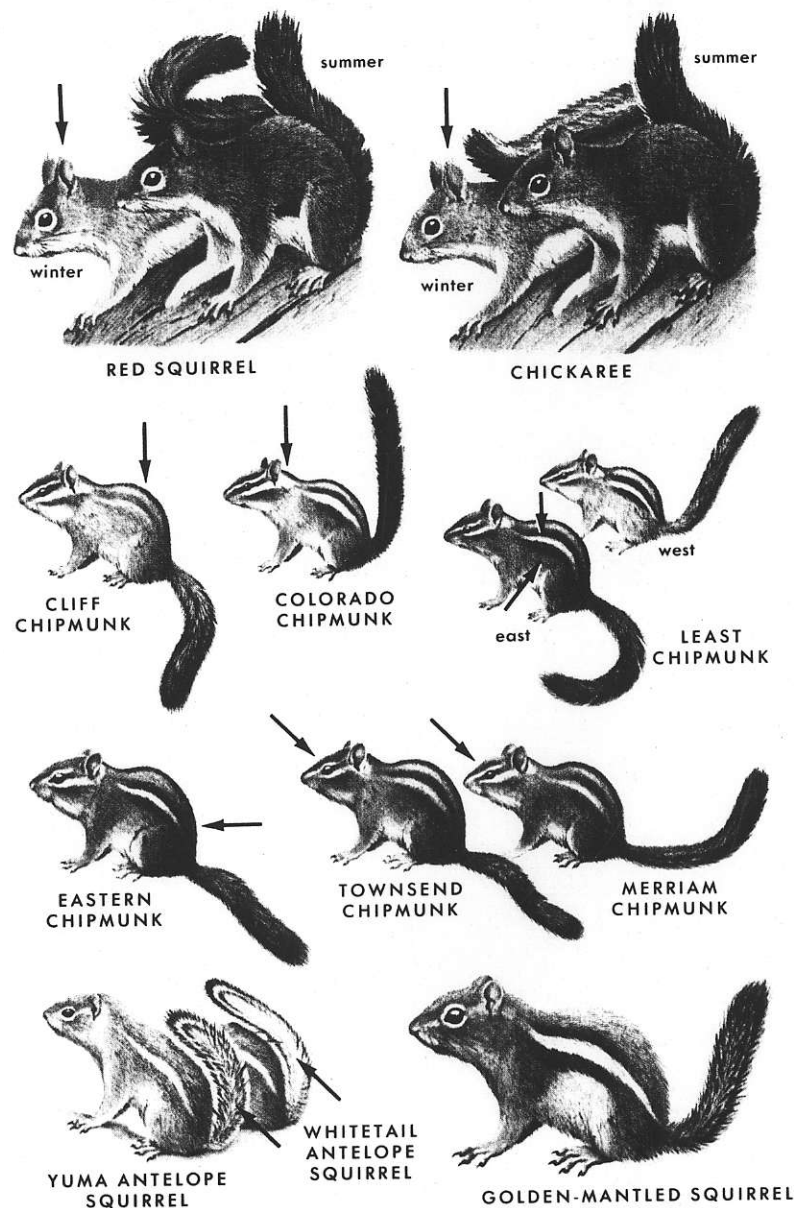


Plate 12

TREE SQUIRRELS

- | | Map | Text |
|--|-----|------|
| WESTERN GRAY SQUIRREL <i>Sciurus griseus</i> | 117 | 116 |
| Body gray, feet dusky; very bushy tail. W. | | |
| EASTERN GRAY SQUIRREL <i>Sciurus carolinensis</i> | 119 | 117 |
| Body gray, washed with fulvous in summer. E.
Winter: White behind ears.
Summer: Tail bordered with white. | | |
| SOUTHERN FLYING SQUIRREL <i>Glaucomys volans</i> | 122 | 122 |
| Fur soft; olive-brown above, white on belly; loose skin between front and hind legs. E. | | |
| TASSEL-EARED SQUIRREL <i>Sciurus aberti</i> | 117 | 117 |
| Ears tufted except in late summer. SW.
South of Grand Canyon: Tail white beneath.
North of Grand Canyon: Tail all-white. | | |
| EASTERN FOX SQUIRREL <i>Sciurus niger</i> | 119 | 118 |
| South: Head blackish, body grayish.
North: Rusty; tail bordered with fulvous.
East: Steel-gray; no fulvous.
E. | | |

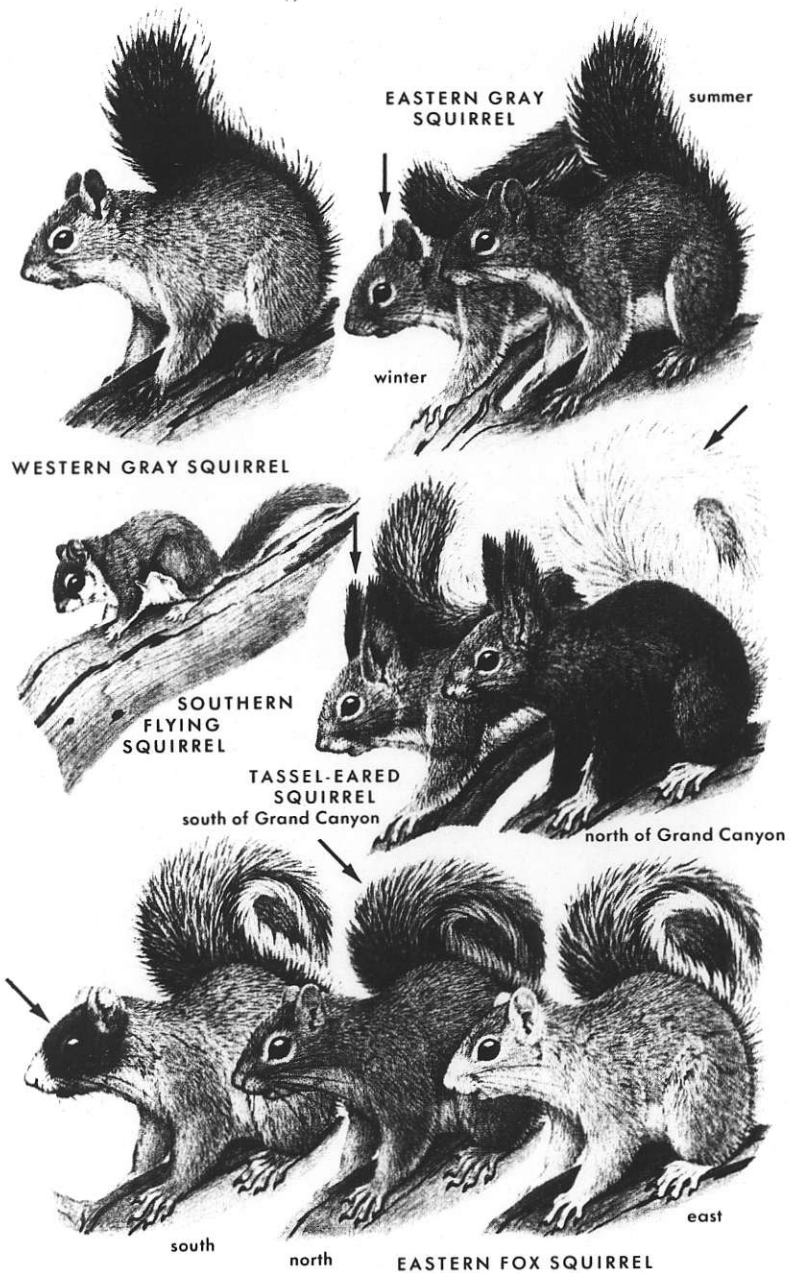
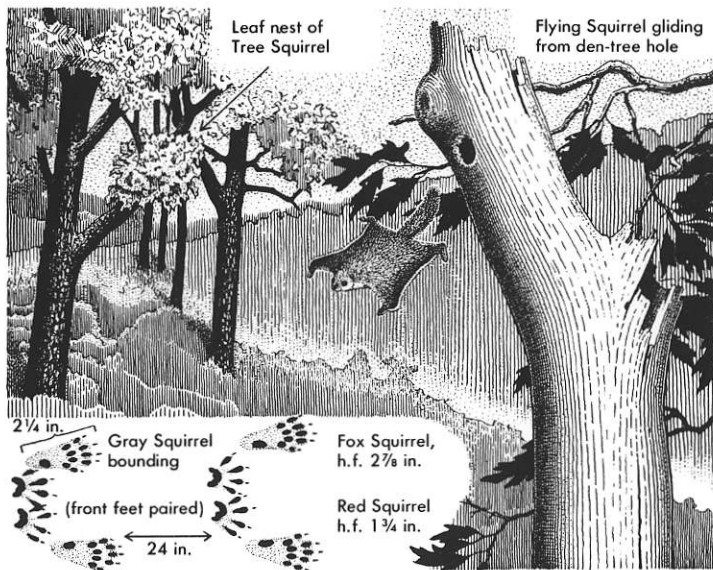


Plate 19

SOME ODD MAMMALS



	Map	Text
FLORIDA WATER RAT <i>Neofiber alleni</i> Rich brown fur; round tail; water. SE.	190	193
MUSKRAT <i>Ondatra zibethica</i> Rich brown fur; scaly tail flattened on sides; water. N, S, E, W.	194	193
APLODONTIA <i>Aplodontia rufa</i> Dark brown; no apparent tail; moist situations. NW.	91	90
NUTRIA <i>Myocastor coypus</i> Body grayish brown; tail long, round, scantily haired; water. S, NW.		200
ARMADILLO <i>Dasypus novemcinctus</i> Covered with armor plate. S Central, SE.	228	228
OPOSSUM <i>Didelphis marsupialis</i> White face, naked tail; size of House Cat. S, E, W.	2	1
BEAVER <i>Castor canadensis</i> Tail scaly, paddle-shaped, flattened on top and bottom. N, S, E, W.	152	151
PORCUPINE <i>Erethizon dorsatum</i> Long sharp spines on body and tail. N, W.	200	199
PECCARY <i>Pecari angulatus</i> Piglike; 3 toes on hind foot. SW, S Central.	214	213

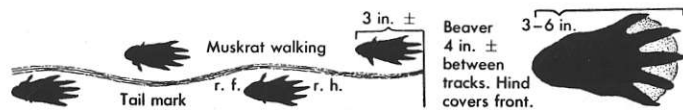
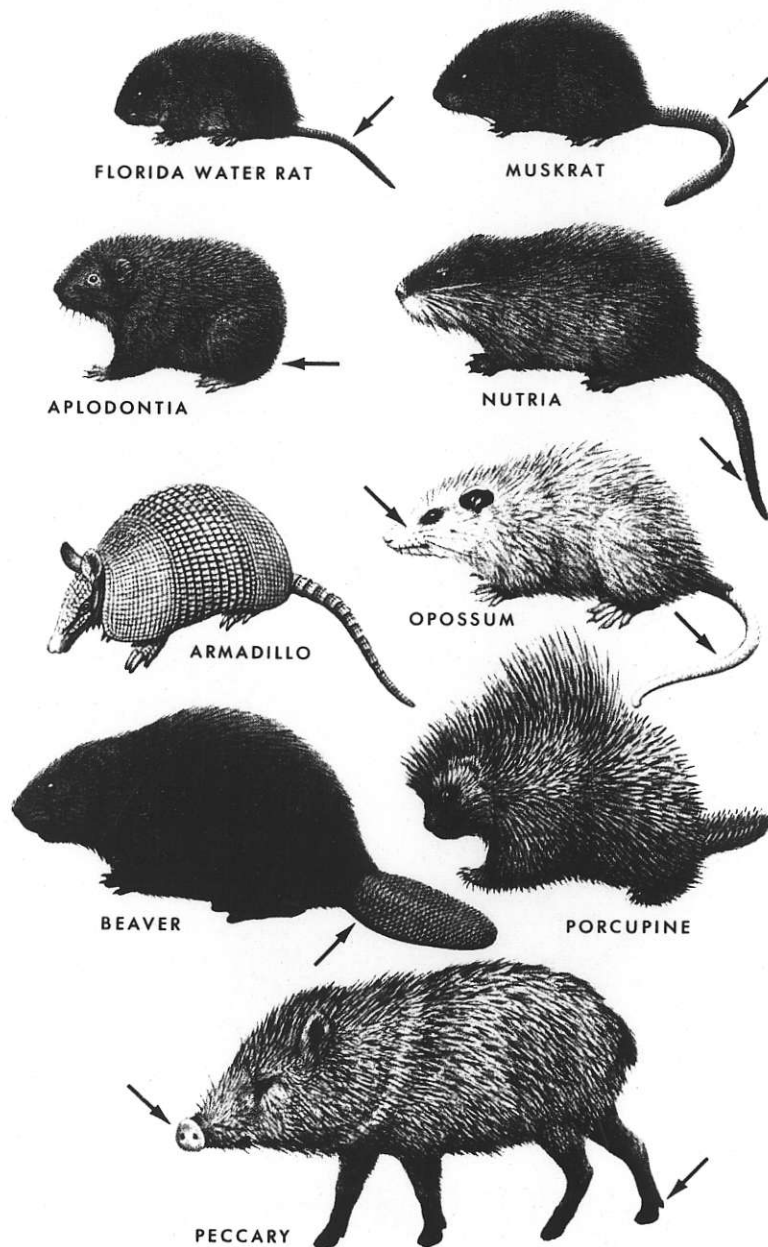


Plate 20

JACKRABBITS AND HARES

WHITETAIL JACKRABBIT *Lepus townsendi* Map Text
204 204

Winter: White or pale gray; large; tail usually white.
Summer: Brownish gray; tail usually white above and below.
N Central, NW.

SNOWSHOE HARE *Lepus americanus* 203 205

Winter: White; hairs dark at bases; large hind feet.
Summer: Dark brown; large hind feet.
N, E, W.

BLACKTAIL JACKRABBIT *Lepus californicus* 206 207

Black on top of tail and rump; ears black-tipped. W, S Central.

ANTELOPE JACKRABBIT *Lepus alleni* 206 206

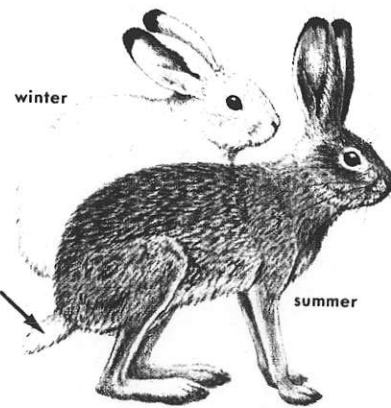
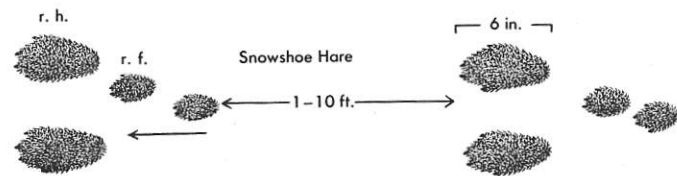
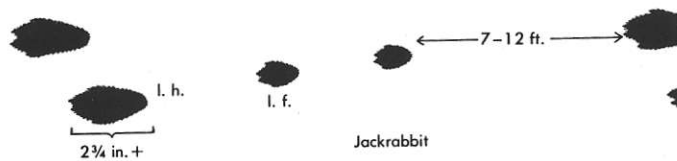
Whitish sides and hips; ears huge. SW.

EUROPEAN HARE *Lepus europaeus* 206 205

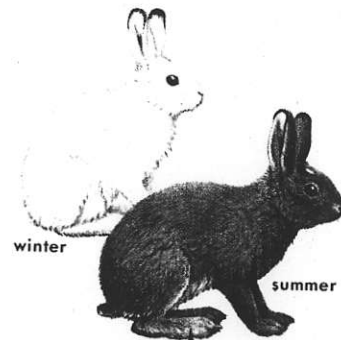
Black on top of tail; large size; open areas. NE.

ARCTIC HARE *Lepus arcticus* 203 203

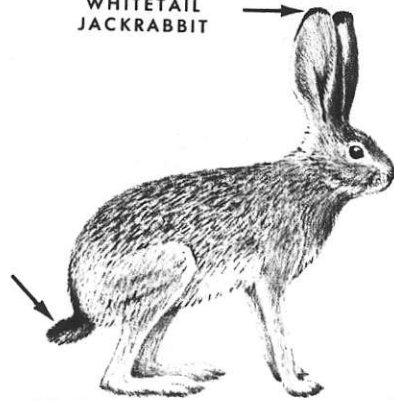
Winter: Body hairs white to skin; tips of ears black.
Summer: Gray, brown, or white; tail always white; tips of ears black.
Arctic, Subarctic.



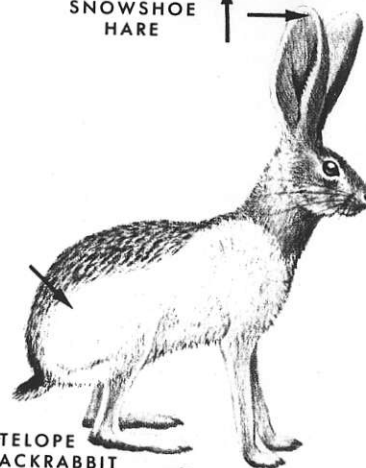
WHITETAIL JACKRABBIT



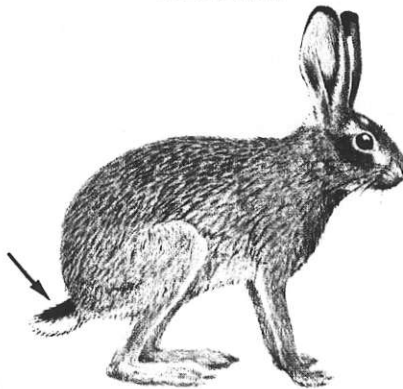
SNOWSHOE HARE



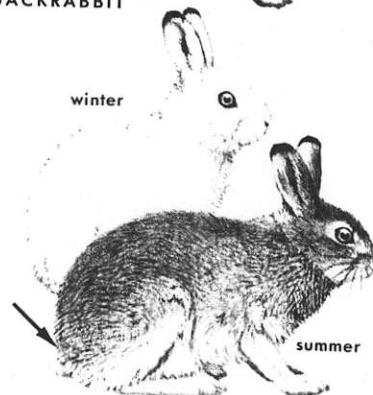
BLACKTAIL JACKRABBIT



ANTELOPE JACKRABBIT



EUROPEAN HARE



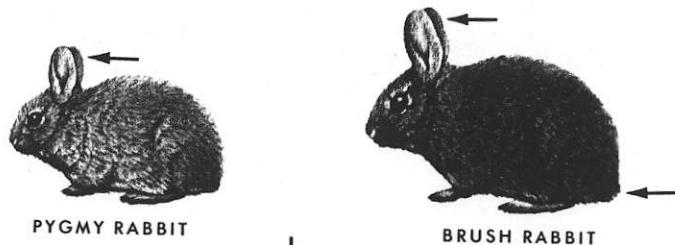
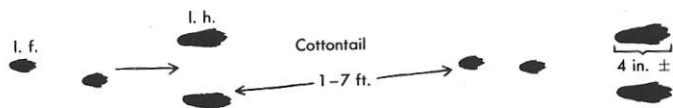
ARCTIC HARE

Plate 21

COTTONTAILS AND PIKAS



- | | Map | Text |
|---|-----|------|
| PYGMY RABBIT <i>Sylvilagus idahoensis</i> | 210 | 212 |
| Body slate-gray with pinkish tinge; ears short; small size; desert brush. NW. | | |
| BRUSH RABBIT <i>Sylvilagus bachmani</i> | 210 | 211 |
| Body brown; ears relatively short; small, inconspicuous tail; brush. W. | | |
| PIKA <i>Ochotona princeps</i> | 202 | 201 |
| No visible tail; rounded ears; small size; rockslides. W. | | |
| DESERT COTTONTAIL <i>Sylvilagus auduboni</i> | 210 | 209 |
| Pale gray washed with yellow; large ears. W. | | |
| MOUNTAIN COTTONTAIL <i>Sylvilagus nuttalli</i> | 208 | 209 |
| Grayish; mts. W. | | |
| EASTERN COTTONTAIL <i>Sylvilagus floridanus</i> | 208 | 208 |
| Feet whitish; nape patch rusty and distinct. E, Central, SW. | | |
| MARSH RABBIT <i>Sylvilagus palustris</i> | 210 | 211 |
| Body dark brown; fur coarse; marshes. SE. | | |
| SWAMP RABBIT <i>Sylvilagus aquaticus</i> | 210 | 212 |
| Body brownish gray; feet rusty above; fur coarse. SE. | | |

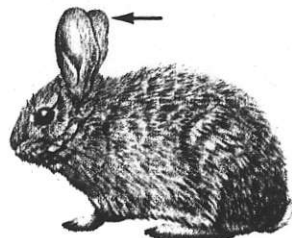


PYGMY RABBIT

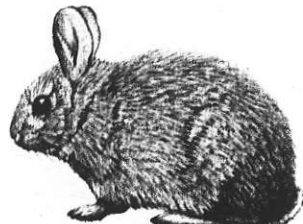
BRUSH RABBIT



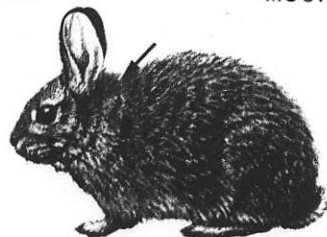
PIKA



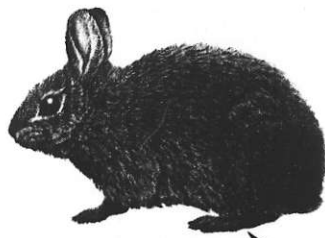
DESERT COTTONTAIL



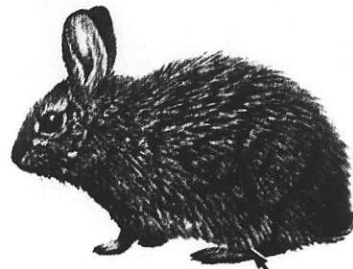
MOUNTAIN COTTONTAIL



EASTERN COTTONTAIL



MARSH RABBIT



SWAMP RABBIT

Plate 22

NORTHERN BIG GAME MAMMALS

	Map	Text
BARREN GROUND CARIBOU <i>Rangifer arcticus</i>	221	220
Whitish; small antlers. Arctic.		
WOODLAND CARIBOU <i>Rangifer caribou</i>	221	220
Body dark chocolate color; neck whitish; white on rump and above hoofs. Arctic, Subarctic.		
MUSKOX <i>Ovibos moschatus</i>	225	226
Long, silky, brown hair reaches nearly to ground. Arctic.		
ELK <i>Cervus canadensis</i>	214	215
Neck chestnut-brown; rump patch pale yellowish. W, Central.		
MOOSE <i>Alces alces</i>	219	218
Body dark brown; antlers (on male) palmate; overhanging snout; "bell" on throat; no white; large size. N.		

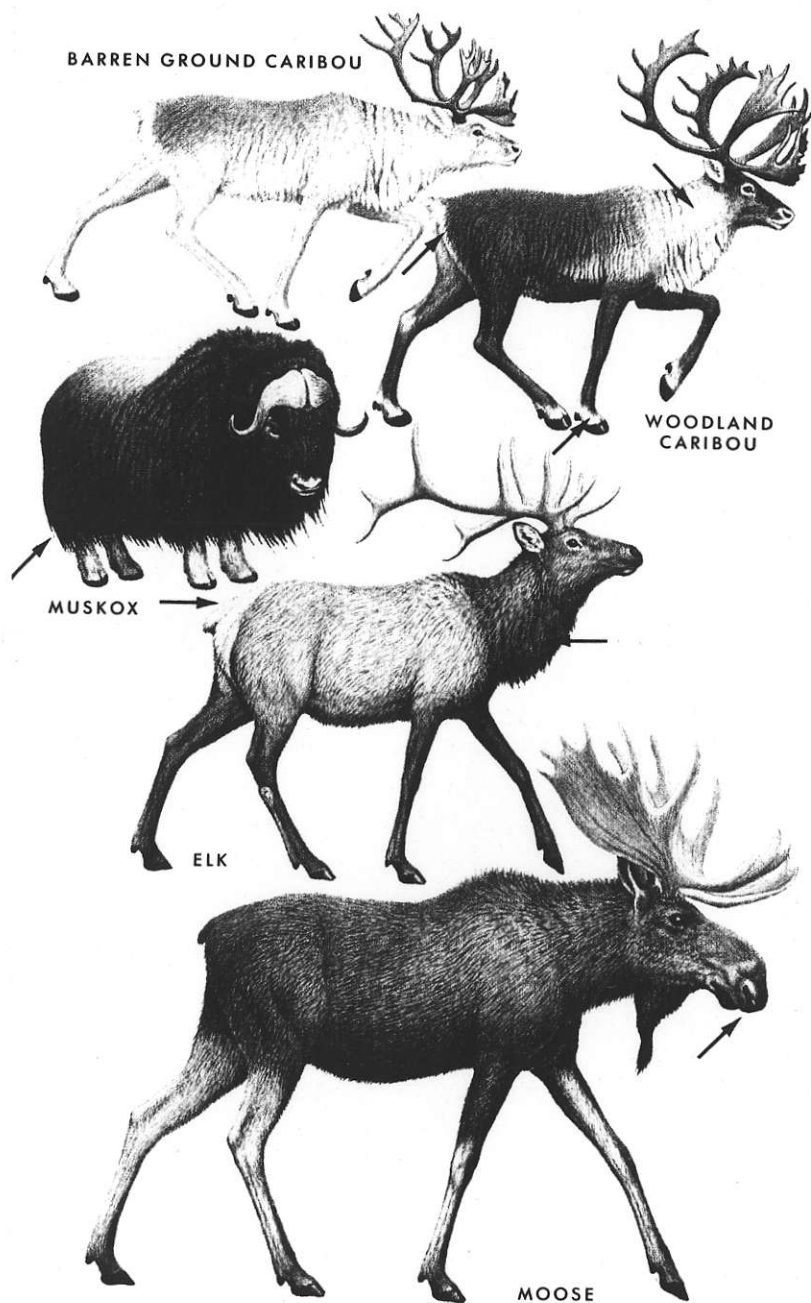
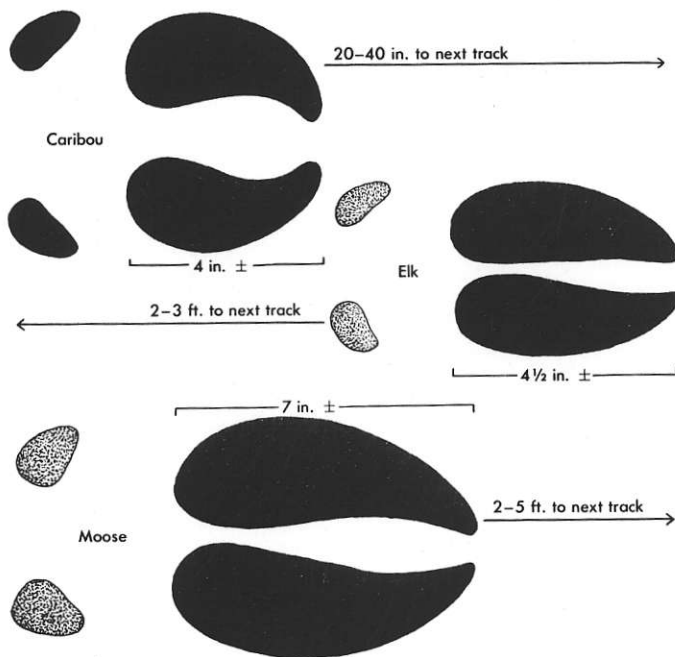
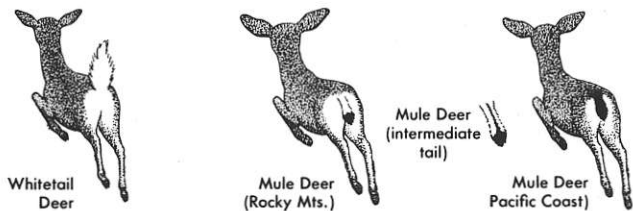


Plate 23

PRONGHORN AND DEER



PRONGHORN *Antilocapra americana*

Map Text
223 223

Body pale tan; bands on throat, rump patch, and lower sides white. W.

MULE DEER *Odocoileus hemionus*

217 216

Northwest Pacific Coast: Winter, black on tip of tail.
Rocky Mts.: Winter, whitish rump, large ears, black-tipped tail.

Antlers in velvet, summer.

W.

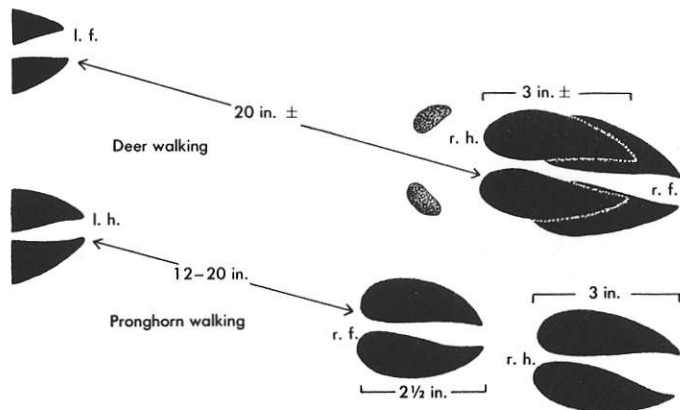
WHITETAIL DEER *Odocoileus virginianus*

217 218

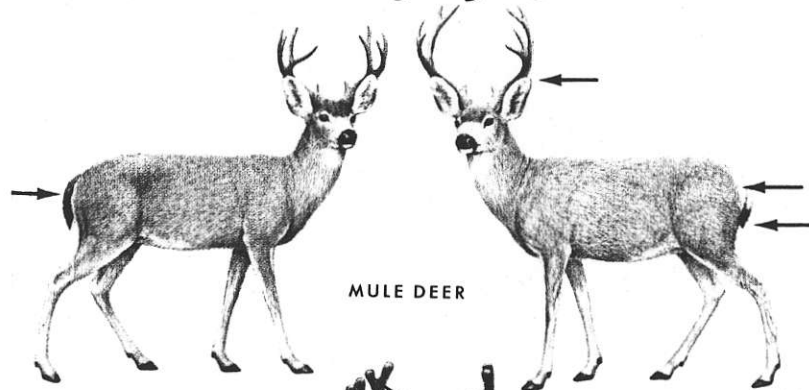
Winter, male: Body blue-gray; large tail white beneath; antlers branch from main beam.
Summer, female: Body reddish; large tail white beneath.

Fawn: Spotted, tail white beneath.

N, S, E, W.



PRONGHORN



MULE DEER

northwest pacific coast: winter

rocky mountains: winter



head in velvet: summer



WHITETAIL DEER

Plate 24

GOAT, SHEEP, AND BISON

MOUNTAIN GOAT *Oreamnos americanus*
White; horns and hoofs black; beard. NW.

Map Text
223 224

WHITE SHEEP *Ovis dalli*
Horns massive, yellowish, coiled. NW.
Gray phase: Grayish.
Black phase: Blackish.
White phase: White.

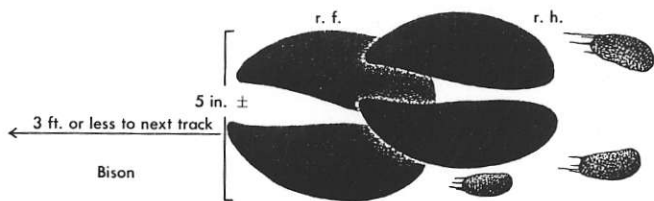
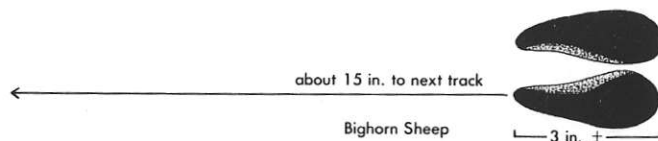
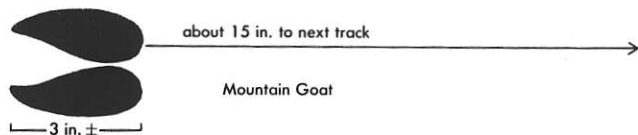
227 227

BIGHORN SHEEP *Ovis canadensis*
Creamy-white rump; massive coiled horns. W.

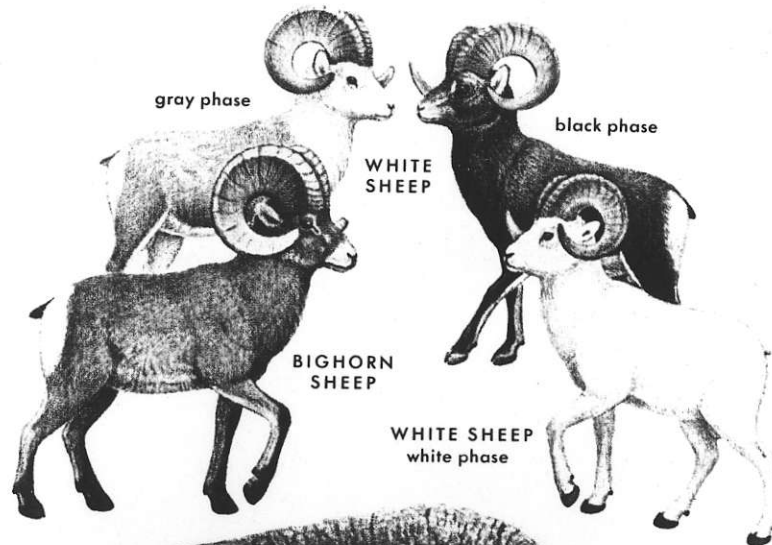
227 226

BISON *Bison bison*
Body dark brown all over; hump over shoulders;
massive head; horns in both sexes. W.

225 224



MOUNTAIN GOAT



BISON

