1962

Vegetative Type Mapping (summer) Unit 6: Data Sheets and Overlays

TYPE FORMULA DATA SHEET

Unit No.: 6

Mapper: Leslie F. Beaty

Date: July, 1962 (Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
6-1	Msfs 6	6.0	Barley (Hju)	=	51	6	3	*	1
			Grasses (Gx)	-	18	7	2	*	1
			Weeds (Wx)	-	14	7	2	*	1
			Bare (B)	*	11	6	*	*	*
			Spikerush (Ex)	*	4	*	*	*	*
			Wiregrass (Jba)	*	1	*	*	*	*
			Bulrush (Sva)	*	1	*	*	*	*
6-2	Tap 6	3.2	Greasewood (Sve)	=	51	9	2	2b	12
			Saltgrass (Dst)	-	42	8	2	*	1
			Bare (B)	*	34	4	*	*	*
			Wiregrass (Jba)	-	13	3	2	*	1
			Weeds (Wx)	-	9	*	*	*	*
			Grasses (Gx)	-	3	*	*	*	*
6-3	Asafp 6	2.3	Weeds (Wx)	=	52	8	2	*	1
			Bare (B)	*	24	9	*	*	*
			Saltgrass (Dst)	-	23	8	2	*	1
			F. Barley (Hju)	*	2	*	*	*	*
			Wiregrass (Jba)	*	Trace	*	*	*	*
			Greasewood (Sve)	*	Trace	*	*	*	*
6-4	MSpasf 6	6.1	Weeds (Wx)	=	42	9	2	*	1
			Bare (B)	*	34	8	*	*	*
			F. Barley (Hju)	-	20	7	3	*	1
			Grass (Gx)	*	Trace	*	*	*	*
6-5	Tapf 5	5.6	Weeds (Wx)	=	43	6	2	*	1
			Wiregrass (Jba)	-	30	9	34	*	12
			Saltgrass (Dst)	-	11	8	2	*	1
			Grass (Gx)	*	9	*	*	*	*
			F. Barley (Hju)	*	5	*	*	*	*
			Sedge (Cx)	*	Trace	*	*	*	*
			Greasewood (Sve)	*	Trace	*	*	*	*

TYPE FORMULA DATA SHEET

Mapper: Leslie F. Beaty

Unit No.: 6

Date: July, 1962 (Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
6-6	Apa 67	3.0	Saltgrass (Dst)	-	52	4	2	*	1
			Greasewood (Sve)	=	46	8	2	2b	12
			Bare (B)	*	37	4	*	*	*
			Weeds (Wx)	*	9	*	*	*	*
			Grass (Gx)	*	2	*	*	*	*
			Wiregrass (Jba)	*	Trace	*	*	*	*
6-7	Tapf 5	49.6	Barley (Hju)	=	37	9	3	*	1
			Wiregrass (Jba)	=	18	23	3	*	23
			Spikerush (Ex)	=	16	8	3	*	2
			Saltgrass (Dst)	-	15	7	3	*	1
			Weeds (Wx)	*	7	*	*	*	*
			Grass (Gx)	*	7	*	*	*	*
			Greasewood (Sve)	*	Trace	*	*	*	*
			Cattail (Tla)	*	Trace	*	*	*	*
6-8	Aap 67	13.9	Bare (B)	*	72	4	*	*	*
			Greasewood (Sve)	=	51	9	3	2b	2
			Saltgrass (Dst)	-	23	8	2	*	1
			Weeds (Wx)	*	6	*	*	*	*
			Wiregrass (Jba)	*	3	*	*	*	*
			Grass (Gx)	*	1	*	*	*	*
6-9	Tpf 5	4.7	Wiregrass (Jba)	=	52	8	3	*	2
			Grass (Gx)	-	31	8	3	*	1
			Saltgrass (Dst)	=	9	3	3	*	2
			Weeds (Wx)	*	8	*	*	*	*
			F. Barley (Hju)	*	3	*	*	*	*
			Spikerush (Ex)	*	Trace	*	*	*	*
6-10	Aspf 6	0.4	Bare (B)	*	74	6	*	*	*
			Weed (Wx)	-	15	7	2	*	1
			F. Barley (Hju)	*	7	*	*	*	*
			Saltgrass (Dst)	-	4	0	2	*	1

TYPE FORMULA DATA SHEET

Unit No.: 6

Mapper: Leslie F. Beaty

Date: July, 1962
(Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
6-11	Tpa 6	7.7	Greasewood (Sve)	=	35	8	2	1b	2
			Saltgrass (Dst)	-	32	4	3	*	1
			Weeds (Wx)	-	22	7	2	*	1
			Wiregrass (Jba)	-	17	4	3	*	2
			Bare (B)	*	16	4	*	*	*
			Grass (Gx)	*	13	*	*	*	*
			F. Barley (Hju)	*	3	*	*	*	*
			Canadian Thistle (Car)	*	Trace	*	*	*	*
6-12	Apasf 6	1.7	Weeds (Wx)	-	56	8	2	*	1
			Bare (B)	*	18	4	*	*	*
			Barley (Hju)	*	11	*	*	*	*
			Saltgrass (Dst)	-	10	8	2	*	1
			Grass (Gx)	*	4	*	*	*	*
			Greasewood (Sve)	=	3	0	2	1b	1
			Spikerush (Ex)	*	1	*	*	*	*
6-13	Apa 7	18.8	Bare (B)	*	90	4	*	*	*
			Greasewood (Sve)	=	63	67	2	2b	2
			Weeds (Wx)	*	3	*	*	*	*
			Rabbitbrush (Crx)	*	1	*	*	*	*
			Saltgrass (Dst)	*	Trace	*	*	*	*
6-14	Apa 67	10.6	Saltgrass (Dst)	=	94	9	2	*	1
			Greasewood (Sve)	=	46	9	2	1b	2
			Bare (B)	*	3	*	*	*	*
			Weeds (Wx)	*	2	*	*	*	*
			Barley (Hju)	*	Trace	*	*	*	*
			Grasses (Gx)	*	Trace	*	*	*	*
			Wiregrass (Jba)	*	Trace	*	*	*	*
6-15	Mspf 5	9.7	Wiregrass (Jba)	=	50	9	2	*	2
			Spikerush (Ex)	=	28	8	2	*	2
			Barley (Hju)	*	6	*	*	*	*
			Weeds (Wx)	*	6	*	*	*	*
			Saltgrass (Dst)	*	4	*	*	*	*
			Grass (Gx)	*	3	*	*	*	*
			Sedge (Cx)	*	2	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 6

Mapper: Leslie F. Beaty

Date: August, 1962
(Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
			Greasewood (Sve)	*	Trace	*	*	*	*
6-16	Apa 67	2.8	Bare (B)	*	65	4	*	*	*
			Greasewood (Sve)	=	48	8	3	2b	2
			Saltgrass (Dst)	-	32	4	2	*	1
			Weeds (Wx)	*	Trace	*	*	*	*
			Grass (Gx)	*	Trace	*	*	*	*
6-17	Tpf 6	23.5	Weeds (Wx)	=	33	8	2	*	1
			Greasewood (Sve)	=	25	7	4	2a	23
			Wiregrass (Jba)	=	24	4	2	*	23
			Saltgrass (Dst)	-	23	3	2	*	1
			Grass (Gx)	-	15	8	2	*	1
			Barley (Hju)	*	4	*	*	*	*
			Spikerush (Ex)	*	Trace	*	*	*	*
			Bare (B)	*	Trace	*	*	*	*
6-18	Tpf 6	11.4	Barley (Hju)	=	31	8	3	*	1
			Greasewood (Sve)	-	28	7	4	2a	23
			Saltgrass (Dst)	=	23	3	2	*	1
			Wiregrass (Jba)	=	15	4	3	*	1
			Spikerush (Ex)	-	15	4	4	*	1
			Grass (Gx)	-	15	7	2	*	1
			Weeds (Wx)	*	4	*	*	*	*
			Bare (B)	*	1	**	*	*	*
6-19	Aap 67	10.4	Saltgrass (Dst)	=	64	8	2	*	1
			Bare (B)	*	33	4	*	*	*
			Greasewood (Sve)	=	28	6	3	1b	12
			Weeds (Wx)	*	5	*	*	*	*
6-20	Tapf 6	4.7	Wiregrass (Jba)	=	29	8	2	*	2
			Grass (Gx)	-	24	7	2	*	1
			Saltgrass (Dst)	=	24	4	3	*	1
			Greasewood (Sve)	-	15	7	4	1a	2
			Weeds (Wx)	*	10	*	*	*	*
			Barley (Hju)	*	9	*	*	*	*
			Bare (B)	*	4	*	*	*	*

TYPE FORMULA DATA SHEET

Mapper: Leslie F. Beaty

Unit No.: 6

Date: August, 1962
(Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
			Spikerush (Ex)	*	2	*	*	*	*
6-21	Tapf 5	15.0	Wiregrass (Jba)	=	42	9	2	*	2
			Grass (Gx)	-	23	8	3	*	1
			F. Barley (Hju)	-	20	7	3	*	1
			Weeds (Wx)	*	6	*	*	*	*
			Saltgrass (Dst)	-	5	3	3	*	1
			Sedge (Cx)	*	5	*	*	*	*
			Spikerush (Ex)	*	3	*	*	*	*
6-22	Aap 67	7.9	Saltgrass (Dst)	-	74	8	3	*	1
			Greasewood (Sve)	-	14	9	3	2b	12
			Weeds (Wx)	-	14	*	*	*	*
			Bare (B)	*	8	2	*	*	*
			Grass (Gx)	*	3	*	*	*	*
6-23	Tapf 6	2.7	Weeds (Wx)	=	48	8	2	*	1
			Wiregrass (Jba)	=	22	8	2	*	12
			Saltgrass (Dst)	=	15	4	3	*	12
			Greasewood (Sve)	-	13	7	2	2a	1
			Grass (Gx)	*	11	*	*	*	*
			F. Barley (Hju)	*	5	*	*	*	*
			Bare (B)	*	1	*	*	*	*
6-24	Aap67	53.8	Bare (B)	*	61	4	*	*	*
			Greasewood (Sve)	=	40	6	2	2b	1
			Saltgrass (Dst)	-	26	7	2	*	1
			Grass (Gx)	*	8	*	*	*	*
			Weeds (Wx)	*	3	*	*	*	*
			Barley (Hju)	*	3	*	*	*	*
			Spikerush (Ex)	*	1	*	*	*	*
			Wiregrass (Jba)	*	Trace	*	*	*	*
6-25	MSpaf 56	14.3	Weeds (Wx)	=	32	8	2	*	1
			Wiregrass (Jba)	=	28	3	3	*	1
			F. Barley (Hju)	=	15	4	2	*	1
			Grass (Gx)	*	9	*	*	*	*
			Spikerush (Ex)	*	6	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 6

Mapper: Leslie F. Beaty

Date: August, 1962
(Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
			Saltgrass (Dst)	*	4	*	*	*	*
			Bare (B)	*	3	*	*	*	*
			Greasewood (Sve)	*	Trace	*	*	*	*
			Saltgrass (Dst)	-	51	8	3	*	1
6-26	Aap 67	11.0	Bare (B)	*	44	4	*	*	*
			Greasewood (Sve)	=	41	6	3	2b	1
			Wiregrass (Jba)	*	4	*	*	*	*
			Grass (Gx)	*	1	*	*	*	*
			F. Barley (Hju)	*	Trace	*	*	*	*
			Wiregrass (Jba)	=	31	8	3	*	2
6-27	MSpf 56	37.8	Grasses (Gx)	=	27	8	2	*	1
			Sedge (Cx)	=	25	7	3	*	1
			Barley (Hju)	*	10	*	*	*	*
			Weeds (Wx)	*	5	*	*	*	*
			Spikerush (Ex)	*	4	*	*	*	*
			Saltgrass (Dst)	*	1	*	*	*	*
			Bare (B)	*	62	4	*	*	*
6-28	Tap 6	43.0	Greasewood (Sve)	=	43	6	3	2b	1
			Weeds (Wx)	-	18	7	2	*	1
			Wiregrass (Jba)	*	12	*	*	*	*
			Rabbitbrush (Crx)	*	7	*	*	*	*
			Saltgrass (Dst)	*	6	*	*	*	*
			Grass (Gx)	*	5	*	*	*	*
			F. Barley (Hju)	*	Trace	*	*	*	*
			Weeds (Wx)	=	32	7	3	*	1
6-29	Tap 6	4.8	Greasewood (Sve)	=	28	8	4	2a	2
			Saltgrass (Dst)	=	26	8	3	*	1
			Wiregrass (Jba)	-	18	4	3	*	1
			Bare (B)	*	16	3	*	*	*
			Grass (Gx)	*	8	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 6

Mapper: Leslie F. Beaty

Date: August 1962
(Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
6-30	Tap 6	11.1	Saltgrass (Dst)	-	45	8	3	*	1
			Wiregrass (Jba)	-	22	7	34	*	12
			Weeds (Wx)	=	17	8	2	*	1
			Greasewood (Sve)	-	10	9	2	2b	1
			Bare (B)	*	8	3	*	*	*
			Grass (Gx)	*	6	*	*	*	*
			F. Barley (Hju)	*	3	*	*	*	*
			Sedge (Cx)	*	Trace	*	*	*	*
6-31	MSf 56	0.5	Weeds (Wx)	=	35	9	2	*	1
			Spikerush (Ex)	=	26	8	4	*	1
			Barley (Hju)	=	23	7	3	*	1
			Grass (Gx)	*	14	*	*	*	*
			Bulrush (Sva)	*	Trace	*	*	*	*
			Sweetclover (Mof)	*	Trace	*	*	*	*
6-32	Aap 67	1.0	Saltgrass (Dst)	=	52	8	3	*	1
			Greasewood (Sve)	=	32	7	2	2b	12
			Bare (B)	*	32	4	*	*	*
			Wiregrass (Jba)	*	4	*	*	*	*
			Weeds (Wx)	*	3	*	*	*	*
			Grass (Gx)	*	2	*	*	*	*
6-33	MSf 56	0.5	Weeds (Wx)	=	53	6	2	*	1
			Spikerush (Ex)	-	43	9	4	*	1
			Grass (Gx)	*	3	*	*	*	*
			F. Barley (Hju)	*	2	*	*	*	*
6-34	Aap 67	1.8	Greasewood (Sve)	=	59	6	2	2b	12
			Bare (B)	*	50	4	*	*	*
			Saltgrass (Dst)	-	26	8	3	*	1
			Weeds (Wx)	-	20	7	3	*	1
			Wiregrass (Jba)	*	3	*	*	*	*
			Grass (Gx)	*	1	*	*	*	*
			Barley (Hju)	*	Trace	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 6

Mapper: Leslie E. Beaty

Date: August 1962
(Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
6-35	Aap67	3.9	Bare (B)	*	73	4	*	*	*
			Greasewood (Sve)	=	38	6	2	2b	2
			Saltgrass (Dst)	-	13	5	2	*	1
			Weeds (Wx)	*	11	*	*	*	*
			Rabbitbrush (Crx)	*	8	*	*	*	*
			Barley (Hju)	*	2	*	*	*	*
			Grass (Gx)	*	1	*	*	*	*
			Wiregrass (Jba)	*	Trace	*	*	*	*
6-36	MSsfp 6	1.8	Weeds (Wx)	-	55	6	2	*	1
			Barley (Hju)	-	33	9	3	*	1
			Bare (B)	*	10	9	*	*	*
			Grass (Gx)	*	3	*	*	*	*
6-37	Tap 6	6.3	Saltgrass (Dst)	-	33	8	3	*	1
			Weed (Wx)	=	25	8	2	*	1
			Greasewood (Sve)	=	22	7	2	2b	2
			Wiregrass (Jba)	-	18	9	3	*	1
			Bare (B)	*	18	4	*	*	*
			Grass (Gx)	*	7	*	*	*	*
			Barley (Hju)	*	Trace	*	*	*	*
6-38	Tap 6	4.5	Saltgrass (Dst)	=	45	8	2	*	12
			Greasewood (Sve)	=	36	9	2	2b	23
			Bare (B)	*	23	4	*	*	*
			Weeds (Wx)	=	17	7	2	*	1
			Wiregrass (Jba)	-	10	3	3	*	1
			Barley (Hju)	*	4	*	*	*	*
			Grass (Gx)	*	3	*	*	*	*
			Sweetclover (Mof)	*	1	*	*	*	*
6-39	MSfp 56	67.5	Wiregrass (Jba)	=	41	9	2	*	23
			Grass (Gx)	-	23	7	2	*	1
			Barley (Hju)	-	15	8	3	*	1
			Weeds (Wx)	*	11	*	*	*	*
			Spikerush (Ex)	*	9	*	*	*	*
			Sedge (Cx)	*	5	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 6

Mapper: Leslie F. Beaty

Date: August 1962 (Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
			Saltgrass (Dst)	*	3	*	*	*	*
			Greasewood (Sve)	*	2	*	*	*	*
			Bare (B)	*	1	*	*	*	*
6-40	Aap 67	0.6	Saltgrass (Dst)	=	33	2	2	*	1
			Greasewood (Sve)	=	32	8	4	2a	23
			Bare (B)	*	30	4	*	*	*
			Weeds (Wx)	-	29	8	2	*	1
			Grass (Gx)	*	5	*	*	*	*
			Barley (Hju)	*	2	*	*	*	*
			Wiregrass (Jba)	*	1	*	*	*	*
6-41	Tap 6	2.4	Bare (B)	*	51	5	*	*	*
			Greasewood (Sve)	=	38	7	3	2b	1
			Saltgrass (Dst)	-	26	2	3	*	1
			Weeds (Wx)	*	14	*	*	*	*
			Wiregrass (Jba)	-	5	7	3	*	1
			Grass (Gx)	*	4	*	*	*	*
			Barley (Hju)	*	1	*	*	*	*
			Rabbitbrush (Crx)	*	1	*	*	*	*
6-42	Aap 67	3.1	Bare (B)	*	69	5	*	*	*
			Greasewood (Sve)	=	36	8	2	2b	1
			Weeds (Wx)	-	15	7	3	*	1
			Saltgrass (Dst)	-	10	2	3	*	1
			Rabbitbrush (Crx)	*	7	*	*	*	*
			Wiregrass (Jba)	*	3	*	*	*	*
			Grass (Gx)	*	2	*	*	*	*
			Sedge (Cx)	*	1	*	*	*	*
6-43	Aap 67	9.8	Greasewood (Sve)	=	52	8	2	2b	2
			Bare (B)	*	45	4	*	*	*
			Weeds (Wx)	=	36	7	3	*	1
			Saltgrass (Dst)	-	9	3	3	*	1
			Grass (Gx)	*	6	*	*	*	*
			Rabbitbrush (Crx)	*	4	*	*	*	*
			Barley (Hju)	*	3	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 6

Mapper: Leslie F. Beaty

Date: August 1962 (Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
			Wiregrass (Jba)	*	2	*	*	*	*
			Sweetclover(Mof)	*	Trace	*	*	*	*
6-44	Apa 67	4.6	Weeds (Wx)	≡	48	9	2	*	*
			Greasewood (Sve)	≡	47	8	2	3b	2
			Saltgrass (Dst)	=	41	3	2	*	1
			Bare (B)	*	5	3	*	*	*
			Barley (Hju)	*	4	*	*	*	*
			Grass (Gx)	*	2	*	*	*	*
			Wiregrass (Jba)	*	1	*	*	*	*
			Rabbitbrush(Crx)	*	1	*	*	*	*
6-45	Tapf 5	10.1	Wiregrass (Jba)	=	50	36	3	*	2
			Grass (Gx)	-	20	8	2	*	1
			Barley (Hju)	-	15	7	3	*	1
			Spikerush (Ex)	=	15	3	4	*	1
			Weeds (Wx)	*	12	*	*	*	*
			Saltgrass (Dst)	-	9	3	2	*	1
			Sedge (Cx)	*	3	*	*	*	*
			Greasewood (Sve)	*	Trace	*	*	*	*
6-46	MSpf 56	8.9	Barley (Hju)	=	29	8	3	*	1
			Weeds (Wx)	=	27	9	2	*	1
			Grass (Gx)	=	25	67	2	*	1
			Wiregrass (Jba)	=	10	4	3	*	12
			Sedge (Cx)	*	7	*	*	*	*
			Spikerush (Ex)	*	6	*	*	*	*
			Saltgrass (Dst)	*	1	*	*	*	*
			Sweetclover(Mof)	*	Trace	*	*	*	*
6-47	Ap 67	6.1	Weeds (Wx)	≡	66	8	2	*	1
			Saltgrass (Dst)	=	16	3	3	*	12
			Bare (B)	*	7	2	*	*	*
			Grass (Gx)	*	6	*	*	*	*
			Greasewood (Sve)	=	5	8	3	2b	1
			Wiregrass (Jba)	*	4	*	*	*	*
			Barley (Hju)	*	2	*	*	*	*
			Sedge (Cx)	*	2	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 6

Mapper: Leslie F. Beaty

Date: August, 1962
(Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
6-48	Tapf 5	3.7	Barley (Hju)	=	36	8	3	*	1
			Weeds (Wx)	=	22	9	2	*	1
			Saltgrass (Dst)	-	20	7	3	*	1
			Grass (Gx)	=	15	7	2	*	1
			Wiregrass (Jba)	-	7	4	3	*	1
			Greasewood (Sve)	*	3	*	*	*	*
			Spikerush (Ex)	*	2	*	*	*	*
			Bare (B)	*	1	*	*	*	*
			Sedge (Cx)	*	Trace	*	*	*	*
6-49	MSfap 56	32.2	Weeds (Wx)	=	29	8	2	*	1
			Grass (Gx)	=	24	9	2	*	1
			Wiregrass (Jba)	-	22	8	3	*	1
			Barley (Hju)	*	13	*	*	*	*
			Sedge (Cx)	*	5	*	*	*	*
			Saltgrass (Dst)	*	4	*	*	*	*
			Sweetclover (Mof)	*	4	*	*	*	*
			Spikerush (Ex)	*	Trace	*	*	*	*
6-50	Apa 67	11.4	Saltgrass (Dst)	=	40	8	2	*	12
			Weeds (Wx)	=	33	7	2	*	1
			Bare (B)	*	20	4	*	*	*
			Greasewood (Sve)	-	18	7	2	2b	1
			Grass (Gx)	*	11	*	*	*	*
			Wiregrass (Jba)	*	3	*	*	*	*
			Barley (Hju)	*	1	*	*	*	*
6-51	Tapf 5	17.9	Wiregrass (Jba)	=	36	8	3	*	12
			Grass (Gx)	-	30	8	2	*	1
			Weeds (Wx)	-	16	7	2	*	1
			Saltgrass (Dst)	=	12	3	2	*	1
			Barley (Hju)	*	4	*	*	*	*
			Sedge (Cx)	*	3	*	*	*	*
			Bare (B)	*	2	*	*	*	*
			Spikerush (Ex)	*	1	*	*	*	*
			Greasewood (Sve)	*	Trace	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 6

Mapper: Leslie F. Beaty

Date: August, 1962
(Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
6-52	Aap 7	4.4	Bare (B)	*	98	4	*	*	*
			Greasewood (Sve)	=	54	8	3	2b	1
			Weeds (Wx)	*	1	*	*	*	*
			Grass (Gx)	*	1	*	*	*	*
			Saltgrass (Dst)	*	Trace	*	*	*	*
6-53	Aap 67	5.8	Greasewood (Sve)	=	62	6	2	3b	2
			Weeds (Wx)	-	47	7	2	*	1
			Bare (B)	*	29	4	*	*	*
			Saltgrass (Dst)	=	13	3	2	*	1
			Grass (Gx)	*	13	*	*	*	*
			Wiregrass (Jba)	*	2	*	*	*	*
			Barley (Hju)	*	Trace	*	*	*	*
6-54	MSafsp 56	0.8	Weeds (Wx)	=	82	6	1	*	*
			Spikerush (Ex)	-	8	3	4	*	1
			Grass (Gx)	*	8	*	*	*	*
			Barley (Hju)	*	4	*	*	*	*
6-55	MSpf 56	1.4	Grass (Gx)	-	28	8	2	*	1
			Weeds (Wx)	-	22	7	2	*	1
			Wiregrass (Jba)	-	20	8	3	*	1
			Barley (Hju)	-	18	8	3	*	1
			Spikerush (Ex)	*	10	*	*	*	*
			Sedge (Cx)	*	8	*	*	*	*
6-56	MSsfp 6	0.3	Weeds (Wx)	=	79	8	1	*	1
			Bare (B)	*	16	4	*	*	*
			Saltgrass (Dst)	*	4	*	*	*	*
			Grass (Gx)	*	1	*	*	*	*
6-57	Tap 6	2.2	Weeds (Wx)	=	40	9	2	*	1
			Saltgrass (Dst)	=	35	8	2	*	1
			Wiregrass (Jba)	-	10	3	4	*	1
			Greasewood (Sve)	-	8	7	2	2b	1
			Grass (Gx)	*	6	*	*	*	*
			Barley (Hju)	*	6	*	*	*	*
			Bare (B)	*	2	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 6

Mapper: Leslie F. Beaty

Date: August, 1962 (Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
			Algae (Clx)	≡	52	8	*	*	*
6-58	MS 2	0.2	Buttercup (Rag)	=	34	3	*	*	*
			Open Water (Ow)	*	14	3	*	*	*
			Buttercup (Rag)	=	41	8	*	*	*
6-59	MS 2	0.6	Unknown	=	35	8	*	*	*
			Open water (Ow)	*	8	3	*	*	*
			Algae (Clx)	-	7	7	*	*	*
			Weeds (Wx)	*	5	*	*	*	*
			Bare (B)	*	4	*	*	*	*
			Spikerush (Ex)	*	1	*	*	*	*
			Open water (Ow)	*	45	*	*	*	*
6-60	MS 2	0.3	S. Pondweed (Ppe)	=	40	*	*	*	*
			Algae (Clx)	-	15	*	*	*	*
			Duckweed (Lmi)	*	Trace	*	*	*	*
			Weeds (Wx)						
Dike enclosing small impoundments (both permanent and semi-permanent water)			Barley (Hju)	This is the general composition of					
			Grass (Gx)	the impoundment dikes. The dikes may					
			C. Thistle (Car)	or may not contain all of these species.					
			Sweetclover (Mof)	They are arranged in decending order					
			Wiregrass (Jba)	of percentage ground cover with weeds					
			Saltgrass (Dst)	generally occurring most frequently					
			Greasewood (Sve)	and being the densest and Bare					
			Bare (B)	occurring least frequently.					
		612.1	Total individual type acreages						
		625.2	Total unit acreage typed						
		13.1	Total acreage for roads, ditches, dikes, etc.						

Vegetative Cover Types

Key

Light Blue — Open Water, permanent and semi-permanent
MS-1, MS-2

Dark Green — Emergent aquatics
MS-4

Light Green — Marsh Meadow (Emergents & sedges)
Green — Lowland mixed Subaccous (Sedges, grasses, weeds)
MS-5, MS-6

Orange — Transition
Upland shrub ⟷ marsh meadow
Upland Subaccous ⟷ Lowland mixed Subaccous
T5, T6, T7

Brown
Upland mixed Subaccous (Saltgrass)
Upland shrubs (greasewood)
A6, A7

657-357/

Type Map Unit 6
August, 1962 Leslie F. Beaty
Photo #16

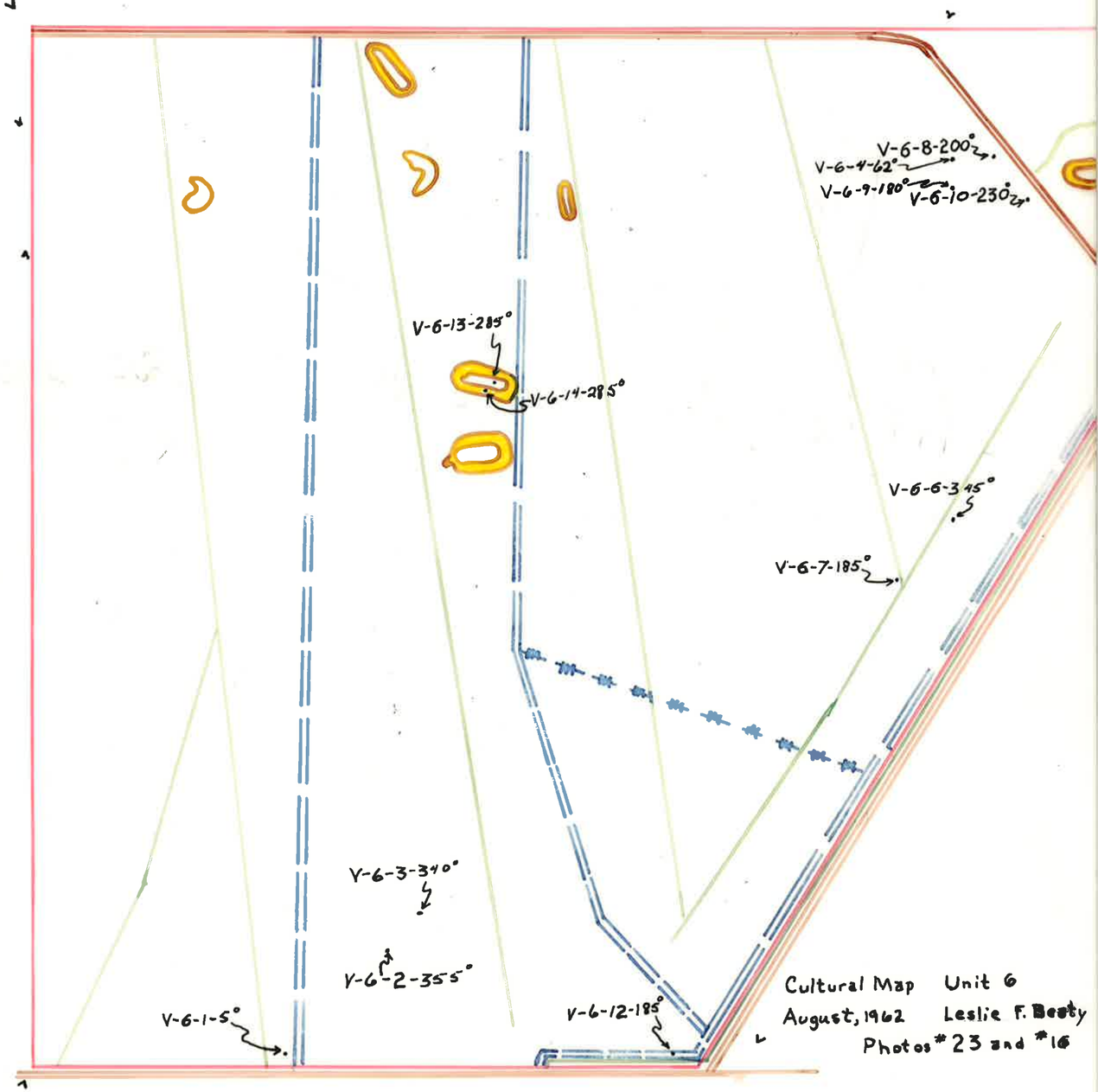
KEY

Existing Features

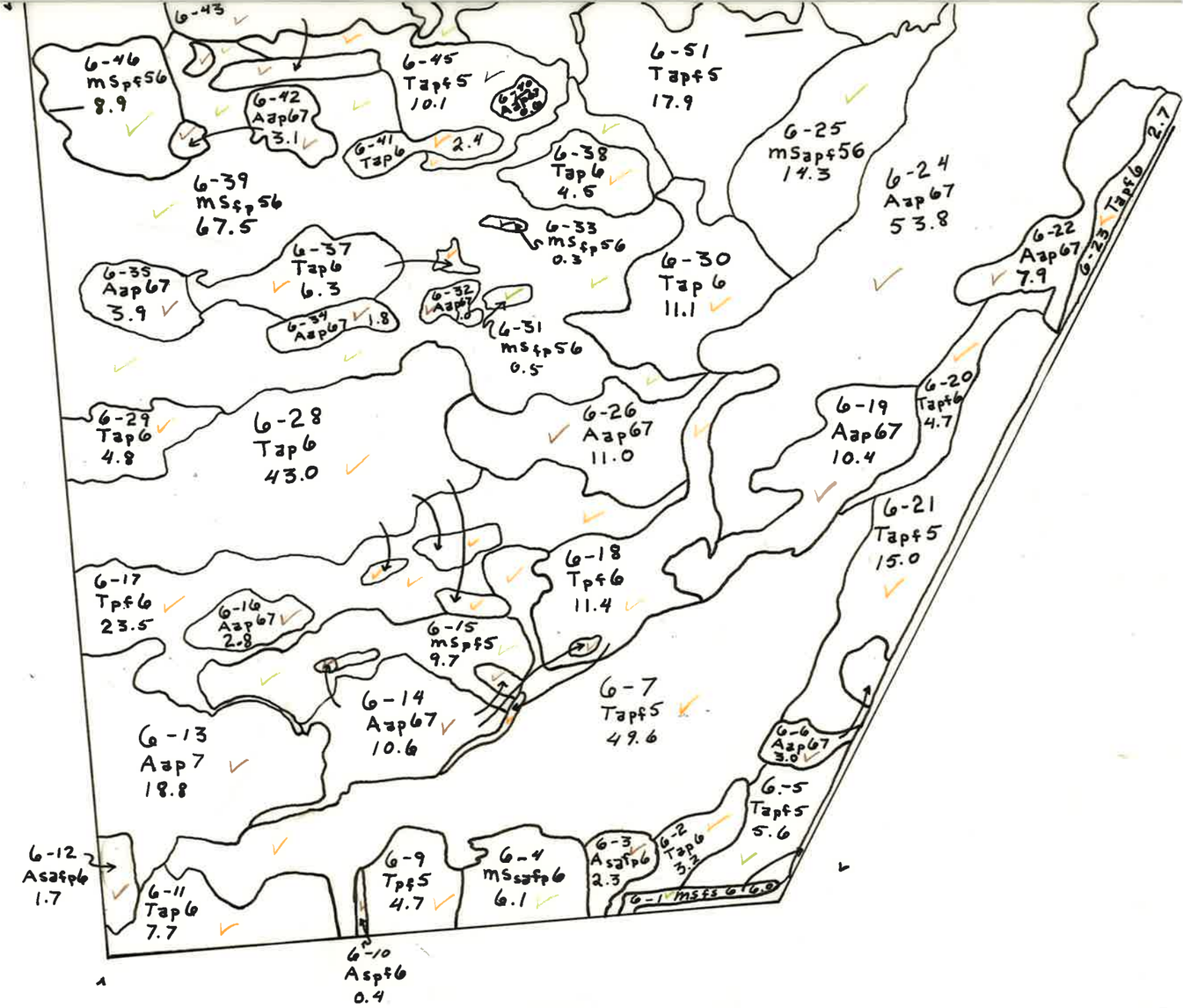
Fences
Roads
Dikes
Ditches

Proposed Features

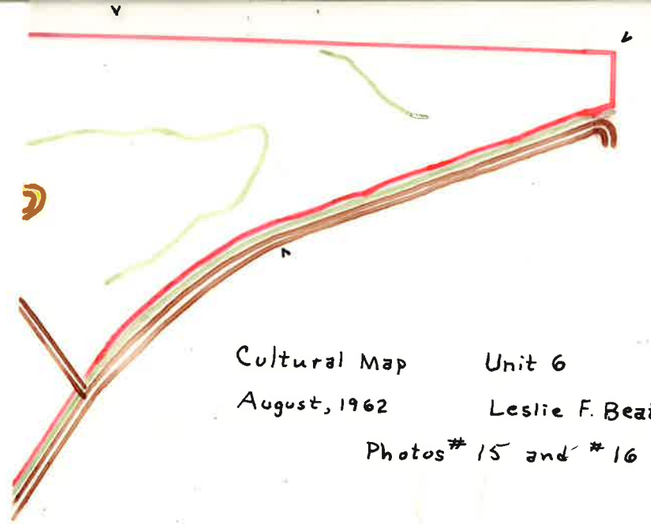
Contour Dikes
Dikes without road (4' top)



Cultural Map Unit 6
August, 1962 Leslie F. Beaty
Photos #23 and #16



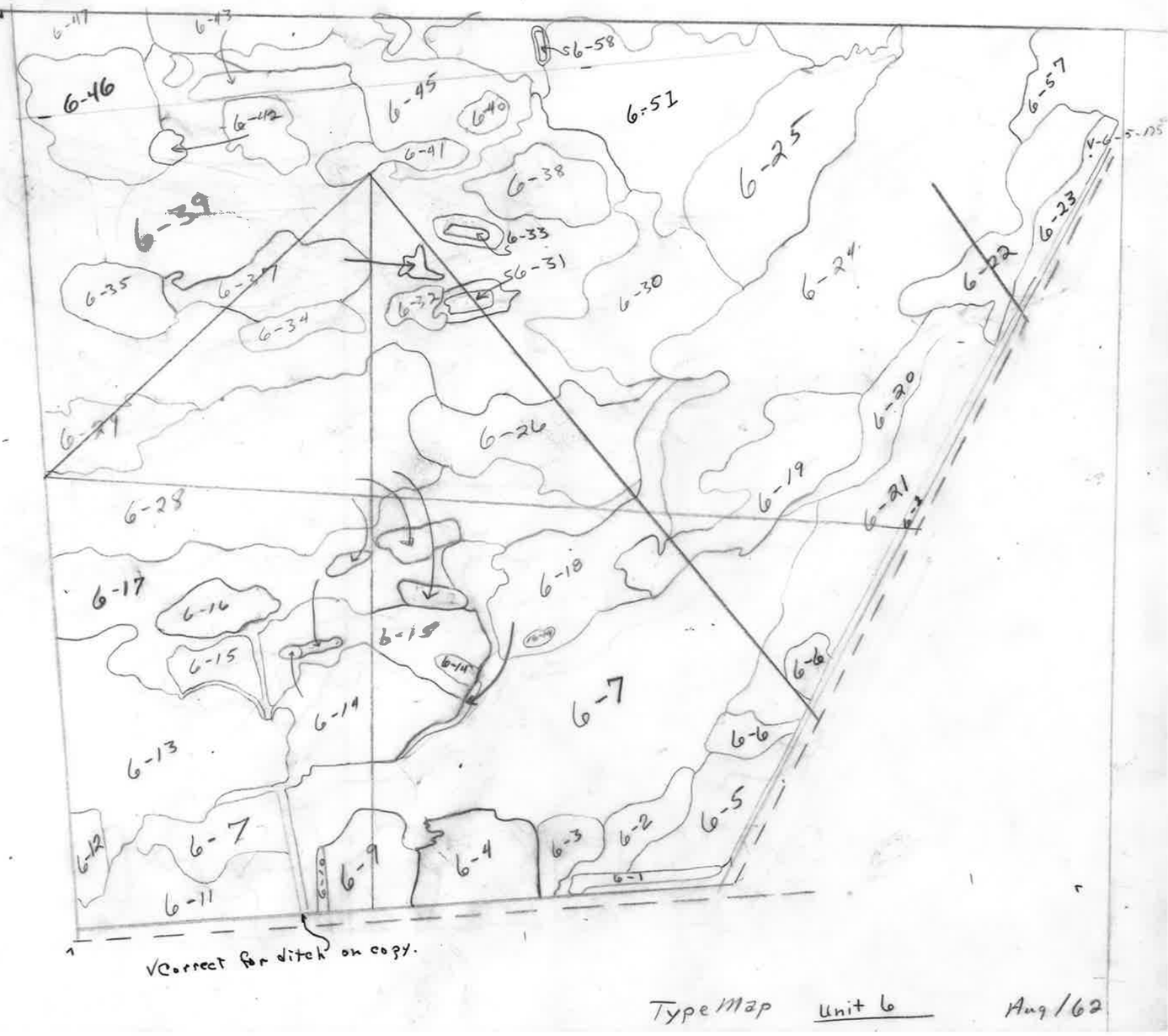
Type Map Unit 6
August, 1962 Leslie F. Beaty
Photo # 23



Cultural Map Unit 6

August, 1962 Leslie F. Beaty

Photos # 15 and # 16



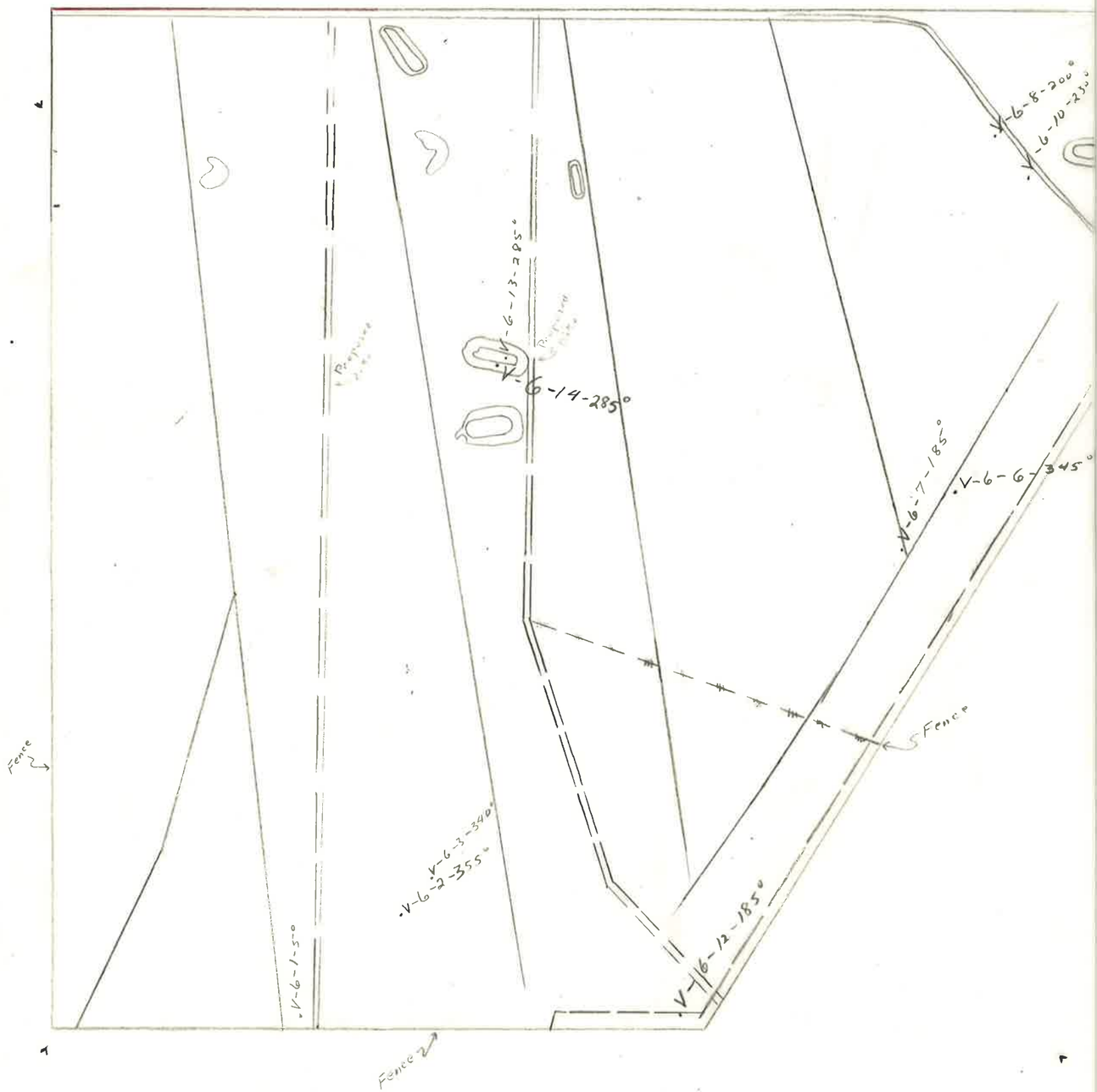
Type Map Unit 6 Aug/62

is the time for all

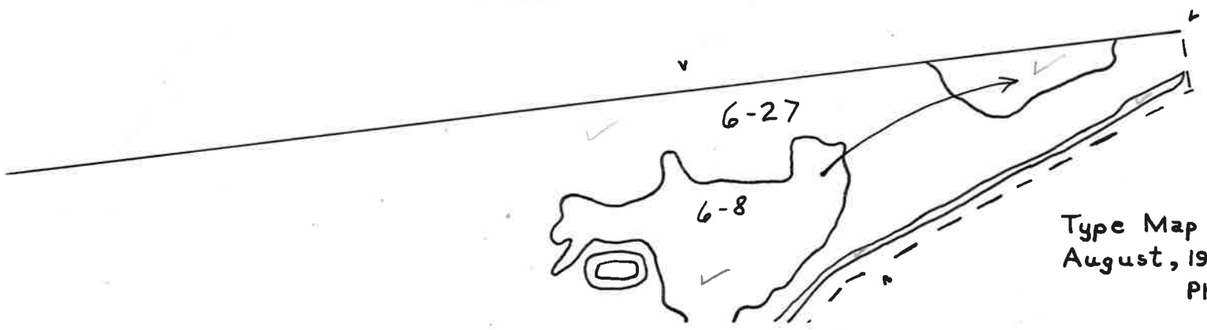
13.6

Aug/62

Type Map Unit 6



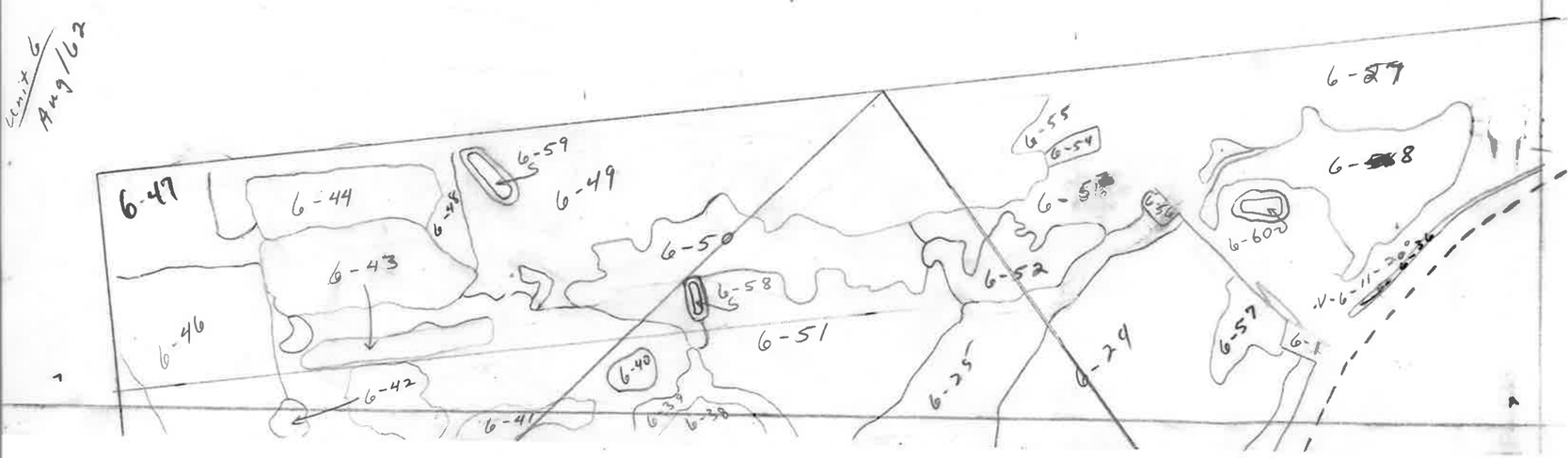
Cultural Map



Type Map Unit 6
August, 1962 Leslie F. Beaty
Photo #15

Type map

Unit 6
Aug/62



Vegetative Type Mapping (summer) Unit 14: Data Sheets and Overlays

TYPE FORMULA DATA SHEET

Unit No.: 14

Mapper: Leslie F. Beaty

Date: August 1962
(Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
			Bare (B)	*	42	4	*	*	*
14-1	Ap 67	8.5	Weeds (Wx)	=	33	8	2	*	1
			Greasewood (Sve)	=	27	7	2	2b	2
			Saltgrass (Dst)	=	21	4	2	*	1
			Barley (Hju)	*	3	*	*	*	*
			Grass (Gx)	*	1	*	*	*	*
			Wiregrass (Jba)	*	1	*	*	*	*
			Spikerush (Ex)	≡	90	6	2	*	1
14-2	MSfap 5	3.9	Weeds (Wx)	*	8	*	*	*	*
			Sedge (Cx)	*	1	*	*	*	*
			Bare (B)	*	1	*	*	*	*
			Barley (Hju)	*	Trace	*	*	*	*
			Grass (Gx)	*	Trace	*	*	*	*
			Wiregrass (Jba)	*	Trace	*	*	*	*
			Spikerush (Ex)	=	63	7	4	*	2
14-3	MSfp 56	2.6	Weeds (Wx)	-	35	3	2	*	1
			Wiregrass (Jba)	*	2	*	*	*	*
			Saltgrass (Dst)	=	87	6	2	*	1
14-4	Tpf 5	5.1	Wiregrass (Jba)	-	6	3	3	*	1
			Barley (Hju)	*	5	*	*	*	*
			Greasewood (Sve)	*	2	*	*	*	*
			Grasses (Gx)	*	1	*	*	*	*
			Wiregrass (Jba)	=	47	8	3	*	2
14-5	MSp 56	36.3	Barley (Hju)	=	32	7	3	*	1
			Weeds (Wx)	*	9	*	*	*	*
			Grass (Gx)	*	8	*	*	*	*
			Spikerush (Ex)	*	4	*	*	*	*
			Saltgrass (Dst)	*	Trace	*	*	*	*
			Weeds (Wx)	-	45	6	2	*	1
14-6	MSfp 56	0.2	Spikerush (Ex)	-	34	8	4	*	1
			Barley (Hju)	*	14	*	*	*	*
			Grass (Gx)	*	5	*	*	*	*

TYPE FORMULA DATA SHEET

Mapper: Leslie F. Beaty

Unit No.: 14

Date: August 1962
(Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
			Weeds (Wx)	-	72	6	2	*	1
14-7	MSpf 56	0.2	Spikerush (Ex)	=	18	8	4	*	1
			Grass (Gx)	*	8	*	*	*	*
			Bare (B)	*	4	*	*	*	*
			Spikerush (Ex)	=	38	3	3	*	1
14-8	MSfp 56	2.1	Weeds (Wx)	-	36	7	2	*	1
			Bare (B)	*	26	8	*	*	*
			Saltgrass (Dst)	=	74	6	2	*	1
14-9	Tap 5	4.6	Weeds (Wx)	-	15	7	2	*	1
			Wiregrass (Jba)	-	6	8	3	*	1
			Grass (Gx)	*	3	*	*	*	*
			Barley (Hju)	*	3	*	*	*	*
			Greasewood (Sve)	*	1	*	*	*	*
			Saltgrass (Dst)	=	79	6	2	*	2
14-10	Aap 67	10.3	Greasewood (Sve)	=	25	6	3	2b	2
			Weeds (Wx)	-	18	7	2	*	1
			Bare (B)	*	3	*	*	*	*
			Wiregrass (Jba)	*	Trace	*	*	*	*
			Buttercup (Rag)	=	83	8	*	*	*
14-11	MS 2	0.2	Open Water (Ow)	*	5	*	*	*	*
			Algae (Clx)	-	12	7	*	*	*
			Weeds (Wx)	-	55	6	2	*	1
14-12	MSfp 6	0.3	Barley (Hju)	-	27	7	2	*	1
			Grass (Gx)	*	14	*	*	*	*
			Spikerush (Ex)	*	2	*	*	*	*
			Bare (B)	*	.2	*	*	*	*
			Bare (B)	*	95	4	*	*	*
14-13	Aap 7	24.5	Greasewood (Sve)	=	44	6	3	2b	2
			Saltgrass (Dst)	-	5	2	2	*	1
			Weeds (Wx)	*	Trace	*	*	*	*
			Wiregrass (Jba)	*	Trace	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 14

Mapper: Leslie F. Beaty

Date: August 1962
(Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
			Greasewood (Sve)	=	68	8	2	2b	2
14-14	Ap 67	1.4	Bare (B)	*	56	7	*	*	*
			Saltgrass (Dst)	-	22	8	3	*	1
			Weeds (Wx)	-	20	7	2	*	1
			Grass (Gx)	*	3	*	*	*	*
14-15	Afp 1	0.3	Bare (B)	*	100	*	*	*	*
			Bare (B)	*	74	4	*	*	*
14-16	Ap 67	1.2	Greasewood (Sve)	=	64	8	2	2b	2
			Weeds (Wx)	-	21	7	2	*	1
			Wiregrass (Jba)	*	3	*	*	*	*
			Saltgrass (Dst)	*	2	*	*	*	*
			Wiregrass (Jba)	-	63	6	3	*	1
14-17	MSpf 56	18.9	Sedge (Cx)	-	15	7	3	*	1
			Grass (Gx)	-	14	3	2	*	1
			Spikerush (Ex)	*	4	*	*	*	*
			Weeds (Wx)	*	4	*	*	*	*
			Barley (Hju)	*	2	*	*	*	*
			Wiregrass (Jba)	=	43	6	3	*	1
14-18	Msapf 56	7.3	Sedge (Cx)	=	30	8	3	*	1
			Grass (Gx)	-	16	7	3	*	1
			Barley (Hju)	*	8	*	*	*	*
			Weeds (Wx)	*	6	*	*	*	*
			Barley (Hju)	=	43	9	3	*	1
14-19	MSp6	2.1	Weeds (Wx)	-	38	8	2	*	1
			Grass (Gx)	-	16	7	2	*	1
			Wiregrass (Jba)	*	3	*	*	*	*
			Saltgrass (Dst)	*	1	*	*	*	*
			C. Thistle (Car)	*	Trace	*	*	*	*
			Sweetclover (Mof)	*	Trace	*	*	*	*
			Wiregrass (Jba)	=	51	6	4	*	1
14-20	MSp 56	4.6	Grass (Gx)	=	40	6	2	*	1
			Weeds (Wx)	*	5	*	*	*	*
			Sedge (Cx)	*	4	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 14

Mapper: Leslie E. Beaty

Date: August 1962 (Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
14-21	MSp 56	7.8	Sedge (Cx)	=	34	9	3	*	1
			Wiregrass (Jba)	=	24	9	4	*	1
			Barley (Hju)	-	19	9	3	*	1
			Grass (Gx)	*	10	*	*	*	*
			Spikerush (Ex)	*	9	*	*	*	*
			Weeds (Wx)	*	8	*	*	*	*
14-22	MSfp 6	0.2	Weeds (Wx)	=	98	67	1	*	1
			Grass (Gx)	*	1	*	*	*	*
			Spikerush (Ex)	*	1	*	*	*	*
14-23	MSp 56	6.1	Weeds (Wx)	=	43	6	2	*	1
			Grass (Gx)	=	36	6	2	*	1
			Wiregrass (Jba)	-	20	7	4	*	1
			Barley (Hju)	*	1	*	*	*	*
			C. Thistle (Car)	*	Trace	*	*	*	*
14-24	MSpf 56	7.4	Sedge (Cx)	=	37	6	3	*	3
			Wiregrass (Jba)	=	29	9	3	*	3
			Grass (Gx)	-	22	7	3	*	1
			Weeds (Wx)	*	4	*	*	*	*
			Spikerush (Ex)	*	3	*	*	*	*
			Barley (Hju)	*	2	*	*	*	*
14-25	Aap 67	1.7	Bare (B)	*	68	4	*	*	*
			Greasewood (Sve)	=	58	9	3	2b	2
			Weeds (Wx)	-	25	7	3	*	1
			Saltgrass (Dst)	-	5	7	2	*	1
			Wiregrass (Jba)	*	2	*	*	*	*
14-26	Aap 7	4.6	Bare (B)	*	98	4	*	*	*
			Greasewood (Sve)	=	68	6	2	2b	2
			Weeds (Wx)	*	2	*	*	*	*
14-27	MSfp 56	0.1	Weeds (Wx)	-	38	8	2	*	1
			Grass (Gx)	-	29	7	2	*	1
			C. Thistle (Car)	=	20	8	2	*	1
			Spikerush (Ex)	-	10	7	4	*	1
			Barley (Hju)	*	4	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 14

Mapper: Leslie F. Beaty

Date: August 1962
(Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
			Weeds (Wx)	-	73	6	2	*	1
14-28	MSfp 56	0.1	Spikerush (Ex)	-	16	7	4	*	1
			C. Thistle (Car)	*	7	*	*	*	*
			Grass (Gx)	*	4	*	*	*	*
			Wiregrass (Jba)	*	3	*	*	*	*
			Barley (Hju)	*	1	*	*	*	*
			Weeds (Wx)	-	42	7	2	*	1
14-29	MSfp 256	0.1	S.Pondweed (Ppe)	-	30	7	*	*	1
			Spikerush (Ex)	=	23	8	3	*	1
			C. Thistle (Car)	*	4	*	*	*	*
			Barley (Hju)	*	2	*	*	*	*
			Grass (Gx)	*	Trace	*	*	*	*
			S. Bulrush (Sva)	*	Trace	*	*	*	*
			Spikerush (Ex)	=	52	9	3	*	1
14-30	MSfp 56	0.1	Barley (Hju)	=	23	7	3	*	1
			Weeds (Wx)	*	14	*	*	*	*
			C. Thistle (Car)	*	6	*	*	*	*
			Grass (Gx)	*	5	*	*	*	*
			Grass (Gx)	=	44	8	2	*	1
14-31	MSfp 56	0.1	Spikerush (Ex)	-	27	7	4	*	1
			C. Thistle (Car)	*	10	*	*	*	*
			Weeds (Wx)	*	8	*	*	*	*
			Barley (Hju)	*	7	*	*	*	*
			Wiregrass (Jba)	*	1	*	*	*	*
			Weeds (Wx)	-	49	6	2	*	1
14-32	MSfp 56	0.1	Spikerush (Ex)	-	47	8	4	*	1
			Grass (Gx)	*	2	*	*	*	*
			C. Thistle (Car)	*	1	*	*	*	*
			Barley (Hju)	*	1	*	*	*	*

TYPE FORMULA DATA SHEET

Mapper: Leslie F. Beaty

Unit No.: 14

Date: August 1962
(Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
14-33	MSapf 56	17.9	Wiregrass (Jba)	=	60	6	4	*	2
			Weeds (Wx)	-	22	8	2	*	1
			Grass (Gx)	*	12	*	*	*	*
			Sedge (Cx)	*	5	*	*	*	*
			Barley (Hju)	*	1	*	*	*	*
			C. Thistle (Car)	*	Trace	*	*	*	*
			Greasewood (Sve)	*	Trace	*	*	*	*
14-34	MSap6	13.0	Weeds (Wx)	=	57	6	2	*	1
			Grass (Gx)	=	46	9	3	*	1
			Barley (Hju)	=	18	7	3	*	1
			Wiregrass (Jba)	*	Trace	*	*	*	*
14-35	MSfp56	3.9	Wiregrass (Jba)	=	43	8	3	*	3
			Sedge (Cx)	=	19	1	3	*	3
			Barley (Hju)	*	14	*	*	*	*
			Weeds (Wx)	*	11	*	*	*	*
			Grass (Gx)	*	9	*	*	*	*
			Spikerush (Ex)	*	6	*	4	*	*
14-36	MSf 1	0.2	Bare (B)	*	86	6	*	*	*
			Grass (Gx)	*	10	*	*	*	*
			Spikerush (Cx)	*	4	*	*	*	*
			Weeds (Wx)	*	Trace	*	*	*	*
14-37	MSfp 56	1.7	Weeds (Wx)	-	69	7	2	*	1
			Bare (B)	*	22	5	*	*	*
			Spikerush (Ex)	-	7	3	3	*	1
			Wiregrass (Jba)	*	2	*	*	*	*
			Barley (Hju)	*	1	*	*	*	*
			Sedge (Cx)	*	Trace	*	*	*	*
14-38	Tap 6	2.3	Saltgrass (Dst)	=	65	9	3	*	2
			Weeds (Wx)	-	25	7	2	*	1
			Greasewood (Sve)	=	24	7	25	1b	2
			Wiregrass (Jba)	-	8	5	3	*	1
			Grass (Gx)	*	2	*	*	*	*
			Barley (Hju)	*	Trace	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 14

Mapper: Leslie F. Beaty

Date: August 1962 (Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
			Spikerush (Ex)	=	59	4	2	*	1
14-39	MSafp 56	1.8	Weeds (Wx)	=	35	67	1	*	0
			Bare (B)	*	6	2	*	*	*
			Wiregrass (Jba)	=	44	8	3	*	3
14-40	MSfp 56	9.3	Barley (Hju)	=	22	7	3	*	1
			Sedge (Cx)	*	13	*	*	*	*
			Grass (Gx)	*	12	*	*	*	*
			Spikerush (Ex)	*	7	*	*	*	*
			Weeds (Wx)	*	3	*	*	*	*
			Saltgrass (Dst)	*	1	*	*	*	*
			Unknown Sedge	*	1	*	*	*	*
			Weeds (Wx)	=	86	9	1	*	*
14-41	MSfp 6	0.1	Bare (B)	*	14	3	*	*	*
			Spikerush (Ex)	*	Trace	*	*	*	*
			Weeds (Wx)	=	43	8	2	*	1
14-42	Tap 6	1.4	Saltgrass (Dst)	=	38	6	2	*	1
			Wiregrass (Jba)	-	23	4	3	*	1
			Greasewood (Sve)	-	12	7	4	*	2
			Grass (Gx)	*	2	*	*	*	*
			Barley (Hju)	*	Trace	*	*	*	*
			Weeds (Wx)	=	89	6	2	*	1
14-43	MSfp 6	0.2	Spikerush (Ex)	*	4	*	*	*	*
			Barley (Hju)	*	5	*	*	*	*
			Bare (B)	*	2	*	*	*	*
			S. Pondweed (Ppe)	-	29	7	5	*	2
14-44	MSfp256	0.9	Bare (B)	*	24	3	*	*	*
			Weeds (Wx)	-	22	2	2	*	0
			Buttercup (Rag)	-	15	3	3	*	1
			Spikerush (Ex)	-	9	7	2	*	1
			Barley (Hju)	*	1	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 14

Mapper: Leslie F. Beaty

Date: August 1962 (Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
14-45	MSfp 56	0.2	Weeds (Wx)	=	55	9	25	*	2
			Spikerush (Ex)	-	25	7	2	*	1
			Grass (Gx)	*	12	*	*	*	*
			Bare (B)	*	6	*	*	*	*
			Barley (Hju)	*	2	*	*	*	*
14-46	MSfp 56	0.1	Spikerush (Ex)	=	47	9	3	*	1
			Weeds (Wx)	=	39	7	2	*	1
			Grass (Gx)	*	8	*	*	*	*
			Barley (Hju)	*	5	*	*	*	*
			C. Thistle (Car)	*	1	*	*	*	*
			Sedge (Cx)	*	1	*	*	*	*
14-47	MSfp 2	0.1	Buttercup (Rag)	-	73	9	5	*	1
			S.Pondweed (Ppe)	-	12	7	5	*	1
			Algae (Clx)	-	11	8	5	*	1
			Spikerush (Ex)	*	1	*	*	*	*
			Arrowhead (Sgx)	*	Trace	*	*	*	*
14-48	MSfp 56	0.1	Weeds (Wx)	-	29	6	2	*	1
			Spikerush (Ex)	-	28	7	3	*	1
			Grass (Gx)	-	24	8	2	*	1
			Barley (Hju)	*	10	*	*	*	*
14-49	MSfp 6	0.1	Weeds (Wx)	=	58	6	2	*	1
			Barley (Hju)	=	42	6	2	*	1
			Spikerush (Ex)	*	Trace	*	*	*	*
14-50	MSfp 56	0.1	Grass (Gx)	=	45	6	2	*	1
			Barley (Hju)	=	29	6	2	*	1
			Spikerush (Ex)	-	11	7	3	*	1
			C. Thistle (Car)	-	9	7	2	*	1
			Weeds (Wx)	*	5	*	*	*	*

TYPE FORMULA DATA SHEET

Mapper: Leslie F. Beaty

Unit No.: 14

Date: August 1962
(Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
14-51	MSp6	0.1	Barley (Hju)	=	46	6	3	*	1
			Grass (Gx)	=	40	6	2	*	1
			Weeds (Wx)	*	11	*	*	*	*
			C. Thistle (Car)	*	1	*	*	*	*
			Spikerush (Ex)	*	1	*	*	*	*
			Wiregrass (Jba)	*	1	*	*	*	*
14-52	Tap 6	0.7	Saltgrass (Dst)	-	56	9	2	*	1
			Weeds (Wx)	-	22	7	2	*	1
			Wiregrass (Jba)	-	21	8	3	*	1
			Greasewood (Sve)	-	8	7	4	1a	2
			Grass (Gx)	*	3	*	*	*	*
14-53	Aap 67	0.9	Saltgrass (Dst)	=	81	8	2	*	2
			Weeds (Wx)	-	11	7	2	*	1
			Greasewood (Sve)	-	8	7	2	1b	2
			Bare (B)	*	6	*	*	*	*
14-54	MSp 56	1.5	Sedge (Cx)	=	29	8	2	*	1
			Grass (Gx)	=	24	7	2	*	1
			C. Thistle (Car)	=	21	8	2	*	1
			Weeds (Wx)	*	8	*	*	*	*
			Wiregrass (Jba)	*	8	*	*	*	*
			Spikerush (Ex)	*	7	*	*	*	*
			Barley (Hju)	*	6	*	*	*	*
			Greasewood (Sve)	*	1	*	*	*	*
			Sweetclover (Mof)	*	1	*	*	*	*
14-55	MSp 56	9.7	Wiregrass (Jba)	=	56	9	3	*	3
			Grass (Gx)	-	23	7	2	*	1
			Sedge (Cx)	*	7	*	*	*	*
			Weeds (Wx)	*	6	*	*	*	*
			Saltgrass (Dst)	*	4	*	*	*	*
			Barley (Hju)	*	3	*	*	*	*
			Greasewood (Sve)	*	1	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 14

Mapper: Leslie F. Beaty

Date: August 1962
(Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
			Bare (B)	*	82	4	*	*	*
14-56	Aap 67	3.8	Greasewood (Sve)	=	66	6	3	2b	3
			Saltgrass (Dst)	-	14	2	3	*	1
			Wiregrass (Jba)	*	3	*	*	*	*
			Weeds (Wx)	*	1	*	*	*	*
			Weeds (Wx)	=	77	9	3	*	1
14-57	MSp 56	20.2	Wiregrass (Jba)	-	20	7	4	*	1
			Barley (Hju)	*	2	*	*	*	*
			Grass (Gx)	*	1	*	*	*	*
			Weeds (Wx)	-	55	9	2	*	1
14-58	MSp 6	0.1	Barley (Hju)	-	16	8	3	*	1
			Grass (Gx)	-	16	7	2	*	1
			C. Thistle (Car)	*	13	*	*	*	*
			Barley (Hju)	=	28	8	3	*	1
14-59	MSfp 56	0.2	Weeds (Wx)	-	20	7	2	*	1
			C. Thistle (Car)	-	18	8	2	*	1
			Spikerush (Ex)	-	12	8	3	*	1
			Wiregrass (Jba)	-	10	3	3	*	1
			Sedge (Cx)	*	6	*	*	*	*
			Grass (Gx)	*	4	*	*	*	*
			Bare (B)	*	2	*	*	*	*
			Barley (Hju)	=	57	9	2	*	1
14-60	MSfp 56	0.1	Weeds (Wx)	-	26	7	2	*	1
			Grass (Gx)	-	9	7	2	*	1
			Spikerush (Ex)	-	7	8	3	*	1
			Wiregrass (Jba)	*	1	*	*	*	*
			S. Pondweed (Ppe)	=	94	6	*	*	*
14-61	MS 2	0.1	Unknown	=	9	2	*	*	*
			Open water (Ow)	*	2	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 14

Mapper: Leslie F. Beaty

Date: August 1962
(Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
			Bare (B)	*	68	4	*	*	*
14-62	Tap 6	2.7	Greasewood (Sve)	-	50	7	2	2b	1
			Wiregrass (Jba)	-	18	3	3	*	2
			Weeds (Wx)	*	9	*	*	*	*
			Saltgrass (Dst)	=	6	3	2	*	1
			Bare (B)	*	58	4	*	*	*
14-63	Ta 7	0.7	Greasewood (Sve)	=	46	6	2	1b	2
			Weeds (Wx)	-	26	7	3	*	1
			Wiregrass (Jba)	-	8	3	3	*	1
			Saltgrass (Dst)	*	4	*	*	*	*
			Grass (Gx)	*	4	*	*	*	*
			Weeds (Wx)	=	49	7	3	*	2
14-64	MSf 56	0.2	Spikerush (Ex)	-	38	8	3	*	1
			Grass (Gx)	*	4	*	*	*	*
			Barley (Hju)	*	4	*	*	*	*
			C. Thistle (Car)	*	4	*	*	*	*
			Bare (B)	*	3	*	*	*	*
			S.Bulrush (Sva)	*	1	*	*	*	*
			Sedge (Cx)	*	1	*	*	*	*
			Weeds (Wx)	=	91	9	2	*	*
14-65	MS 6	0.2	Bare (B)	*	4	*	*	*	*
			Barley (Hju)	*	3	*	*	*	*
			Spikerush (Ex)	*	2	*	*	*	*
			Bare (B)	*	100	4	*	*	*
14-66	Aa 7	2.0	Greasewood (Sve)	-	38	7	25	2b	2
			Saltgrass (Dst)	*	Trace	*	*	*	*
			Wiregrass (Jba)	*	Trace	*	*	*	*
			Weeds (Wx)	*	Trace	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 14

Mapper: Leslie F. Beaty

Date: August 1962
(Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
14-67	Aa 67	3.2	Bare (B)	*	40	4	*	*	*
			Saltgrass (Dst)	-	30	8	3	*	2
			Greasewood (Sve)	-	28	7	25	2b	2
			Weeds (Wx)	=	28	3	3	*	*
			Barley (Hju)	*	2	*	*	*	*
			Wiregrass (Jba)	*	Trace	*	*	*	*
14-68	MS 6	0.1	Grass (Gx)	=	42	8	3	*	*
			Barley (Hju)	=	31	8	3	*	*
			Bare (B)	*	14	*	*	*	*
			Weeds (Wx)	*	12	*	*	*	*
			Greasewood (Sve)	*	4	*	*	*	*
			Sweetclover (Mof)	*	1	*	*	*	*
14-69	A 67	4.0	Bare (B)	*	60	4	*	*	*
			Greasewood (Sve)	=	56	6	2	2b	1
			Saltgrass (Dst)	-	31	8	3	*	1
			Weeds (Wx)	*	8	*	*	*	*
			Wiregrass (Jba)	*	1	*	*	*	*
14-70	Aap 67	18.6	Bare (B)	*	57	4	*	*	*
			Greasewood (Sve)	=	48	9	3	2b	2
			Saltgrass (Dst)	-	29	7	3	*	1
			Weeds (Wx)	-	14	7	3	*	1
			Wiregrass (Jba)	*	4	*	*	*	*
14-71	Aa7	9.7	Bare (B)	*	100	4	*	*	*
			Greasewood (Sve)	=	52	6	2	2b	2
14-72	Aa67	8.4	Saltgrass (Dst)	=	42	8	2	*	1
			Barley (Hju)	=	31	7	3	*	1
			Greasewood (Sve)	=	30	8	2	*	*
			Bare (B)	*	20	4	*	*	*
			Wiregrass (Jba)	*	1	*	*	*	*
			Grass (Gx)	*	Trace	*	*	*	*
14-73	MSf 2	3.7	Bare (B)	*	70	7	*	*	*
			S.Pondweed (Ppe)	-	17	3	5	*	1
			Weeds (Wx)	*	13	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 14

Mapper: Leslie F. Beaty

Date: August 1962 (Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
			Spikerush (Ex)	=	82	8	45	*	3
14-74	MS 5	0.5	Bare (B)	*	14	*	*	*	*
			Weeds (Wx)	*	4	*	*	*	*
			Greasewood (Sve)	*	Trace	*	*	*	*
			Wiregrass (Jba)	≡	32	9	3	*	2
14-75	MSf 56	11.6	Sedge (Cx)	=	27	1	3	*	1
			Spikerush (Ex)	=	26	7	3	*	1
			Grass (Gx)	-	9	7	3	*	1
			Algae (Clx)	*	4	*	*	*	*
			Barley (Hju)	*	4	*	*	*	*
			Cattail (Tla)	*	Trace	*	*	*	*
			C. Thistle (Car)	*	Trace	*	*	*	*
			Weeds (Wx)	*	Trace	*	*	*	*
			Greasewood (Sve)	*	Trace	*	*	*	*
			Spikerush (Ex)	=	54	8	5	*	2
14-76	T 5	0.6	Wiregrass (Jba)	-	28	4	3	*	1
			Saltgrass (Dst)	-	17	3	2	*	1
			Barley (Hju)	*	6	*	*	*	*
			Wiregrass (Jba)	=	40	3	3	*	2
14-77	T 5	11.4	Barley (Hju)	=	29	5	3	*	1
			Grass (Gx)	*	12	*	*	*	*
			Spikerush (Ex)	*	7	*	*	*	*
			Saltgrass (Dst)	=	5	3	2	*	1
			Weeds (Ws)	*	2	*	*	*	*
			Sedge (Cx)	*	1	*	*	*	*
			Wiregrass (Jba)	-	39	9	3	*	1
14-78	MS 56	17.9	Weeds (Wx)	-	31	7	3	*	1
			Grasses (Gx)	*	13	*	*	*	*
			Sedge (Cx)	*	10	*	*	*	*
			Saltgrass (Dst)	*	4	*	*	*	*
			Barley (Hju)	*	3	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 14

Mapper: Leslie F. Beaty

Date: August 1962 (Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
14-79	MSf 56	44.3	Grass (Gx)	-	34	7	2	*	1
			Wiregrass (Jba)	-	31	8	3	*	1
			Weeds (Wx)	-	15	7	3	*	1
			Sedge (Cx)	*	10	*	*	*	*
			Spikerush (Ex)	*	9	*	*	*	*
			Barley (Hju)	*	3	*	*	*	*
			Saltgrass (Dst)	*	1	*	*	*	*
14-80	MSf6	0.1	Barley (Hju)	-	42	7	3	*	1
			Grass (Gx)	-	25	8	2	*	1
			C. Thistle (Car)	-	18	8	2	*	1
			Weeds (Wx)	*	13	*	*	*	*
			Spikerush (Ex)	*	3	*	*	*	*
			Bare (B)	*	2	*	*	*	*
14-81	MSf 56	0.1	Spikerush (Ex)	-	40	6	4	*	1
			Weeds (Wx)	-	31	6	2	*	1
			Grass (Gx)	*	14	*	*	*	*
			Barley (Hju)	*	11	*	*	*	*
			Sedge (Cx)	*	2	*	*	*	*
			Arrowhead (Sgx)	*	1	*	5	*	*
			Bulrush (Sva)	*	1	*	5	*	*
14-82	MS 2	0.1	S. Pondweed (Ppe)	-	83	9	4	*	*
			Algae (Clx)	=	14	7	4	*	*
			Spikerush (Ex)	*	2	*	*	*	*
			Weeds (Wx)	*	1	*	*	*	*
14-83	MS 2	0.1	S. Pondweed (Ppe)	-	89	7	4	*	*
			Algae (Clx)	-	3	3	4	*	*
			Open water (Ow)	*	8	*	*	*	*
14-84	MSf 56	0.1	Weeds (Wx)	-	81	6	3	*	*
			Spikerush (Ex)	=	17	5	4	*	2
			Sedge (Cx)	*	1	*	*	*	*
			Grass (Gx)	*	Trace	*	*	*	*
			Bulrush (Sva)	)	Trace	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 14

Mapper: Leslie F. Beaty

Date: August 1962 (Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
			Spikerush (Ex)	-	46	8	3	*	*
14-85	MSf 256	0.1	Weeds (Wx	-	42	8	3	*	*
			Buttercup (Rag)	-	12	3	3	*	*
			Bare (B)	*	4	*	*	*	*
			Arrowhead (Sgx)	*	Trace	*	*	*	*
			Sedge (Cx)	*	Trace	*	*	*	*
			Weeds (Wx)	-	52	6	2	*	*
14-86	MSf 56	0.1	Spikerush (Ex)	-	44	9	4	*	*
			C. Thistle (Car)	*	4	*	*	*	*
			Sedge (Cx)	*	Trace	*	*	*	*
			Bulrush (Sva)	*	Trace	*	*	*	*
			Weeds (Wx)	-	56	7	3	*	*
14-87	MSf 56	0.1	Spikerush (Ex)	-	27	8	4	*	1
			Grass (Gx)	*	6	*	*	*	*
			Algae (Clx)	*	5	*	*	*	*
			Sedge (Cx)	*	4	*	*	*	*
			Buttercup (Rag)	*	1	*	*	*	*
			Bulrush (Sva)	*	Trace	*	*	*	*
			Weeds (Wx)	-	55	9	3	*	1
14-88	Tap 6	38.1	Wiregrass (Jba)	-	27	7	4	*	1
			Saltgrass (Dst)	=	12	3	3	*	*
			Greasewood (Sve)	-	6	8	2	*	*
			Grass (Gx)	*	5	*	*	*	*
			Sedge (Cx)	*	1	*	*	*	*
			Bare (B)	*	70	4	*	*	*
14-89	Aap 67	2.9	Greasewood (Sve)	=	50	6	3	1a	2
			Weeds (Wx)	-	18	3	3	*	*
			Saltgrass (Dst)	-	8	3	3	*	*
			Wiregrass (Jba)	*	2	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 14

Mapper: Leslie F. Beaty

Date: August 1962
(Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
14-90	Aao 6	10.1	Weeds (Wx)	=	76	9	3	*	2
			Grass (Gx)	*	10	*	*	*	*
			Barley (Hju)	*	7	*	*	*	*
			Greasewood (Sve)	*	4	*	*	*	*
			Bare (B)	*	4	*	*	*	*
			Saltgrass (Dst)	*	3	*	*	*	*
			Wiregrass (Jba)	*	3	*	*	*	*
			Sweetclover (Mof)	*	2	*	*	*	*
14-91	Tap 6	6.3	Weeds (Wx)	-	46	9	3	*	1
			Greasewood (Sve)	-	34	8	3	1a	2
			Bare (B)	*	26	4	*	*	*
			Saltgrass (Dst)	-	14	3	3	*	*
			Wiregrass (Jba)	-	12	7	4	*	1
			Grass (Gx)	*	2	*	*	*	*
14-92	Tap 6	6.9	Weeds (Wx)	=	45	9	3	*	2
			Greasewood (Sve)	=	22	8	3	1b	2
			Wiregrass (Jba)	-	14	7	4	*	1
			Barley (Hju)	*	12	*	*	*	*
			Grass (Gx)	*	10	*	*	*	*
			Bare (B)	*	10	*	*	*	*
			Saltgrass (Dst)	-	7	7	3	*	*
			Sedge (Cx)	*	3	*	*	*	*
			Spikerush (Ex)	*	1	*	*	*	*
14-93	MSf 245	0.8	Algae (Clx)	=	73	8	35	*	1
			Arrowhead (Sgx)	-	18	7	4	*	1
			Spikerush (Ex)	-	5	3	3	*	1
			Open water (Ow)	*	4	*	*	*	*
			Weeds (Wx)	*	Trace	*	*	*	*
14-94	MS 25	2.1	Spikerush (Ex)	=	50	6	3	*	2
			Algae (Clx)	=	50	6	3	*	*
			Cattail (Tla)	*	Trace	*	*	*	*
			Sedge (Cx)	*	Trace	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 14

Mapper: Leslie F. Beaty

Date: August 1962 (Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
14-95	T 6	0.4	Saltgrass (Dst)	=	52	8	2	*	1
			Greasewood (Sve)	-	44	7	25	2a	3
			Bare (B)	*	32	4	*	*	*
			Wiregrass (Jba)	-	12	3	3	*	2
			Weeds (Wx)	*	6	*	*	*	*
			Barley (Hju)	*	Trace	*	*	*	*
14-96	MSf 56	5.8	Barley (Hju)	-	28	8	3	*	*
			Grass (Gx)	-	25	7	2	*	1
			Wiregrass (Jba)	-	17	3	3	*	1
			Sedge (Cx)	*	14	*	*	*	*
			Weeds (Wx)	*	13	*	*	*	*
14-97	MSf45	3.9	Sedge (Cx)	=	53	9	3	*	1
			Spikerush (Ex)	=	39	7	3	*	2
			Open water (Ow)	*	7	*	*	*	*
			Cattail (Tla)	*	1	*	*	*	*
			Bulrush (Sva)	*	Trace	*	*	*	*
			Grass (Gx)	*	Trace	*	*	*	*
14-98	MSf 2	1.6	S. Pondweed (Ppe)	=	75	8	5	*	2
			Buttercup (Rag)	-	17	7	4	*	1
			Bare (B)	*	6	*	*	*	*
			Weeds (Wx)	*	2	*	*	*	*
14-99	MSf 25	0.2	Buttercup (Rag)	-	44	7	*	*	1
			Spikerush (Ex)	-	32	8	3	*	1
			Open water (Ow)	*	21	4	*	*	*
			Bare (B)	*	3	*	*	*	*
14-100	Aaps 6	0.5	Weeds (Wx)	-	75	6	3	*	1
			Bare (B)	*	18	3	*	*	*
			Saltgrass (Dst)	-	7	2	3	*	1
			Greasewood (Sve)	*	2	*	*	*	*
			Grass (Gx)	*	Trace	*	*	*	*

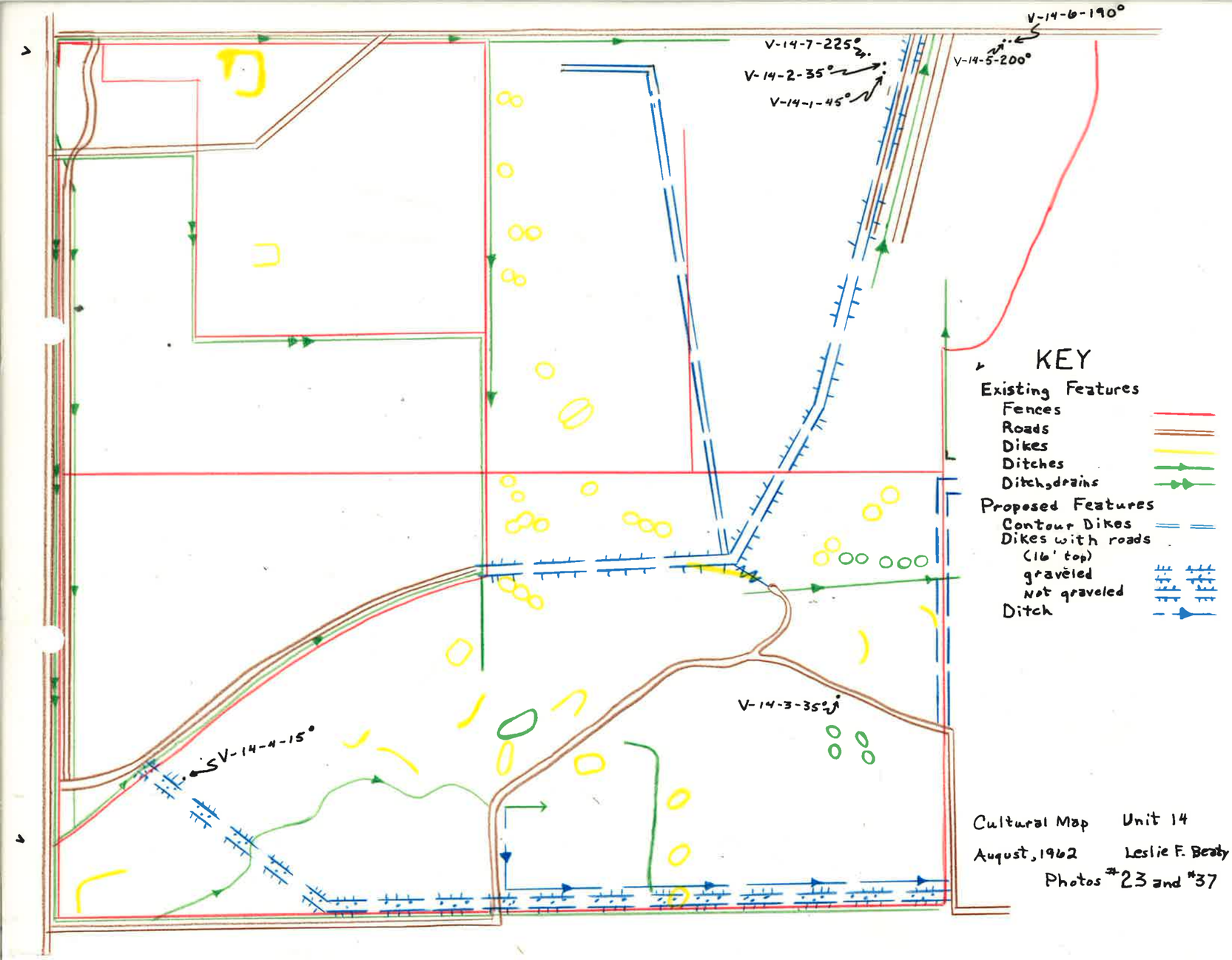
TYPE FORMULA DATA SHEET

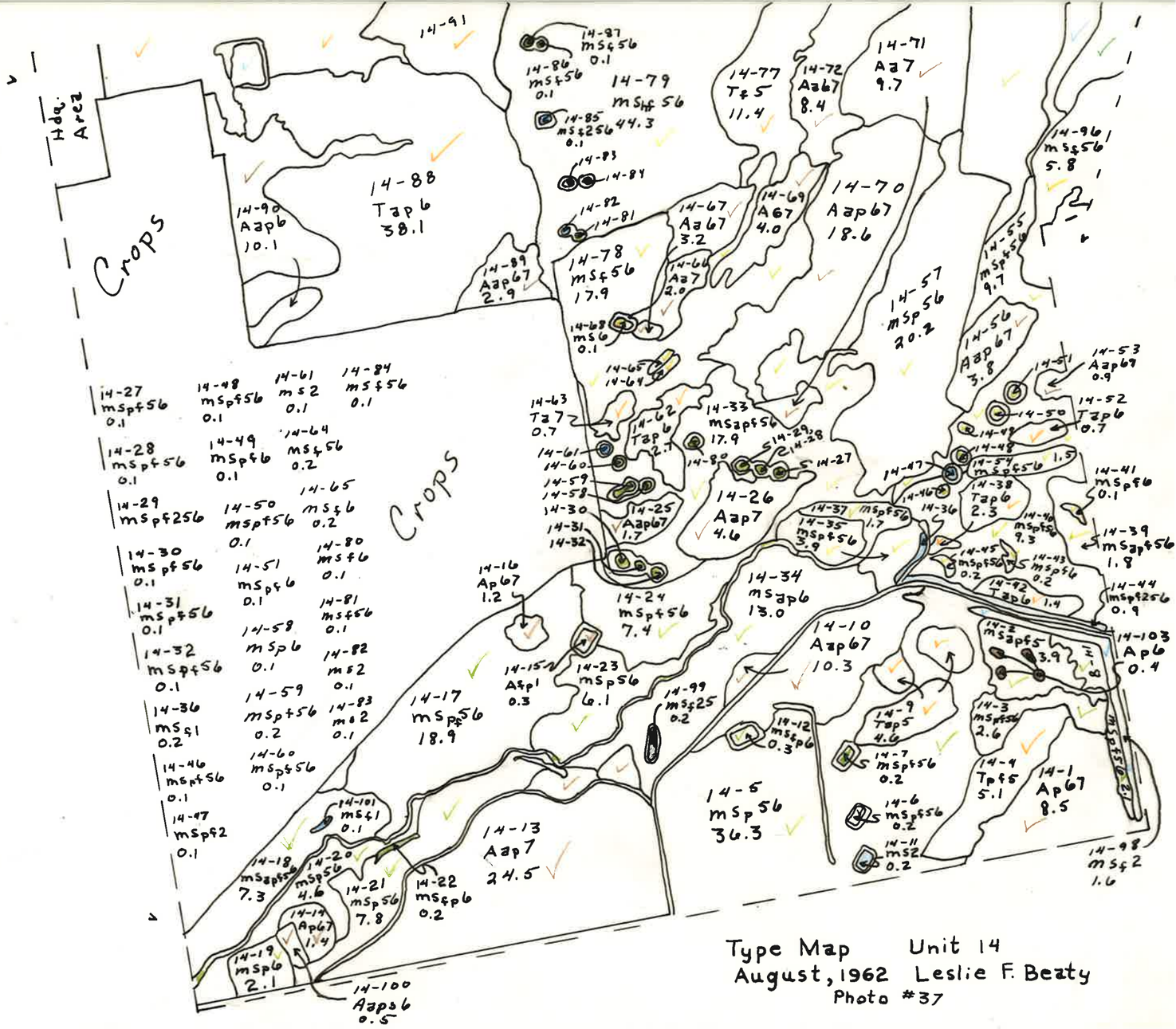
Unit No.: 14

Mapper: Leslie F. Beaty

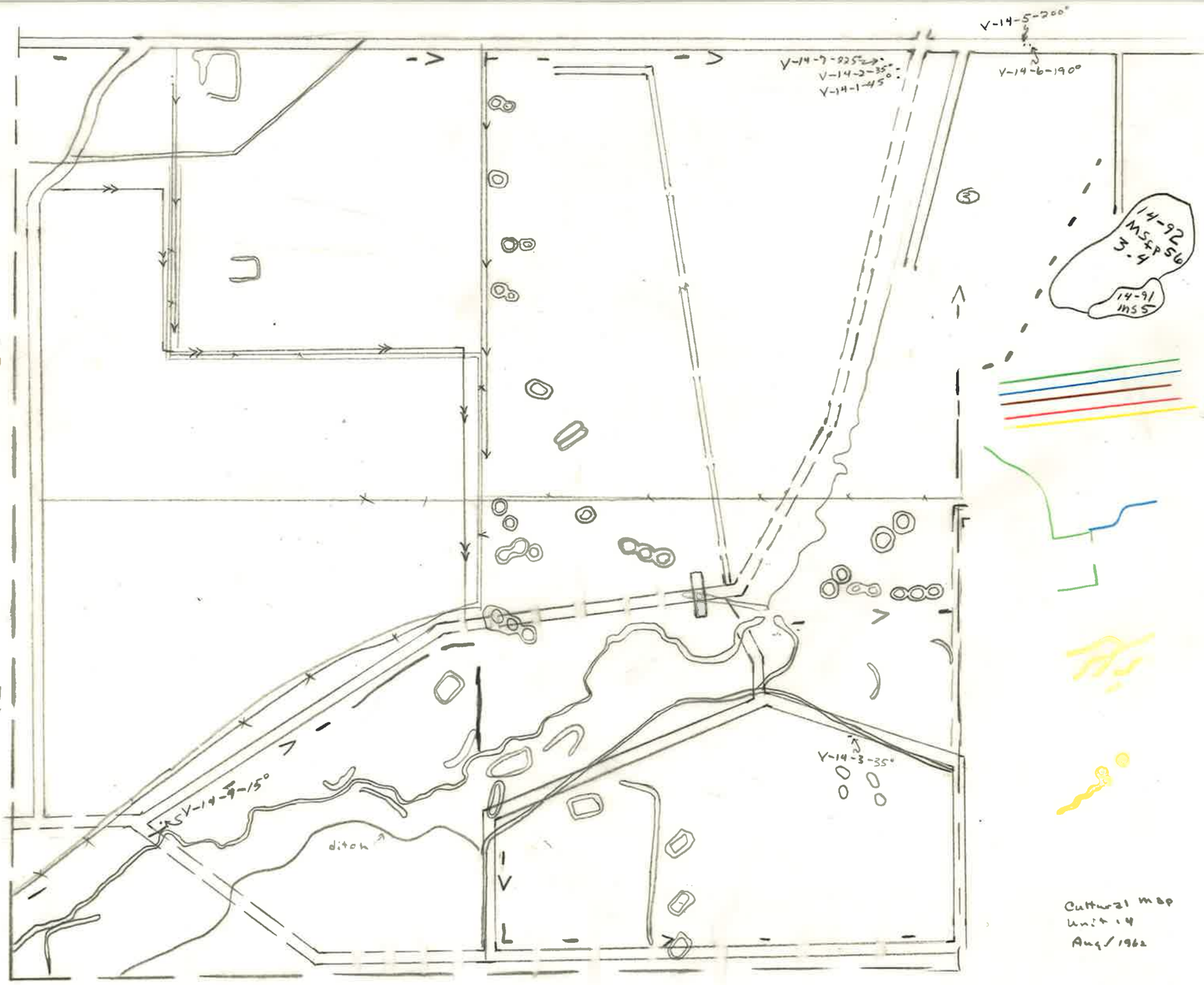
Date: August 1962 (Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
14-101	MSf 1	0.1	Bare (B)	*	100	6	*	*	*
			S. Pondweed (Ppe)	=	61	8	2	*	*
14-102	MS 2	8.6	Open water (Ow)	*	38	9	*	*	*
			Algae (Clx)	*	2	*	*	*	*
14-103	Ap 6	0.4	Saltgrass (Dst)	=	100	6	3	*	2
			S. Pondweed (Ppe)	=	74	8	*	*	*
14-104	MS 2	0.1	Open water (Ow)	*	14	8	*	*	*
			Algae (Clx)	*	8	*	*	*	*
			Spikerush (Ex)	*	2	*	*	*	*
			Saltgrass (Dst)	-	50	6	3	*	2
14-105	Aa6	1.3	Weeds (Wx)	-	33	7	3	*	2
			Bare (B)	*	12	3	*	*	*
			Wiregrass (Jba)	*	3	*	*	*	*
			Grass (Gx)	*	2	*	*	*	*
			Greasewood (Sve)	*	Trace	*	*	*	*
			Barley (Hju)	*	Trace	*	*	*	*
Spring Creek	MS fp 5	2.2	Sedge (Cx)	Generally, spikerush (Ex) growth occurred					
			Spikerush (Ex)	on the dry bottom of the creek bed with					
			Grass (Gx)	dense sedges (Dx), medium wiregrass (Jba),					
			Wiregrass (Jba)	and sparse grasses (Gx) growing on the					
				banks.					
		484.5	Total individual type acreages						
		500.3	Total unit acreage typed						
		15.8	Total acreage for roads, ditches, dikes, etc.						

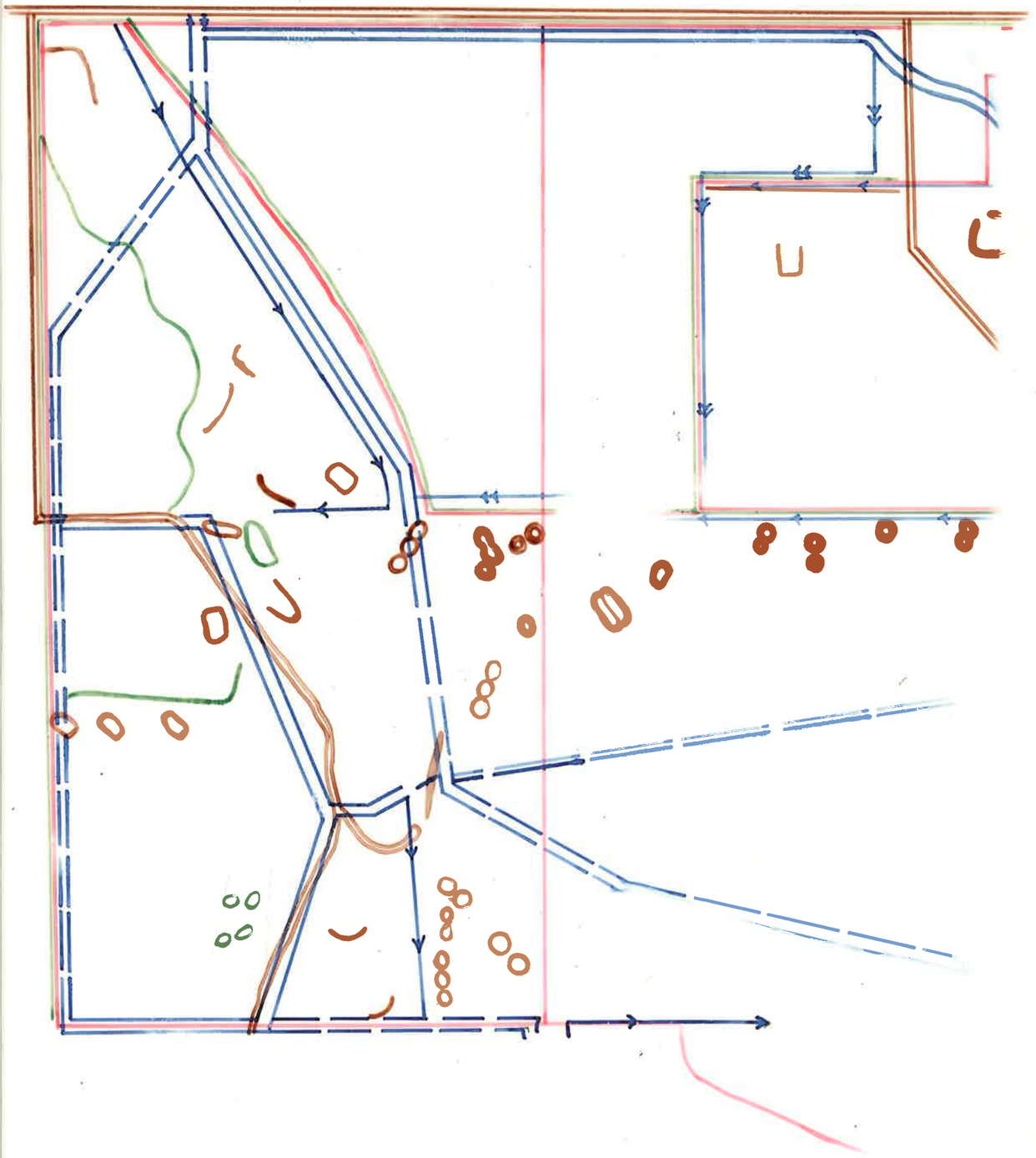

V-14-6-190°
V-14-7-225°
V-14-2-35°
V-14-1-45°
V-14-5-200°
V-14-3-35°
V-14-4-15°
KEY
Existing Features
Fences
Roads
Dikes
Ditches
Ditch,drains
Proposed Features
Contour Dikes
Dikes with roads
(16' top)
graveled
Not graveled
Ditch
Cultural Map Unit 14
August, 1962 Leslie F. Beaty
Photos #23 and #37

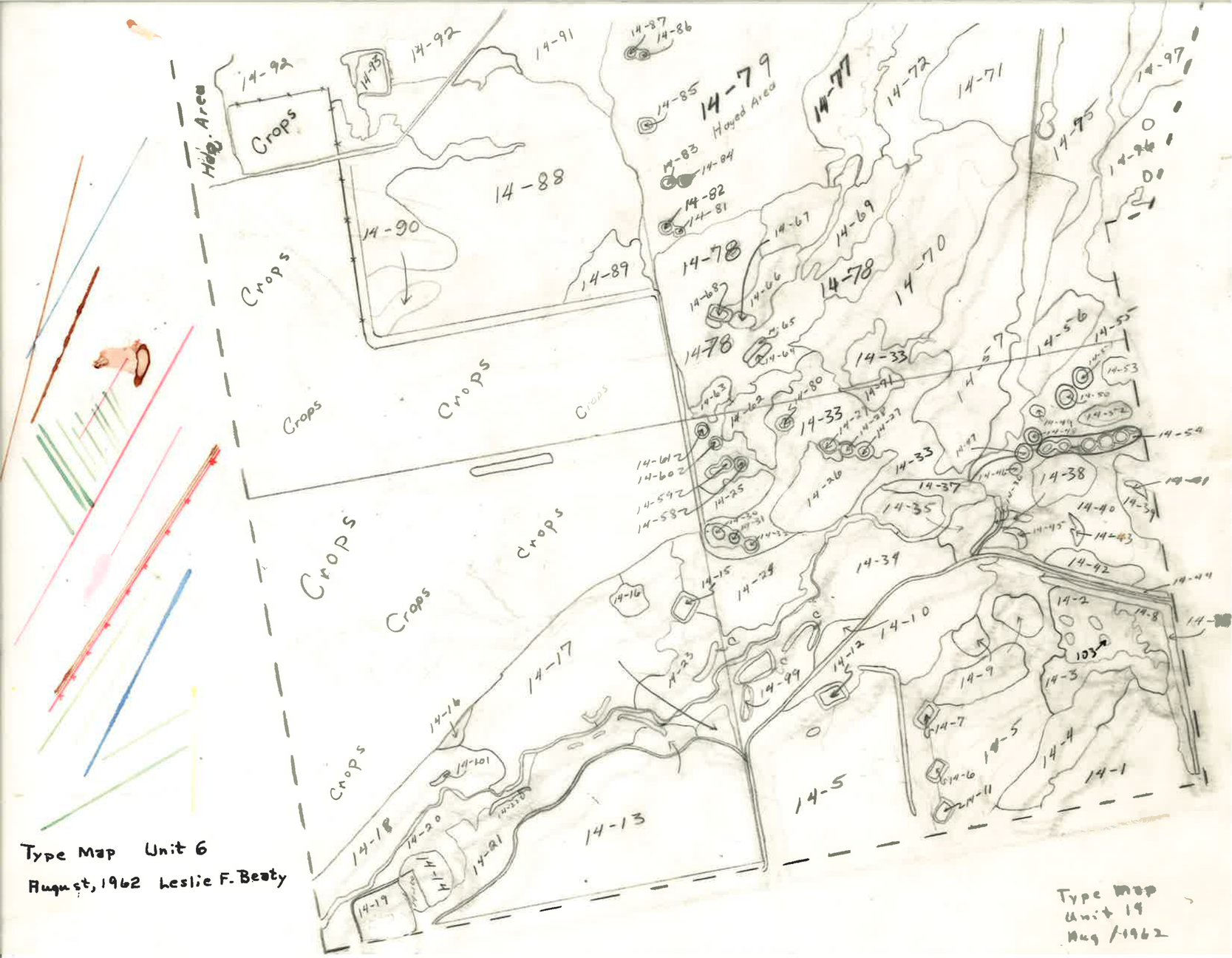


Type Map Unit 14
August, 1962 Leslie F. Beaty
Photo #37



Cultural Map
Unit 14
Aug/1962





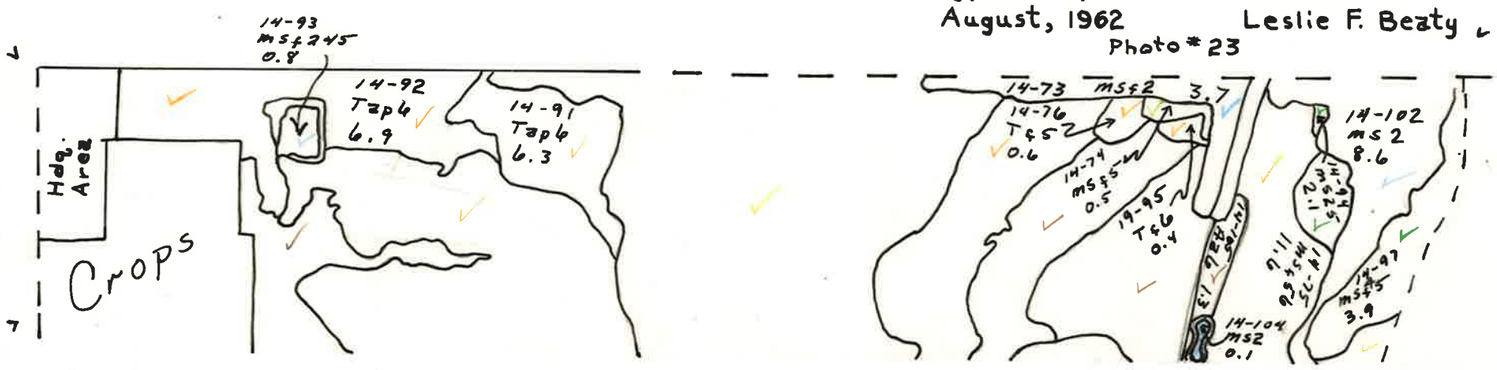
Type Map Unit 6
August, 1962 Leslie F. Beaty

Type Map
Unit 14
Aug 1962

Type Map
August, 1962

Unit 14
Leslie F. Beaty

Photo * 23



Vegetative Type Mapping (summer) Unit 19: Data Sheets, and Overlays

TYPE FORMULA DATA SHEET

Unit No.: 19

Mapper: Leslie F. Beaty

Date: July, 1962 (Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
19-1	Tfp5	4.2	Wiregrass (Jba)	-	39	8	2	*	2
			Grasses (Gx)	=	30	67	2	*	1
			Barley (Hju)	-	16	9	2	*	23
			Saltgrass (Dst)	=	7	3	4	*	1
			Weeds (Wx)	*	6	*	*	*	*
			Bare (B)	*	2	*	*	*	*
19-2	Asfa6	3.8	Weeds (Wx)	-	40	9	2	*	1
			Bare (B)	*	37	3	*	*	*
			Barley (Hju)	*	14	*	*	*	*
			Grasses (Gx)	*	5	*	*	*	*
			Saltgrass (Dst)	*	2	*	*	*	*
			Wiregrass (Jba)	*	1	*	*	*	*
			Spikerush (Ex)	*	Trace	*	*	*	*
19-3	Ap6	3.9	Saltgrass (Dst)	=	87	6	2	*	3
			Weeds (Wx)	*	10	*	*	*	*
			Wiregrass (Jba)	*	1	*	*	*	*
			Bare (B)	*	1	*	*	*	*
			Greasewood (Sve)	*	Trace	*	*	*	*
19-4	Aap6	3.2	Saltgrass (Dst)	=	92	9	3	*	2
			Weeds (Wx)	*	7	*	*	*	*
			Wiregrass (Jba)	*	1	*	*	*	*
			Grasses (Gx)	*	Trace	*	*	*	*
			Greasewood (Sve)	*	Trace	*	*	*	*
19-5	Tap5	1.8	Wiregrass (Jba)	-	32	5	4	*	1
			Weeds (Wx)	=	27	67	2	*	1
			Saltgrass (Dst)	=	24	8	3	*	2
			Grasses (Gx)	*	10	*	*	*	*
			Barley (Hju)	*	6	*	*	*	*
			Bare (B)	*	4	*	*	*	*
			Sedge (Cx)	*	Trace	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 19

Mapper: Leslie F. Beaty

Date: July, 1962
(Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
			Saltgrass (Dst)	=	87	89	3	*	12
19.6	Apa 67	2.4	Greasewood (Sve)	-	8	37	2	1a	1
			Bare (B)	*	7	3	*	*	*
			Weeds (Wx)	*	3	*	*	*	*
			Wiregrass (Jba)	*	2	*	*	*	*
			F. Barley (Hju)	*	1	*	*	*	*
			Saltgrass (Dst)	=	54	8	4	*	2
19.7	Tpa 6	7.4	Weeds (Wx)	-	20	7	25	*	2
			Bare (B)	*	18	5	*	*	*
			Greasewood (Sve)	-	7	7	1-2	2b	0-1
			Wiregrass (Jba)	-	6	3	4	*	2
			Grasses (Gx)	*	1	*	*	*	*
			F. Barley (Hju)	*	1	*	*	*	*
			Greasewood (Sve)	=	46	6	1-2	2b	01
19.8	Apa 67	2.3	Saltgrass (Dst)	=	40	8	3	*	12
			Bare (B)	*	56	5	*	*	*
			Weeds (Wx)	*	4	*	*	*	*
			Wiregrass (Jba)	-	41	4	4	*	23
19.9	Tp 5	1.9	Saltgrass (Dst)	=	24	9	3	*	2
			Weeds (Wx)	*	24	7	25	*	12
			Grasses (Gx)	*	4	*	*	*	*
			F. Barley (Hju)	*	3	*	*	*	*
			Bare (B)	*	3	*	*	*	*
			Greasewood (Sve)	*	Trace	*	*	*	*
			Wiregrass (Jba)	-	44	4	34	*	12
19.10	Tp 5	1.5	Saltgrass (Dst)	=	24	8	3	*	2
			Bare (B)	*	11	4	*	*	*
			Grasses (Gx)	*	9	*	*	*	*
			Weeds (Wx)	*	9	*	*	*	*
			F. Barley (Hju)	*	3	*	*	*	*
			Greasewood (Sve)	*	Trace	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 19

Mapper: Leslie F. Beaty

Date: July, 1962 (Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
			Bare (B)	*	83	5	*	*	*
19.11	Apa 67	3.5	Greasewood (Sve)	=	23	7	2	2c	1
			Saltgrass (Dst)	=	17	4	3	*	2
			Saltgrass (Dst)	=	94	6	3	*	2
19.12	Apa 67	7.9	Greasewood (Sve)	=	6	7	2	2b	1
			Bare (B)	*	5	*	*	*	*
			Weeds (Wx)	*	1	*	*	*	*
			Wiregrass (Jba)	*	Trace	*	*	*	*
			F. Barley (Hju)	*	Trace	*	*	*	*
			Wiregrass (Jba)	-	60	9	3	*	12
19.13	Tp 5	1.7	Grasses (Gx)	=	21	8	2	*	23
			Saltgrass (Dst)	-	12	7	3	*	1
			Weeds (Wx)	*	6	*	*	*	*
			Bare (B)	*	1	*	*	*	*
			F. Barley (Hju)	*	Trace	*	*	*	*
			Greasewood (Sve)	*	Trace	*	*	*	*
			Greasewood (Sve)	=	53	8	2	2b	2
19.14	Apa 67	2.3	Saltgrass (Dst)	=	50	2	3	*	12
			Bare (B)	*	4	2	*	*	*
			Grasses (Gx)	*	4	*	*	*	*
			Wiregrass (Jba)	*	1	*	*	*	*
			F. Barley (Hju)	*	Trace	*	*	*	*
			Weeds (Wx)	*	Trace	*	*	*	*
			Greasewood (Sve)	=	46	67	2	2b	2
19.15	Tp6	3.5	Saltgrass (Dst)	-	40	8	3	*	12
			Bare (B)	*	37	4	*	*	*
			Weeds (Wx)	*	15	7	25	*	1
			Wiregrass (Jba)	*	9	1	4	*	12
			Grasses (Gx)	*	Trace	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 19

Mapper: Leslie F. Beaty

Date: July, 1962
(Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
			Saltgrass (Dst)	=	92	9	2	*	12
19.16	Apa6	8.7	F. Barley (Hju)	*	4	*	*	*	*
			Bare (B)	*	2	*	*	*	*
			Wiregrass (Jba)	*	2	*	*	*	*
			Weeds (Wx)	*	3	*	*	*	*
			Grasses (Gx)	*	1	*	*	*	*
			Greasewood (Sve)	*	Trace	*	*	*	*
			Saltgrass (Dst)	=	50	8	2	*	1
19.17	Ap 67	2.1	Bare (B)	*	39	4	*	*	*
			Greasewood (Sve)	-	20	7	2	2b	1
			Weeds (Wx)	*	8	*	*	*	*
			Grasses (Gx)	*	2	*	*	*	*
			F. Barley (Hju)	*	1	*	*	*	*
			Wiregrass (Jba)	*	Trace	*	*	*	*
			Saltgrass (Dst)	=	80	8	2	*	12
19.18	Ap 67	11.1	Greasewood (Sve)	-	33	7	2	2b	1
			Bare (B)	*	9	4	*	*	*
			Grasses (Gx)	*	3	*	*	*	*
			Wiregrass (Jba)	*	2	*	*	*	*
			Weeds (Wx)	*	5	*	*	*	*
			F. Barley (Hju)	*	1	*	*	*	*
			Wiregrass (Jba)	-	27	8	3	*	1
19.19	Tp 6	8.8	Saltgrass (Dst)	=	26	67	2	*	1
			Greasewood (Sve)	-	13	7	2	1a	1
			Weeds (Wx)	*	18	*	*	*	*
			Grasses (Gx)	*	17	*	*	*	*
			Bare (B)	*	8	*	*	*	*
			F. Barley (Hju)	*	4	*	*	*	*
			Willow (Sx)	*	Trace	*	*	*	*

TYPE FORMULA DATA SHEET

Mapper: Leslie F. Beaty

Unit No.: 19

Date: July, 1962
(Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
			Greasewood (Sve)	=	62	8	3	1b	12
19.20	Tp 6	1.8	Bare (B)	*	40	4	*	*	*
			Saltgrass (Dst)	-	32	8	3	*	1
			Weeds (Wx)	*	11	*	*	*	*
			Wiregrass (Jba)	*	5	3	3	*	1
			Grasses (Gx)	*	5	*	*	*	*
			F. Barley (Hju)	*	2	*	*	*	*
			Wiregrass (Jba)	-	51	8	4	*	12
19.21	Msp 56	59.0	Grasses (Gx)	-	33	6	2	*	2
			Weeds (Wx)	*	9	*	*	*	*
			Saltgrass (Dst)	-	4	1	2	*	2
			Canadian Thistle (Car)	*	Trace	*	*	*	*
			Spikerush (Ex)	*	Trace	*	*	*	*
			Greasewood (Sve)	*	Trace	*	*	*	*
			Wiregrass (Jba)	-	30	8	34	*	12
19.22	Msp 56	6.1	Grasses (Gx)	-	38	6	2	*	1
			Weeds (Wx)	-	28	67	2	*	1
			Canadian Thistle (Car)	*	4	*	*	*	*
			Saltgrass (Dst)	*	2	*	*	*	*
			Sweetclover (Mof)	*	Trace	*	*	*	*
			Greasewood (Sve)	=	63	6	2	2b	12
19.23	Ap 67	3.8	Saltgrass (Dst)	-	52	8	34	*	1
			Bare (B)	*	34	4	*	*	*
			Grasses (Gx)	*	7	*	*	*	*
			Wiregrass (Jba)	*	1	*	*	*	*
			Weeds (Wx)	*	1	*	*	*	*
			Saltgrass (Dst)	-	86	8	2	*	1
19.24	Tp 6	7.9	Wiregrass (Jba)	-	8	3	34	*	1
			Greasewood (Sve)	-	6	7	2	1b	1
			Bare (B)	*	3	*	*	*	*
			Weeds (Wx)	*	2	*	*	*	*
			Grasses (Gx)	*	1	*	*	*	*

TYPE FORMULA DATA SHEET

Mapper: Leslie E. Beaty

Unit No.: 19

Date: July, 1962
(Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
			Saltgrass (Dst)	-	58	4	3	*	1
19.25	Tpt 5	23.7	Wiregrass (Jba	-	24	1	3	*	1
			Grasses (Gx)	*	9	*	*	*	*
			F. Barley (Hju)	*	8	*	*	*	*
			Bare (B)	*	3	*	*	*	*
			Weeds (Wx)	*	1	*	*	*	*
			Greasewood (Sve)	*	Trace	*	*	*	*
			Wiregrass (Jba)	-	56	8	3	*	1
19.26	Mspt 56	2.4	Grasses (Gx)	-	25	67	2	*	1
			F. Barley (Hju)	*	9	*	*	*	*
			Weeds (Wx)	*	6	*	*	*	*
			Saltgrass (Dst)	*	3	4	2	*	1
			Bare (B)	*	2	3	*	*	*
			Sedge (Cx)	*	Trace	*	*	*	*
			Spikerush (Ex)	*	Trace	*	*	*	*
			Saltgrass (Dst)	-	38	8	34	*	1
19.27	Tp6	10.2	Weeds (Wx)	-	25	67	4	*	2
			Bare (B)	*	19	4	*	*	*
			Greasewood (Sve)	=	17	8	2	2b	1
			Wiregrass (Jba)	-	13	4	4	*	1
			Grasses (Gx)	*	3	*	*	*	*
			F. Barley (Hju)	*	2	*	*	*	*
			Wiregrass (Jba)	-	36	8	34	*	1
19.28	Tp5	14.5	Weeds (Wx)	-	34	9	34	*	1
			Grass (Gx)	-	19	67	2	*	1
			Saltgrass (Dst)	-	10	4	2	*	1
			Bare (B)	*	1	*	*	*	*
			Greasewood (Sve)	*	Trace	*	*	*	*

TYPE FORMULA DATA SHEET

Mapper: Leslie F. Beaty

Unit No.: 19

Date: July, 1962
(Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
			Saltgrass (Dst)	-	64	8	34	*	1
19.29	Tp6	1.4	Greasewood (Sve)	-	17	4	2	1b	01
			Weeds (Wx)	*	16	*	*	*	*
			F. Barley (Hju)	*	7	*	*	*	*
			Bare (B)	*	4	4	*	*	*
			Wiregrass (Jba)	*	8	3	3	*	12
			Grasses (Gx)	*	1	*	*	*	*
			Weeds (Wx)	=	45	9	2	*	2
19.30	Msp 6	2.6	Grass (Gx)	=	29	8	3	*	2.
			Thistle (Car)	=	19	8	2	*	0
			F. Barley (Hju)	*	5	*	*	*	*
			Wiregrass (Jba)	*	4	*	3	*	1
			Sedge (Cx)	*	Trace	*	*	*	*
			Wiregrass (Jba)	-	37	8	4	*	12
19.31	Tp 5	22.9	Saltgrass (Dst)	-	36	4	3	*	1
			Grasses (Gx)	-	22	7	2	*	1
			Weeds (Wx)	*	3	*	*	*	*
			Bare (B)	*	1	4	*	*	*
			F. Barley (Hju)	*	1	*	*	*	*
			Greasewood (Sve)	*	Trace	*	*	*	*
			Greasewood (Sve)	=	64	8	2	2a	23
19.32	Ap 67	6.3	Bare (B)	*	64	4	*	*	*
			Saltgrass (Dst)	-	30	7	2	*	1
			Wiregrass (Jba)	*	1	3	*	*	*
			Saltgrass (Dst)	-	68	8	2	*	1
19.33	Tp 6	7.5	Greasewood (Sve)	-	21	8	2	1b	1
			F. Barley (Hju)	*	6	*	*	*	*
			Wiregrass (Jba)	-	9	3	4	*	1
			Bare (B)	*	9	3	*	*	*
			Weeds (Wx)	*	8	*	*	*	*

TYPE FORMULA DATA SHEET

Unit No.: 19

Mapper: Leslie F. Beaty

Date: July, 1962 (Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
			Wiregrass (Jba)	-	44	6	4	*	1
19.34	Tpt 5	6.6	Weeds (Wx)	-	28	6	2	*	1
			Grasses (Gx)	-	17	67	2	*	1
			Saltgrass (Dst)	-	8	7	3	*	1
			F. Barley (Hju)	*	6	*	*	*	*
			Grass (Gx)	=	66	6	3	*	23
19.35	MSpt 6	3.8	Thistle (Car)	=	20	8	2	*	1
			Weed (Wx)	*	8	*	*	*	*
			Wiregrass (Jba)	-	3	0	4	*	1
			F. Barley (Hju)	*	Trace	*	*	*	*
			Bare (B)	*	1	0	*	*	*
			Wiregrass (Jba)	-	63	9	3	*	23
19.36	MSp 56	10.0	Grass (Gx)	-	25	7	2	*	1
			Weeds (Wx)	*	8	*	*	*	*
			F. Barley (Hju)	*	2	*	*	*	*
			Thistle (Car)	*	Trace	*	*	*	*
			Saltgrass (Dst)	*	Trace	*	*	*	*
			Weed (Wx)	-	66	6	2	*	1
19.37	Tp 5	4.6	Wiregrass (Jba)	-	23	8	3	*	1
			Saltgrass (Dst)	-	8	2	3	*	1
			Grass (Gx)	*	Trace	*	*	*	*
			Bare (B)	*	Trace	4	*	*	*
			Greasewood (Sve)	*	Trace	*	1	*	*
			Rabbitbrush (Crx)	=	43	8	2	3b	1
19.38	Tp 6	3.9	Weeds (Wx)	-	42	67	2	*	1
			Bare (B)	*	21	3	*	*	*
			Saltgrass (Dst)	-	20	8	3	*	1
			Wiregrass (Jba)	-	12	1	3	*	1
			Greasewood (Sve)	-	6	7	2	1b	1

TYPE FORMULA DATA SHEET

Unit No.: 19

Mapper: Leslie F. Beaty

Date: July, 1962
(Month & Year)

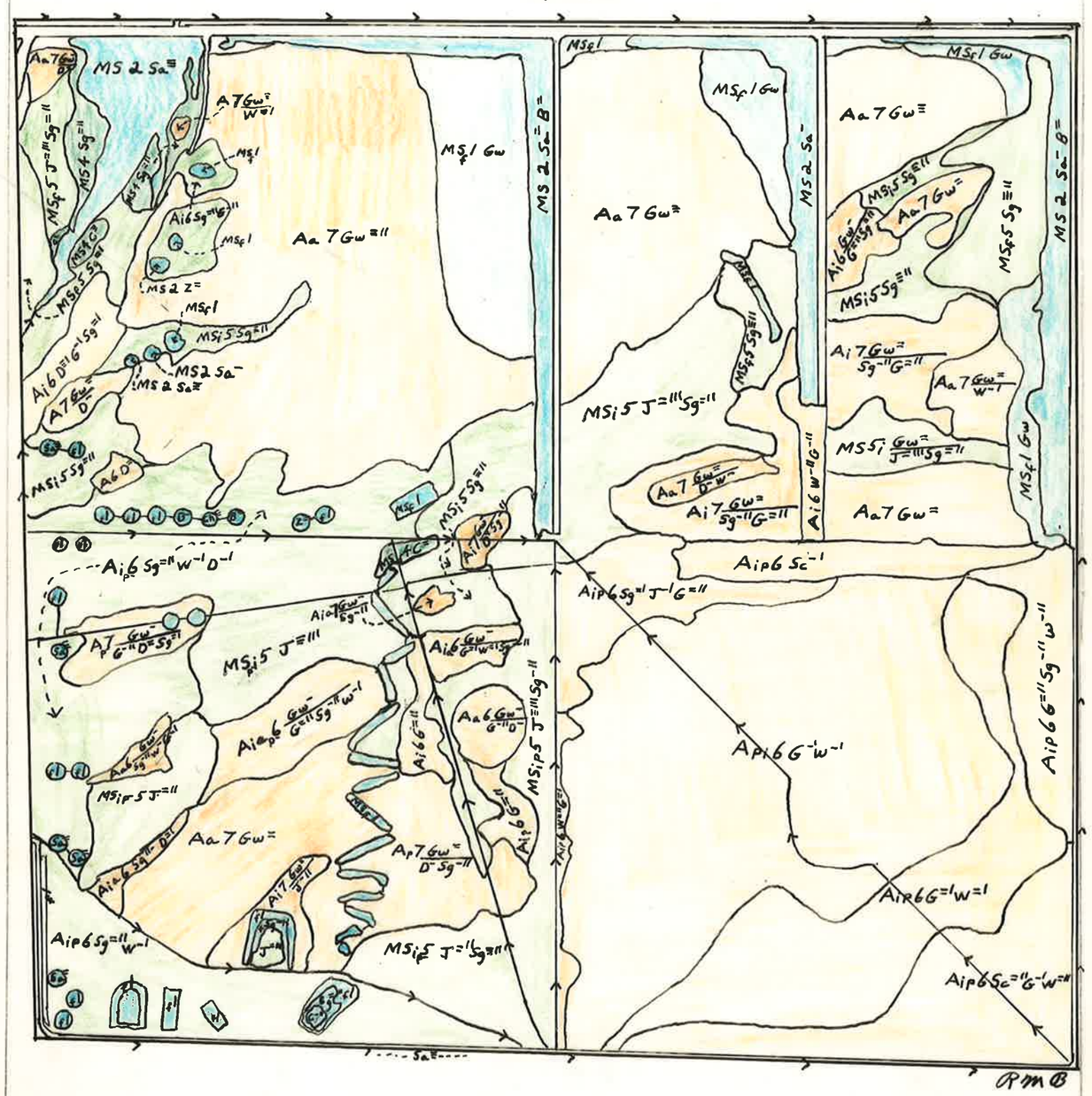
Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
			Greasewood (Sve)	=	59	6	2	2b	2
19.39	Ap 67	3.1	Bare (B)	*	55	4	*	*	*
			Weeds (Wx)	-	19	67	2	*	1
			Saltgrass (Dst)	-	15	3	1	*	1
			Rabbitbrush(Crx)	*	6	*	*	2a	*
			Cactus	*	Trace	*	*	*	*
			Bare (B)	*	90	6	*	*	*
19.40	Asp 67	0.4	Greasewood (Sve)	-	10	8	1	1b	0
			Saltgrass (Dst)	-	9	7	1	*	0
		284.5	Total individual type acreages						
		289.0	Total unit acreage typed						
		4.5	Total acreage for roads, ditches, dikes, etc.						

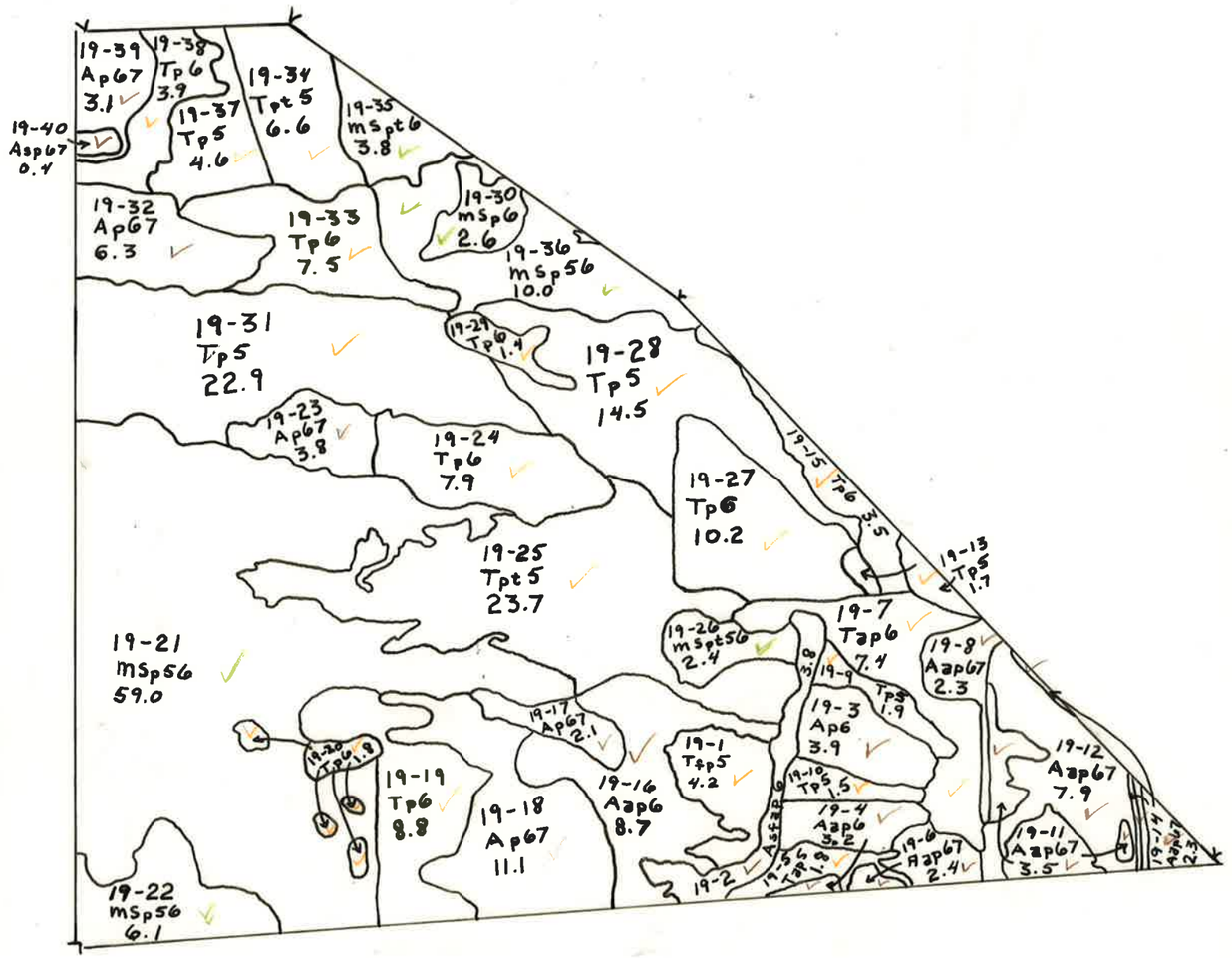
Bob -

We ordered a set of aerial photos - 8" to the mile and flight in Sept. 1961, which should be here in about two weeks for Neil to really get started. Will order more later for making a mosaic. Neil and Jess deleted the soils portion of the project which does not make me very happy. How was the trip to the high country? See you soon

Don

Cover Type Map
Section 5
Monte Vista Refuge
7/14/61





Type Map
July, 1962

Unit 19
Leslie F. Beaty

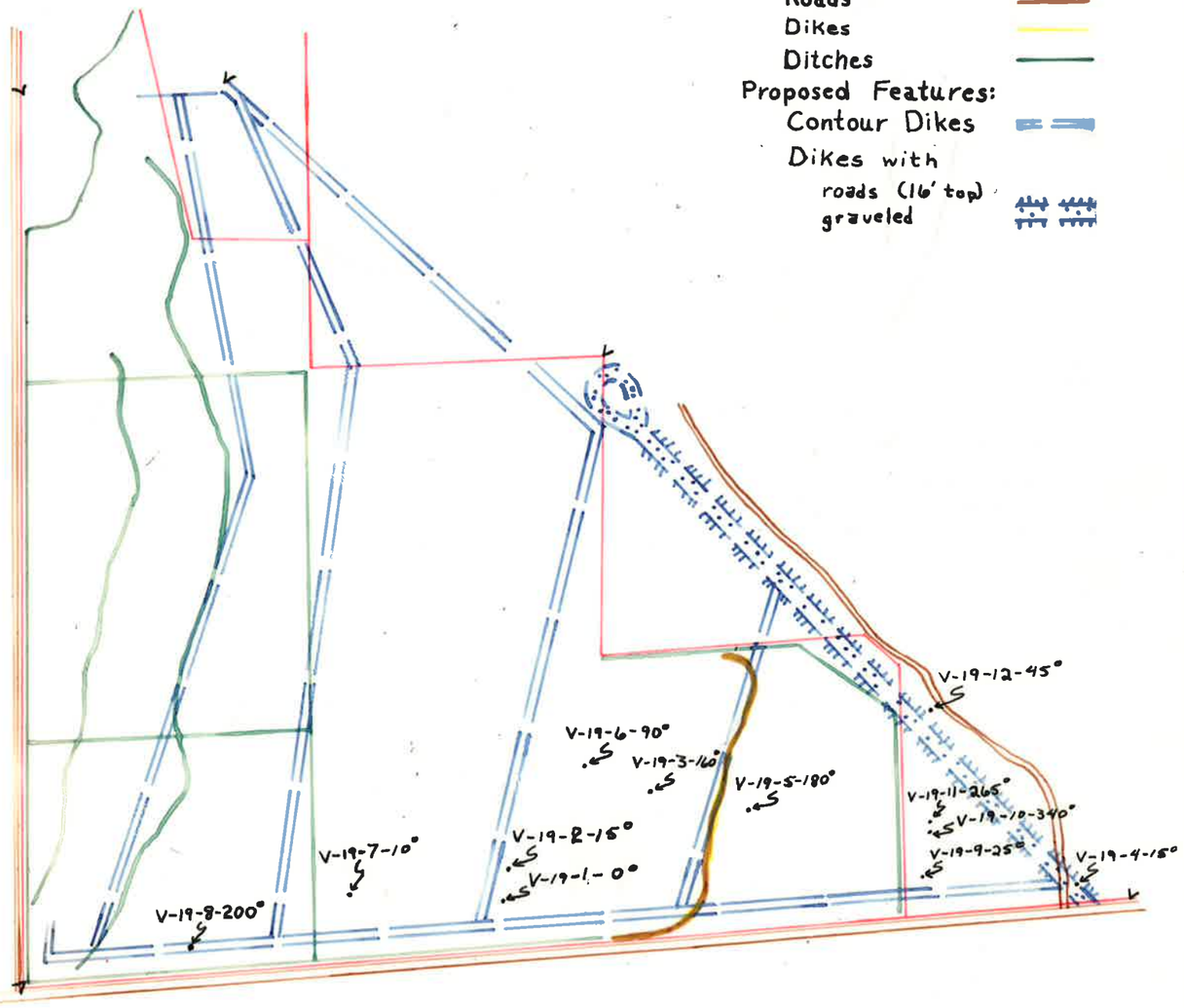
KEY

Existing Features:

- Fences
- Roads
- Dikes
- Ditches

Proposed Features:

- Contour Dikes
- Dikes with roads (16' top) graveled



Cultural Map
July, 1962

Unit 19
Leslie F. Beaty

2 Vegetative Inventories Cover Type Maps (one copy for each)

2 of 3

THE COVER TYPE MAP

Monte Vista Refuge

The cover type map is the vegetative inventory. As such, it is a most important tool for management and habitat evaluation.

Graham's ecological system of cover type mapping will be used as a basis for symbolically describing types. A specialized key, modified and enlarged upon for purposes and conditions at this refuge, is attached. The cover map at this refuge is intensive and in considerable detail.

The initial map will be made, unit by unit, just prior to major development of the units. It is anticipated that the entire breeding habitat on the refuge, of approximately 12,750 acres, will be cover mapped within five years, or on a schedule one year ahead of development. It is not anticipated that new cover type maps will be required more frequently than once in five years during the initial, rapid transition period of the refuge, and perhaps less frequently thereafter.

Procedure

1. A list of the equipment and materials needed is attached at the back.

2. Map with hard pencil (4-6H) directly on polytex overlays on 8" to 1 mile scale aerial photos that are carried into the field. Determined efforts should be made to obtain current aerial photos that accurately

reflect cover types at the time of mapping. Old, inaccurate aerials are practically useless, resulting in much additional time and effort in outlining types.

3. Map all types one acre or greater in size.

4. Delineate as a separate type any complex of habitat which varies from another in any significant degree (soil, management practice, change of 20 percent in density of any species recorded, species pattern, vigor, litter accumulation, etc.).

5. Map all permanent and semi-permanent water, regardless of size, and all cultural features bearing on habitat availability and use.

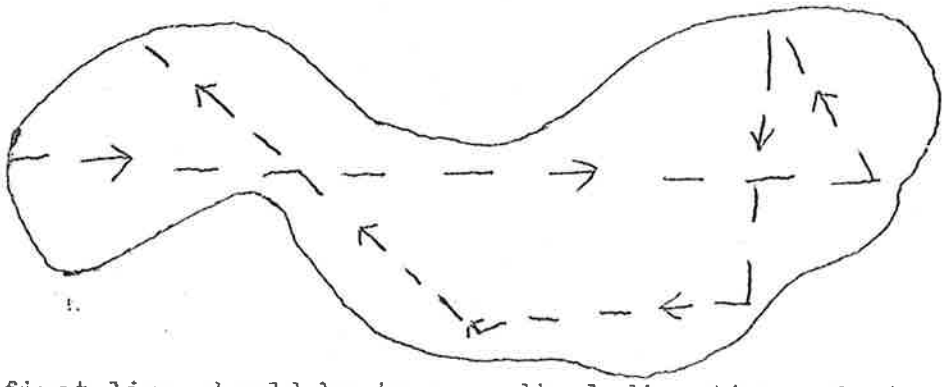
6. Tentatively outline types on the overlay sheet. Experience has shown that time can often be saved by initially delineating all types in a unit. Once all types are outlined, the composition, density, etc. of each type can be worked out.

7. Pace across a type as illustrated below until at least 100 steps have been taken in that type. In large or complex types pace an even multiple of 100 steps to obtain satisfactory information on species composition, density and pattern. In pacing, walk a straight line and pace evenly. Record what occurs in a 6" circle directly to the side of the ball of the foot at each pace, every other pace, every third pace, etc., depending on the size and complexity of the type.

A cane with a 6" wire loop at the bottom works very well. With experience the cane can be abandoned in favor of ocular estimates while pacing. In either case, record anything that occurs in a

vertical column above and below the 6" loop so that ground cover (canopy) is recorded. This is explained in greater detail a little later.

A suggested pacing method is illustrated below:



The first line should be in a cardinal direction. Pacing should then proceed in a way to pace across the type in the other direction; thence to sample remaining portions of the type until an adequate representation of the type composition is obtained. Taking 100 readings, or multiples of 100, permits ease in converting data into percentages.

Record what occurs in the 6" loop at each step as follows:

a. The Ground Cover Data Sheet (sample attached at back) is used for recording.

b. A tally counter is a convenient way to keep track of the total number of paces taken in each type.

c. If one live plant species is found within the loop at a given recording point, it is allotted a "Whole" rating on the data sheet. If two live species are represented, each is given a "Half" rating, and so forth for "Third" and "Fourth". If no live understory plants

occur within the loop, write "Bare" (for bare ground and debris) in the column under "Plant Species" and give it a "Whole" rating. Bare ground and debris are recorded as such only when no live plants fall within the 6" circle.

d. Because shrubs and trees represent overstory and should, therefore, be considered separately from understory cover of grasses, annuals and emergents, they should be allotted a "Whole" rating each time they occur within the 6" loop. This will, of course, mean that in types where shrubs and trees occur, the summation of the totals of all species in the type (last column of data sheet) will exceed 100%.

e. In the case of dead shrubs and other dead, erect, rigid plants which function as overstory cover (greasewood, sagebrush, willow, sweet-clover), record them as plants, but keep a separate tally of them on your data sheet as an aid in determining the vigor of the stand.

f. Examples: Should the loop encompass live Juncus and live Eleocharis, each of these will be given a rating of "Half". Should the loop encircle live Juncus, live Eleocharis, and live greasewood, the first two would receive ratings of "Half", and the greasewood would be tallied as "Whole". If, however, the greasewood is dead, record it separately under the "Whole" column. If the loop catches two overstory species, such as greasewood and rabbitbrush, rate each "Half" and proceed as outlined above with for whatever understory might be present. If there is no understory, give a "Whole" rating opposite "Bare.

In water areas where depths are too great to wade, determine species

composition, density and pattern by boat, using either set distances or time intervals between measurements.

During the pacing there will be an additional opportunity to determine whether each tentative type represents one type, or whether it should be broken down into two or more types.

8. With firm type lines established, proceed to describe each type, using the attached Cover Mapping Key and the Type Formula Data Sheet to modify Graham's basic procedure.

Explanation of these symbols follow:

a. Type Number - The type number is in two parts. The first gives the unit in which the type occurs. The second part identifies the particular type numerically.

b. Type Prefix - The Type Prefix is designed to give a rapid indication of the general classification of the type. The first capital letter(s) immediately designates the type as upland (A or P), or marsh (MS), and in the case of upland types this first letter tells whether the soil is non-porous (A) or porous (P). Transition types (T) are used for very unstable areas where rapid ecological changes are taking place. On the Monte Vista Refuge this usually occurs where water is regularly but recently, spread across uplands which have never (or for a long period of time) received surface water. When this happens, a type emerges for a short period of time which is neither an upland or a marsh type, and is, therefore, designated as a Transition

type (T).

The numbers indicate the stage in succession of the type and closely follow Graham's classification. Between the capital letters and the numbers are placed, as subletters, the symbols to designate the Management Practices (or disturbances) which have been applied to the type. The list shown on the Cover Mapping Key may be enlarged upon to depict conditions not given if Graham's eclogical approach is adherred to.

c. Type Acreage - The acreage column can be left blank for later calculation in the office.

d. Plant Species - To accomodate all who might use this vegetative inventory, identify plants both by their common and scientific names. The common name can be written out. The scientific name should be abbreviated to include three letters, the first letter of the Genus in upper case and the first two letters of the Species in lower case, as follows:

Typho latifolia = Tla

Juncus balticus = Jba

A list of the more important and common species on the refuge is attached.

e. Growth Density - This column is to express the density of a stand (composed of one species) that occurs in a type. For instance, a type may include several spotty stands of Juncus. The symbols used in this column describe how dense the Juncus plants grow together within the spotty stands. The interpretation of density here is subjective, based on general observations throughout the refuge of how dense each

species characterstically grows.

f. Percent Density - This expression of density is the result of pacing and provides an indication to species composition and frequency. Place in this column the total for each species appearing on the Ground Cover Data Sheet. Combined with the previous column (Growth Density) and the following column (Growth Pattern), an accurate mental picture can be obtained of the density, composition, frequency and relationship to each other of each major species in a type.

g. Growth Pattern - A figure for each major species is placed in this column from the Growth Pattern sheet on the last page. A pattern is selected from the chart which most nearly corresponds with the growth characteristics of stands of each species in a type. It is possible that a combination of two patterns may most closely represent the distribution of a species in a type. Consider patterns in relation to the minimum size type to be mapped, in this case one acre, even though the type may be considerably larger. For instance, a type may encompass two acres or 40 acres. However, in determining the growth pattern of each major species, consider them in relation to one acre so that a "Large Spotty" pattern (1) will be interpreted as representing a large spotty distribution for one acre rather than for two acres or 40 acres.

h. Stand Status - This column expresses the vigor of a stand, not the individual plants. "Invading" stands are new stands made up of young immature plants. "Expanding" stands contain both immature plants and some mature ones. The stand is enlarging. A "Mature"

stand may contain some reproduction, but is stabalized and not expanding. A "Declining" stand usually contains a large portion of dead plants. Live plants are generally unthrifty. The stand is on the way out. "Dead" stands are just that. It is possible that a combination of two of the above numbers are required to properly express the status of the stand.

i. Vigor (Shrubs, Trees) - Shrubs and trees are rates as above. They are also given ratings here for the vigor and status of the individual plants within the stand. For instance, a "Mature" stand of greasewood may be made up mostly of large but straggly plants, as compared to the way greasewood usually grows. This would be rated as 3a in the column.

j. Stand Litter - This rates the amount of litter (accumulated past growth) within a stand of the species under consideration. It is a particularly useful expression for species which provide nesting cover early in the season, such as Juncus, but does not have much application for annuals and shrubs. It normally follows that a "Mature" stand of a species will contain greater amounts of litter than "invading" or "expanding" stands, unless they have been hayed, grazed or burned.

The following are examples:

Type No.	Type Prefix	Type acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh.& Tr.)	Stand Litter
19-3	Tia 7	11.2	Greasewood(Sve)	=	23	9	3	2b	0
		/	Saltgrass (Dst)	=	27	1	2	/	1
		/	Sedges (Cx)	-	18	5	12	/	2
		/	Other	/	20	/	/	/	/
		/	Bare	/	35	3	/	/	/

The type of 11.2 acres is in Unit 19 and has arbitrarily been given a number of three (3). It is dominantly a transition shrub type (7) that receives irrigation water (i), but on which are also deposits of alkali (a), indicating a shallow water table that causes capillary action. Twenty-three percent of the area is covered with mature (3) greasewood shrubs (Sve) with no accumulation of past growth (o). The plants themselves are of medium size and normal density (2b), and it is a medium dense stand (=). The distribution pattern of the greasewood is Uniform Spotty (9). The understory of the type is largely composed of saltgrass (Dst) and mixed sedges (Cx). Saltgrass density is 27% that is distributed in a Large Spotty pattern (1). Within the stand, the saltgrass is of medium density (=). The stand has been present for at least a year, but is expanding in size and density (2), from which has resulted a sparse accumulation of litter (1). Sedge density is 18% in a Tenuous pattern (5). It is rapidly invading and expanding because both immature plants and reproduction (12) are present, but is still of sparse density within the stand (-). There are medium accumulations of past growth (2). Twenty percent of the type is covered with other minor species and 35% is represented by bare ground and debris in a Small Spotty distribution pattern (3).

If irrigation water is continued in increasing amounts and distributed more evenly across the type, one can expect it to evolve into something like the following, with (Jba) representing wiregrass:

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh.& Tr.)	Stand Litter
19-3	MS 5	11.2	Wiregrass (Jba)	=	32	4	2	/	3
			Sedges (Cx)	=	32	4	12	/	2
			Saltgrass (Dst)	-	8	3	3	/	1
			Other	/	4	/	/	/	/
			Bare	/	4	3	/	/	/

9. Within each type on the overlay sheet record the following information:

a. The Type Number (first column of Type Formula Data Sheet).

b. Type Prefix (second column)

c. Acreage (last column) Acreage need not be computed in the field. It will usually be more convenient to do this work in the office after the unit has been typed. Either a planimeter or an acreage computer (SCS - 10 - L - 968) can be used.

10. When the field type map is completed, on the overlay ink type lines and symbols with black India ink.

11. With planimeter or acreage computer determine the acreage of each type. Record the acreages in the appropriate column on the Type Formula Data Sheets and within the types on the field overlay with black India ink.

12. On another overlay trace in red ink cultural features, ditches, fences, boundaries, and other physical features which have a bearing on habitat availability and use. Photo points will also be shown on

this overlay, as described later.

13. Trace the overlays onto the master type map overlays of the mosaic aerial photograph of the entire refuge.

14. Date, by month and year, both the field overlays and the master overlays in India ink in the lower right hand corner of the unit (or field overlay sheets).

15. Lightly shade in with colored pencils on master overlays both the field and the major cover types as follows:

Light blue - permanent and semi-permanent open water areas (MS 1, MS 2)

Dark green - emergent marsh (MS 4)

Light green - marsh meadows (MS 5, MS 6)

Orange - transition types (T5, T6, T7)

Brown - upland types (A1, A6, A7)

Yellow - shelterbelts and woods (A8, MS 8)

16. Using fresh Type Formula Data Sheets, copy with typewriter the formulas. Do not put the data for more than one unit on a sheet.

PHOTOGRAPHIC HABITAT INVENTORY

A photographic habitat record is an integral part of the habitat inventory and can therefore not be separated from the cover type map. It is a major tool in visually interpreting the cover type map. Neither is complete without the other.

Procedure

All photographs will be taken with the 2¼ x 2¼ Kalimar camera. Use the single lens reflex Kalimar available at the refuge. Use Kodacolor film and have film custom developed and enlarged to 5" x 5" prints.

Vegetative Type Illustrative Series

This series of photographs is designed to illustrate the components, and combinations of components, used in the type formula for describing vegetative types. It will serve to help standardize mapping between individuals and between years. It will also aid those reading the formulas by visually interpreting what was meant by the mapper.

Eventually this series will include all of the individual components shown on the Cover Mapping Key. It will also include many of the simpler and more important combinations of components. For instance, there will be photographs to show the differences between heavy (3) and very heavy, dense accumulation (4) of wiregrass (Tba) litter. There will also be photographs to show the difference between a type of emergents, sedges, upland mixed herbaceous and upland shrubs (T6) and

emergents, sedges and upland shrubs (T7). It is anticipated that this series will eventually include well over 100 photographs.

The series will not be complete for a number of years. As each unit is typed, the mapper will study the available photographs in the series from units that have been typed and photographed previously. He will then add to the series photographs which illustrate additional components, or combination of components, that he is confronted with in the unit he is typing. There also may be opportunities to substitute photos that better illustrate certain components than those already in the series.

Procedures for taking the photographs follow:

1. Use the standard 80 mm lens on the Kalimar camera and Kodacolor film.

2. Before taking the picture, mark with white chalk on a small blackboard (12" x 12") the description of the photograph.

Example: #17	#17 = Photograph number
19 - 18	19-18 = Unit and type number
Ti 67	Ti 67 = Type prefix
7/27/62	7/27/62 = Date

Place the blackboard in such a way that the writing can be clearly read in the photo yet not obscure what the picture is meant to show.

3. Photograph only under good, bright light conditions. Obtain a light reading on the light meter and select a combination of shutter speed and f stop that gives you a shutter speed of at least 1/50 of a

second and a minimum diaphragm opening (f 11, 16, or 22) so that your picture will have maximum depth of focus. Use the depth of field guide on the top of the camera lens to determine where you must place the camera to show all important elements in sharp focus. Cross lighting will generally cause vegetation to stand out better than when the light comes from behind the camera.

4. Mark the photo point on the overlay which has the cultural features, boundaries, etc. On the overlay beside the photo point identify the point by printing the information which appears on the blackboard.

5. Upon receiving the 5" x 5" enlargement, print in ink on the back of the enlargement the information you are depicting in the photo. Inked arrows or lines on the face of the photo may help to illustrate a point.

6. Trace the photo points and identifying symbols in brown ink onto the master overlay of cultural features for the entire refuge.

7. Mount prints and file negatives in accordance with procedures given below.

Unit Panoramic Photographic Series

1. The first series of these photographs will be made immediately upon completion of development in each unit. Subsequently, they will be made at the time the units are again cover mapped, and between times, if desirable.

2. These photos will give panoramic views of the units to graphically illustrate vegetative types, water, topographic features, and their

relationships to each other.

a. Photos will be taken with the Kalimar camera with 55 mm wide angle lens from a platform elevated ___ feet above ground level by means of an erectable tower mounted on a truck especially designed for this purpose.

b. A number of permanent photo points will be established in each unit to adequately illustrate the various habitat relationships that are present. Each photo point will be permanently marked by stakes, or will be located directly over identifiable permanent structures.

c. Before taking the picture, mark with white chalk on a large blackboard (3' x 4') the description of the photo.

Example: P-2-3 P = Panoramic photo series

270° - 15° 2 = Habitat Unit 2

8/5/62 3 = Photo point 3 in unit

270° = Direction of photo

15° = Degrees camera depressed from horizontal

8/5/62 = Month, day and year

Place the blackboard so it will appear in the lower portion (foreground) of the photo.

d. Take the photo with the camera mounted on a tripod to insure precision; otherwise, follow the same procedure as outlined for the previous photographic series.

e. On the cultural overlay of the aerial photo of the unit, mark and number the photo points in the manner prescribed above in brown ink.

f. Identify the various types illustrated in the 5" x 5" color enlargements by dotted lines in India ink. Identify these by their type number. Use the back of the photo for additional information.

g. Trace the overlay of the photo points in brown ink onto the same master overlay of photo points used for the Vegetative Type Illustrative Series.

Filing and Preserving Type Maps and Photographs

Special files should be set up to preserve the type maps and photographic records in an orderly and readily usuable condition. Recommended procedures follow:

1. Sub-divide the file by habitat units. File by habitat units, the field cover type map overlays, the type formula data sheets, the photo point overlays, and the unit panoramic photo series.

2. File all negatives in light resistant envelopes appropriately identified.

3. Provide a separate sheet for each unit panoramic photo point, so that as subsequent pictures are taken at each photo point, they can be mounted with the previous ones. The photo hinge (No. 121, two tab, $10.00/100 sheets, E.E. Miles Co., South Lancaster, Mass.) works well and permits 10 photos to be mounted on one sheet for rapid, quick-flip comparisons. The first photo in the series should be mounted on the bottom set of hinges.

4. Store the file at room temperature and minimum light to prolong the fidelity of the colors of the photographs.

5. Place the enlargements from the vegetative type illustrative series in protective plastic envelopes and mount them in such a way (by general type categories) that they will be readily available for reference. These should be stored as above.

(More on this later when I get the dope on a super duper mounting device I have wind of)

COVER MAPPING KEY*

Monte Vista Refuge

A 1 Non-porous, bare soil
MS 1 Open water, no aquatics (intermittent open water designated by MS$_f$ 1--- see Mgt. Practices below).
MS 2 Open water, submerged vegetation
MS 4 Emergent aquatics
MS 5 Emergents and sedges
T 5 Emergents, sedges & upland mixed herbaceous
MS 6 Mixed herbaceous
A 6 Upland mixed herbaceous on non-porous soils
T 6 Emergents, sedges and upland mixed herbaceous & shrubs
MS 7 Lowland shrubs (willows)
A 7 Upland shrubs on non-porous soils (greasewood)
T 7 Emergents, sedges and upland shrubs
MS 8 Intolerant trees (cottonwood, willow)

Management Practices (Sub-letters)

i Irrigated
f Flooded seasonally
p Pastured
h Hayed
a Alkali deposits
t Previously tilled

Density - of plants within stand, according to growth characteristics of species

- Sparse
= Medium
≡ Dense

Ground Cover (Canopy)

Of species in type
Express as percent of type covered by this species.

Species Growth Pattern

See attached sheet for examples

1 Large spotty
2 Block
3 Small spotty
4 Mixed spotty (Tenuously spotty)
5 Tenuous
6 Uniform scattered
7 Spotty scattered
8 Mixed spotty scattered
9 Uniform spotty

Stand Status

1. Invading
2. Expanding
3. Mature
4. Declining (decadent)
5. Dead

Vigor (Shrubs & Trees)

Average Size/plant
1. Small
2. Medium
3. Large

Average Density/shrub
a. Sparce
b. Moderate
c. Dense

Stand Litter - Characteristic of Species

0 None
1 Sparse
2 Medium
3 Heavy
4 Very heavy, dense accumulation

* Adapted from Graham, S.A., 1948, "Ecological Classification of Cover Types", Jour. Wildl. Mgt., 9:182-190. Also see Mosby, Henry S., 1960, "Manual of Game Investigational Techniques", 4:2 - 4:5, The Wildlife Society.

Vegetative Type Mapping

Partial List of Species Symbols

Monte Vista Refuge

Raq	Ranunculus aquatilis	Buttercup
Fpe	Potamogeton pectinatus	Sago Pondweed
Zpa	Zannichellia palustris	Horned Pondweed
Chx	Chara species	Muskgrass
Tla	Typha latifolia	Cattail
Sva	Scirpus validus	Softstem Bulrush
Sac	Scirpus acutis	Hardstem Bulrush
Jba	Juncus balticus var. littoralis	Miregrass
Ex	Eleocharis species	Spikerush species
Cx	Carex species	Sedge
Dst	Distichlis stricta	Saltgrass
Hju	Hordeum jubatum	Foxtail Barley
Gx	Grass species (other than listed)	
Wx	Weed species (other than listed)	
Car	Cirsium arvense	Canadian Thistle
Mof	Melilotus officinalis	Sweetclover
Ksc	Kochia scoparia	Kochia weed
Sx	Salix species	Willow
Sve	Sarcobatus vermiculatus	Greasewood
B	Bare ground and debris	

x - indicates species

Equipment, Supplies & Materials
for Vegetative Type Mapping

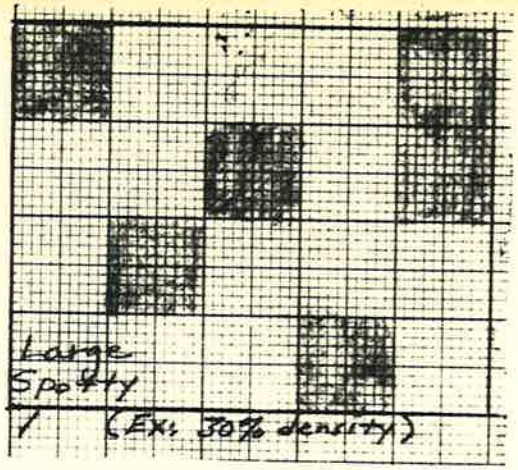
Field

Aerial photos, 8" = 1 mile
Polytex overlay sheets
Protective cover for photos and overlays
Mapping instructions and legend
Ground Cover Data Sheets
Plant Formula Data Sheets
Field notebook
Acreage computer (SCS - 10 - L - 968)
Masking tape
4-6H pencils
Magnetic compass
6" loop with handle
Tally counter
Kalimar camera with Kodacolor film
Light meter
12" x 12" blackboard
White chalk
Blackboard eraser

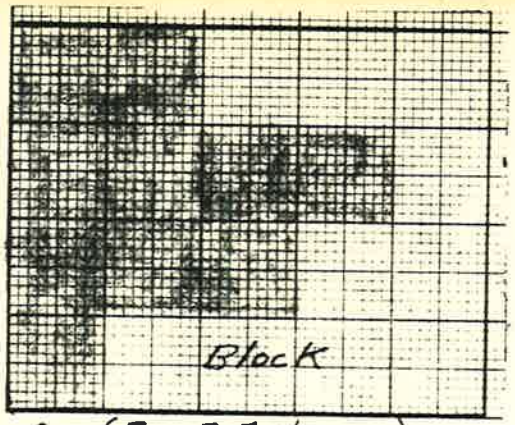
Office

Aerial photo mosaic of refuge, 8" to 1 mile scale
36" wide polytex overlay sheets
Rapidograph inking pens, sizes 00, 0, and 1
India ink - black, red and brown
Post ink eraser for polytex overlays
Planimeter or acreage computer (SCS - 10 - L - 968)
Color pencils
Straightedge
File cabinet, folders, negative envelopes & Plastic print holders

50x50

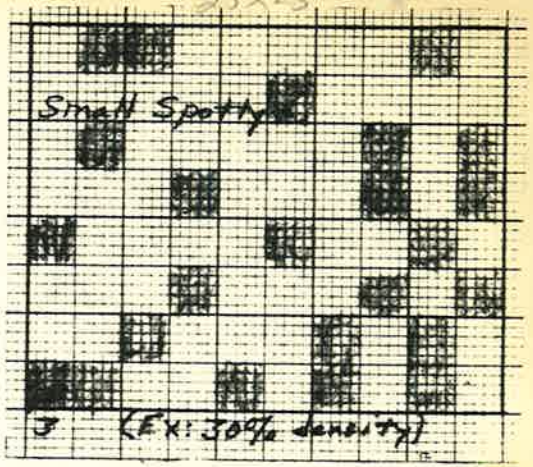


1 (Ex: 30% density)

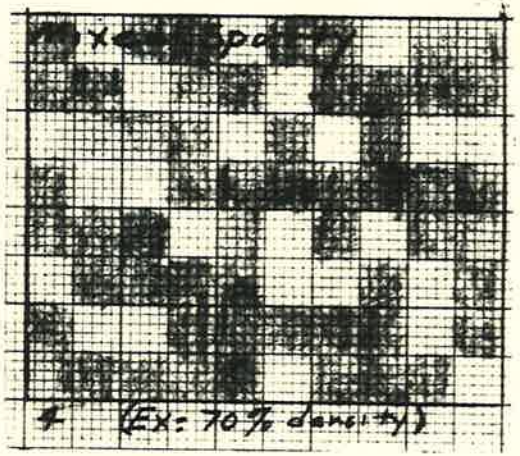


2 (Ex: 50% density)

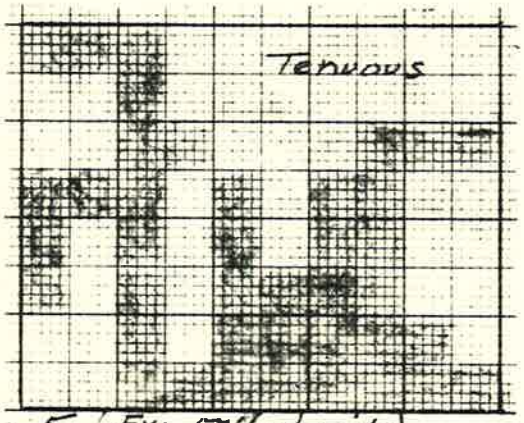
25x25



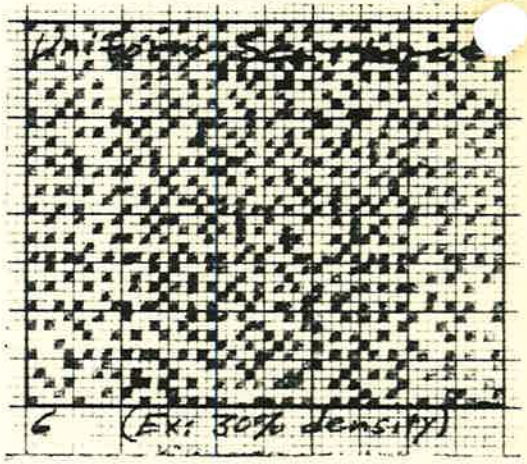
3 (Ex: 30% density)



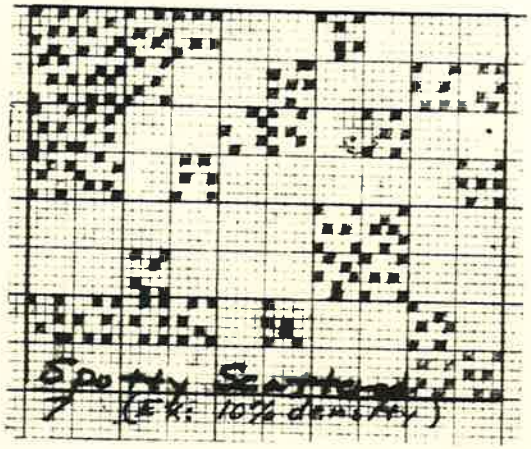
4 (Ex: 70% density)



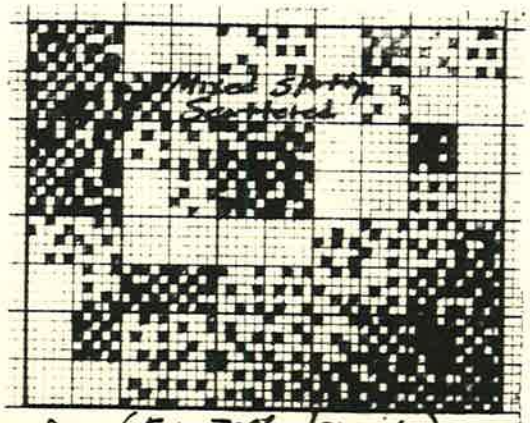
5 (Ex: 50% density)



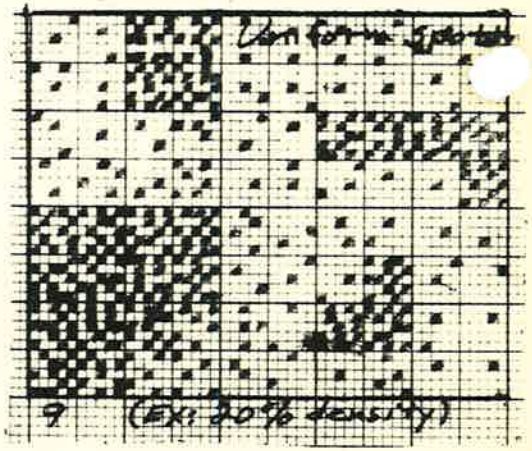
6 (Ex: 80% density)



7 (Ex: 10% density)

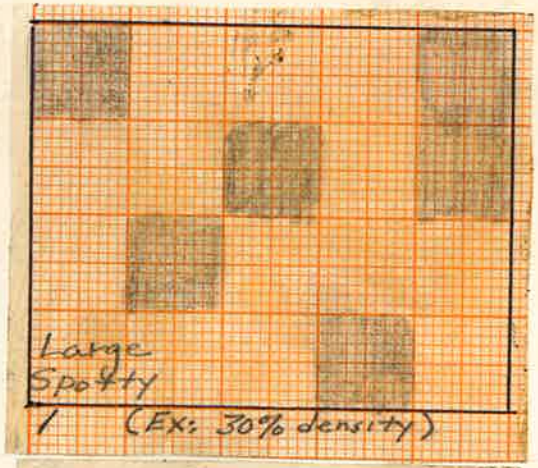


8 (Ex: 30% density)

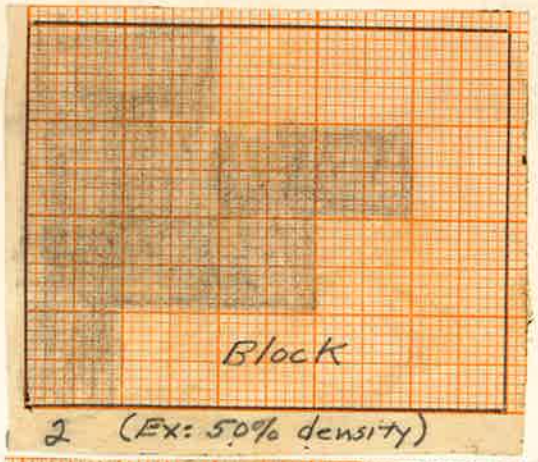


9 (Ex: 20% density)

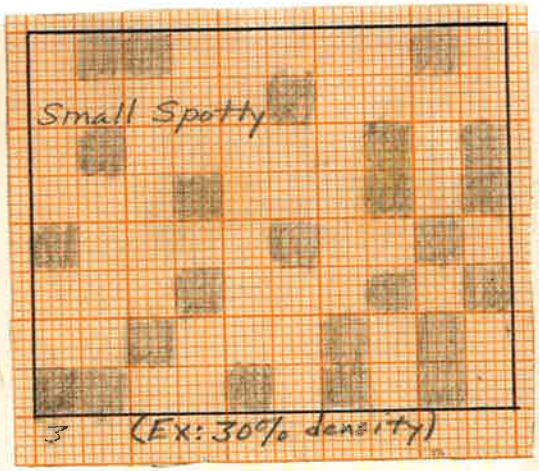
21



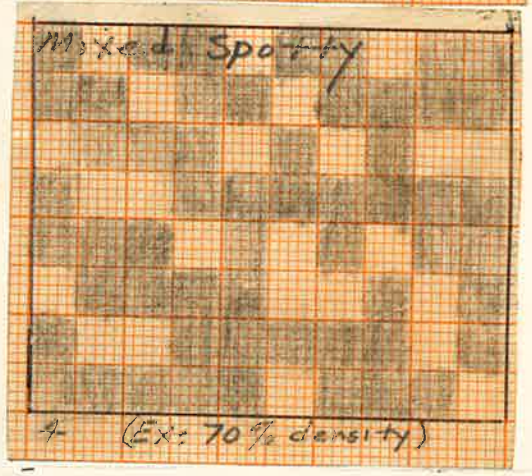
1 (Ex: 30% density)



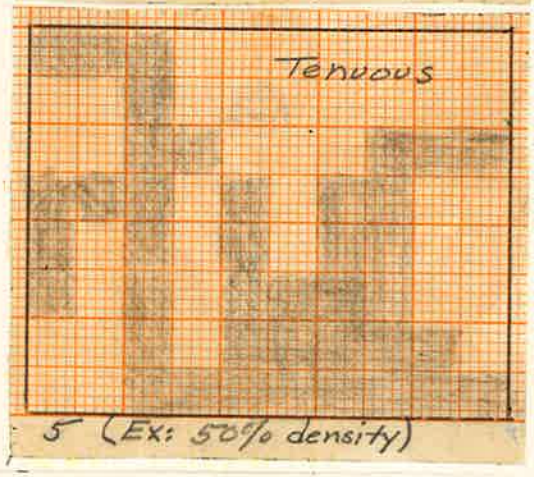
2 (Ex: 50% density)



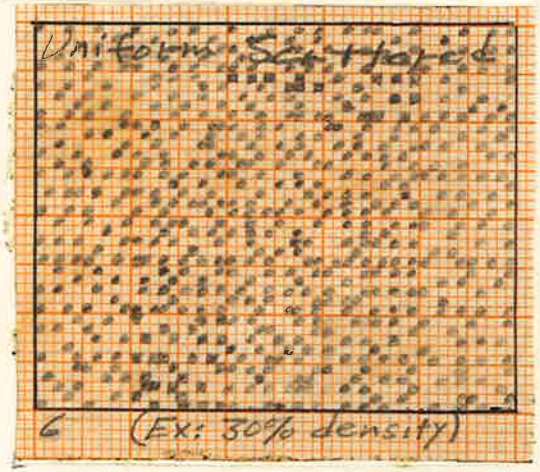
3 (Ex: 30% density)



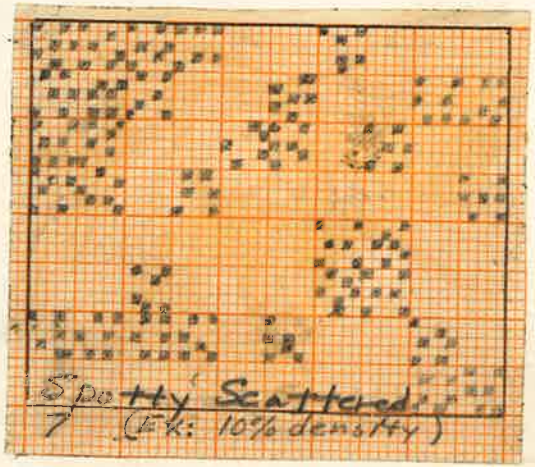
4 (Ex: 70% density)



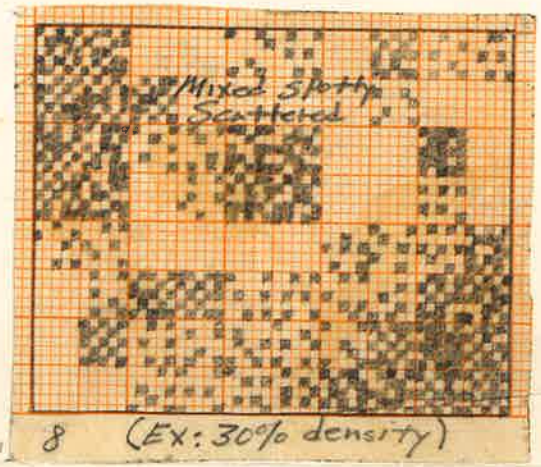
5 (Ex: 50% density)



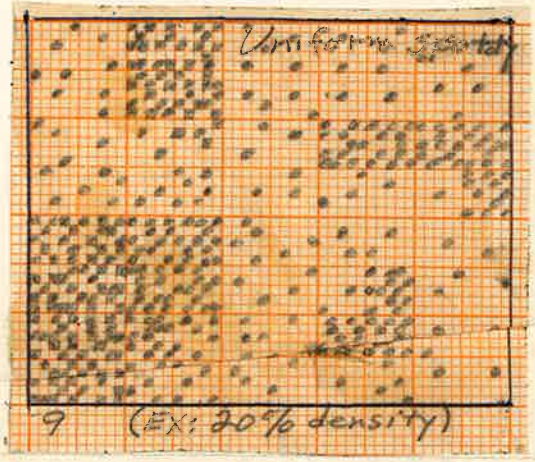
6 (Ex: 30% density)



7 (Ex: 10% density)



8 (Ex: 30% density)



9 (Ex: 20% density)

OPTIONAL FORM NO. 10

UNITED STATES GOVERNMENT

Memorandum

TO : Wildlife Management Biologist,
Monte Vista Refuge, Monte Vista, Colorado

DATE: September 13, 1962

FROM : Chief, Section of Wildlife Management,
Branch of Wildlife Refuges

SUBJECT: Vegetative cover type mapping procedure

I have reviewed and given some thought to the cover type mapping procedure transmitted by your memorandum of August 20. It is good to see a fresh approach used to find a practical answer to such a potentially valuable management tool. The cover map procedure outlined in section 3127 of the Wildlife Refuges Manual is not much used at the present time, presumably because it is not filling the need; consequently, any effort you make to increase the usefulness of cover mapping is well expended.

I do not have any major suggestions to make of the procedure outlined at this point. Discovering better cover mapping methods is largely a matter of trial, error, and persistent effort. It would, of course, be very helpful if the method you finally adopt for Monte Vista can be adapted to other life zones and regions, and I know you have this in mind. It is confusing to have such specialized cover type legends that refuge managers cannot interpret maps other than of their own areas, so a universal language of hieroglyphics is a very worthwhile objective. The possibility of arriving at a standardized universal legend, using some of S. A. Graham's criteria, would be a large step forward. I am sure you recognized this in attempting to adopt his method to your needs.

It will be interesting to follow the use of standardized photographs in cover type interpretation. Trimming the 5" x 5" format to $3\frac{1}{2}$" x 5" would have an advantage in that it would be possible to mount two on an 8 x 10-inch sheet of paper, if this offered any advantage. Also, rather than describe the camera depression angle using the horizon as a basis, as outlined in 1(c) Unit Panoramic Photographic Series, it might be better to indicate the amount of sky to be included in the photograph, say one-fourth of an inch for example. Otherwise, when photographing habitat on a slope, more or less ground cover than desired might be included if the horizon is used as the governing criterion.

Have you thought of graphing the information which will be contained in the Type Formula Data Sheet, i.e., converting the mass of data on the sheet to representative scale? If applicable criteria were worked out, graphing would provide a visual instead of numerical index which might complement or replace the photographic section.

All in all, it appears that you are making good progress in using a fresh and imaginative approach to cover mapping problems. I will be interested in following the progress of this project.

Win Banko

Winston E. Banko

cc:
Regional Director, Albuquerque, New Mexico

September 13, 1962

Wildlife Management Biologist,
Monte Vista Refuge, Monte Vista, Colorado

Chief, Section of Wildlife Management,
Branch of Wildlife Refuges

Vegetative cover type mapping procedure

I have reviewed and given some thought to the cover type mapping procedure transmitted by your memorandum of August 20. It is good to see a fresh approach used to find a practical answer to such a potentially valuable management tool. The cover map procedure outlined in section 3127 of the Wildlife Refuges Manual is not much used at the present time, presumably because it is not filling the need; consequently, any effort you make to increase the usefulness of cover mapping is well expended.

I do not have any major suggestions to make of the procedure outlined at this point. Discovering better cover mapping methods is largely a matter of trial, error, and persistent effort. It would, of course, be very helpful if the method you finally adopt for Monte Vista can be adapted to other life zones and regions, and I know you have this in mind. It is confusing to have such specialized cover type legends that refuge managers cannot interpret maps other than of their own areas, so a universal language of hieroglyphics is a very worthwhile objective. The possibility of arriving at a standardized universal legend, using some of S. A. Graham's criteria, would be a large step forward. I am sure you recognized this in attempting to adopt his method to your needs.

It will be interesting to follow the use of standardized photographs in cover type interpretation. Trimming the 5" x 5" format to 3½" x 5" would have an advantage in that it would be possible to mount two on an 8 x 10-inch sheet of paper, if this offered any advantage. Also, rather than describe the camera depression angle using the horizon as a basis, as outlined in 1(c) Unit Panoramic Photographic Series, it might be better to indicate the amount of sky to be included in the photograph, say one-fourth of an inch for example. Otherwise, when photographing habitat on a slope, more or less ground cover than desired might be included if the horizon is used as the governing criterion.

Have you thought of graphing the information which will be contained in the Type Formula Data Sheet, i.e., converting the mass of data on the sheet to representative scale? If applicable criteria were worked out, graphing would provide a visual instead of numerical index which might complement or replace the photographic section.

All in all, it appears that you are making good progress in using a fresh and imaginative approach to cover mapping problems. I will be interested in following the progress of this project.

Winston E. Banko

cc:
Regional Director, Albuquerque, New Mexico

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

BUREAU OF SPORT FISHERIES AND WILDLIFE

TO : Wildlife Biologist
Monte Vista, Colorado

DATE: September 7, 1962

FROM : Regional Supervisor, Branch of Wildlife Refuges
Albuquerque, New Mexico

2-R

SUBJECT: Vegetative Cover Type Mapping Procedure

We appreciate receiving a copy of your August 20 memorandum to Winston E. Banko in Washington.

Most of the persons in this Refuge Branch and Mr. Krummes have reviewed your proposed type mapping procudure. We feel that in the first place, there is a misunderstanding as to the purpose of this survey. In a true sense, it is not a vegetative type cover map but it is to be used in order that the change to vegetative cover can be ascertained. Most of us are very much in favor of your experiment. Mr. Krummes stated that he felt it was too complicated. Personally, I like it very much but feel that as previously stated, all this work should be tied to definite objects if at a later date we hope to realize the fruits from your efforts. We feel that this is so important on the Monte Vista Refuge where you have a change of cover from the greasewood type to sage type.

It will be interesting to know the Washington Office's reaction to this proposal.

George E. Barclay

FISH & WILDLIFE SERVICE
Monte Vista Refuge

SEP 10 1962

RECEIVED

Winston E. Banko, Staff Biologist
Branch of Wildlife Refuges
Bureau of Sports Fisheries and Wildlife
Washington 25, D. C.
Wildlife Management Biologist
Monte Vista Refuge, Box 566
Monte Vista, Colorado
Vegetative Cover Type Mapping Procedure

August 20, 1962

When Ray Erickson was here on a visit a couple of months ago, he mentioned that you were reviewing and exploring cover mapping procedures with the thought that perhaps some standardized method might be developed that would be applicable to most waterfowl refuges.

We have been tinkering with the same problem. We have a number of refuges on which we very much want a pre-development inventory for purposes of later comparison and evaluation. Enclosed is a copy of the stage where we are now in this pursuit. This procedure is being used at Quivira, Monte Vista and Ouray refuges this summer. The graduate student at Ouray is using this procedure as a basis for his master's thesis. He will compare this method with the others available and attempt to determine if this one, a modification of it, or an entirely different one will do the job best.

The enclosed was developed after review of literature available to us. There are, of course, a number of ways to measure environment, but it seemed to us that none of these was designed for use on waterfowl areas where edge, interspersion and the quality of vegetation are so important. As you will note, it is an attempt to express habitat as graphically as possible so that the results will be readily useable by refuge managers, and others, without having to wade through a mass of data. For this reason, we have relied heavily on photographs and visual expressions. As I see it, the weakness of this approach is that it depends more on subjective interpretation than is desirable, but we have been unable to overcome this objection without sacrificing usability.

Your critical review and suggestions on this procedure will be much appreciated. I am sure that it still has a long ways to go before it will do the job we want it to.

Robert M. Ballou

Enclosure
cc: Regional Director

Regional Director
Bureau of Sports Fisheries and Wildlife
Box 1306, Albuquerque, New Mexico
Wildlife Management Biologist
Monte Vista Refuge, Box 566
Monte Vista, Colorado
Cover Type Mapping Procedures

August 9, 1962

On August 3, I submitted a memorandum to you which transmitted a cover type mapping procedure we are designing for use at Monte Vista, Quivira, Ouray and perhaps other refuges. In that memorandum I failed to mention that during Mr. Erickson's recent visit, we discussed this subject. He reported that Win Banko has been concerned with this same problem and is working towards a procedure that might be applicable for this type of work on all refuges.

If you agree, I would like to send him a copy of our cover mapping procedure for whatever use he can make of it, and possibly for what suggestions he might have that would improve our method.

Robert M. Ballou

In duplicate

UNITED STATES GOVERNMENT

Memorandum

TO : Regional Director
Bureau of Sports Fisheries and Wildlife
Box 1306, Albuquerque, New Mexico

DATE: August 3, 1962

FROM : Wildlife Management Biologist
Monte Vista Refuge
Box 566, Monte Vista, Colorado

SUBJECT: Cover Type Mapping Procedure

Attached is the latest version of the Cover Type Mapping Procedure that is currently in use at Monte Vista, Quivira and Ouray. You may have already received some reprocussions on the earlier version.

This procedure is a home-grown product, an outgrowth of my dissatisfaction with any S.O.P. method used by any agency, including the Bureau. I feel strongly that none of the other methods have attempted to analyze habitat in terms of the components of the habitat which are important to waterfowl. The attached may yet leave much to be desired, but it is workable and it will give us a pretty good idea of what an area looks like at the time it was mapped.

Rather than delve into an explanation of each paragraph, which may be needed, I will say no more and await the comments of anyone wishing to plow through it. It should be kept in mind, however, that cover mapping is only a part of the habitat inventory, trend and evaluation we hope to do here at Monte, and probably elsewhere too.

If you have received the outline for the graduate study at Ouray you have probably noticed that a portion of the study will be devoted to comparing the attached cover mapping procedure with other known methods. I can't say for sure because I haven't yet received a study outline, but that was the idea when I left Ouray. It should make a good study and should either improve on this procedure or provide us with a better one.

Robert M. Ballou

Attachments

THE COVER TYPE MAP

The cover type map is the vegetative inventory. As such, it is a most important tool for management and habitat evaluation.

Graham's ecological system of cover type mapping will be used to symbolically describe types. A specialized key, modified and enlarged upon for purposes and conditions at this refuge, is attached. The cover map at this refuge is intensive and in considerable detail.

The initial map will be made, unit by unit, just prior to major development of the units. It is anticipated that the entire breeding habitat on the refuge, of approximately 12,750acres, will be cover mapped within five years, or on a schedule one ye r ahead of development. It is not anticipated that new cover type maps will be required more frequently than once in five years during the initial, rapid transition period of the refuge, and perhaps less frequently thereafter.

Procedure

1. Map directly on polytex overlays on 8" to 1 mile scale aerial photos that are carried into the field. Efforts should be made to obtain current aerial photos that accurately reflect cover types at the time of mapping.

2. Map all types one acre or greater in size.

3. Delineate as a separate type any complex of habitat which varies from another in any significant degree (soil, management practice, change of 20% in density of any species recorded, species pattern, vigor, litter accumulation, etc).

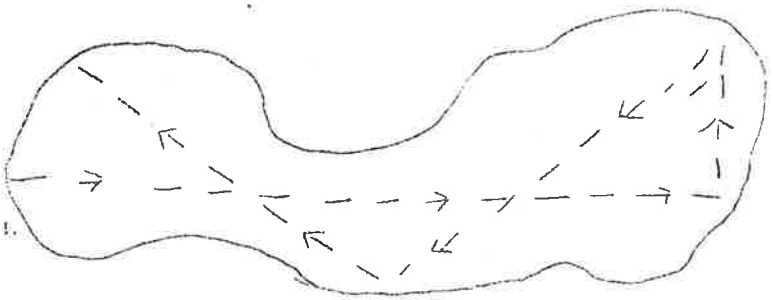
4.

4. Map all permanent and semi-permanent water, regardless of size, and all cultural features bearing on habitat availability and use.

5. Tentatively outline types on overlay sheet.

ground cover

6. Pace across a type as illustrated below until at least 100 steps have been taken in that type. In large or complex types pace an even multiple of 100 steps to obtain satisfactory information on species composition, density and pattern. In pacing, walk a straight line and pace evenly. Each time your foot comes down, record what occurs in a ¼" circle directly in front of your toe. This will be a plant species, litter, bare ground, or a combination of two or more of these. A suggested pacing method is illustrated below:



The first line should be in a cardinal direction. Pacing should then proceed in a way to pace across the type in the other direction; thence to sample remaining portions of the type. Pacing should continue until 100 steps, or an even multiple of 100 have been taken, thus permitting ease in converting data into percentages.

In water areas where depths are too great to wade, determine species com osition, density and pattern by boat, using either set distances or time intervals between measurements.

During the pacing there will be an opportunity to determine whether each tentative type represents one type, or whether it should be broken down into two or more types.

7. With firm type lines established, proceed to describe each type, using the attached cover mapping symbols to modify Graham's basic procedure. [In recording the species growth pattern, consider the pattern in relation to the minimum size type to be mapped, in this case one acre, even though the type may be considerably larger.] The following

are examples:

$$A_{ia}\,7\ \frac{Gw\ {}^{23-9}_{3-0}}{D^{=12-1}_{2-1}\ Sg\ {}^{-18-5}_{12-2}\ O^{20}}\ B^{35-3}$$

This is dominantly a shrub type (7) on non-porous soil (A) that receives irrigation water (i), but on which are also deposits of alkali (a), indicating a shallow water table that causes capillary action. 23% of the area is covered with mature (3) greasewood shrubs (Gw) with no litter (o). The distribution pattern of the greasewood is Uniform Spotty (9). The understory of the type is largely composed of saltgrass (D) and mixed sedges (Sg). Saltgrass density is 12% that is distributed in a Large Spotty pattern (1). Within the stand, the saltgrass is of medium density (=). It is in a vigorous, expanding condition (2) from which has resulted a sparse accumulation of litter (1). Sedge density is 18% in a Tenuous pattern (5). It is increasing because both vigorously expanding plants and reproduction (12) are present, but is still of sparse density within the stand (-). There are medium accumulations of past growth (2). Twenty percent of the type is covered with other minor species (O), and 35 percent is represented by bare ground (B) in a Small Spotty distribution pattern (3).

If irrigation water is increased and distributed more evenly across the type, one can expect it to evolve into something like the following, with (J) representing wiregrass:

$$MSi\,5\ J^{=32-4}_{2-3}\ Sg\ {}^{=56-4}_{12-2}\ D^{-8-3}_{3-1}\ O^{4}\ B^{4-3}$$

8. When the field type map is completed, ink it with black India ink.

9. Trace the field type map overlay onto the master cover type map overlay of the mosaic aerial photograph of the entire refuge.

10. Lightly shade in with colored pencils the major cover types as follows:

- Light blue - permanent and semi-permanent open water areas
- Dark green - emergent marsh

Light green - marsh meadows (emergents and sedges)
Orange - upland types (greasewood, mixed herbaceous)

PHOTOGRAPHIC HABITAT INVENTORY

A photographic habitat record is an integral part of the habitat inventory and can therefore not be separated from the cover type map. It is a major tool in visually interpreting the cover type map. Neither is complete without the other.

Procedure

All photographs will be taken with a 2¼ x 2¼ camera with a _____ mm wide angle lens. Preferably use the single lens reflex Kalimar available at the refuge. Use Kodacolor film and have film custom developed and enlarged to 5" x 5" prints.

Individual Vegetative Type Photographic Series

1. This series of phtographs will be made while each unit is being cover mapped.

2. Photograph all major types:
   a. Types which occupy a major portion of the unit.
   b. Types which are important becasue they represent important waterfowl breeding habitat, or becaune they are undergoing rapid ecological changes.
   c. Transition areas between types which are undergoing rapid vegetational changes.

3. Before taking the picture, mark with white chalk on a small blackboard (12" x 12") the description of the photograph.

Example: V-18-6	V	= Vegetative type photo series
120°	18	= Habitat unit 18
7/20/62	6	= Photo point #6 in unit
	120°	= Direction of photo
	7/20/62	= Month, day and year.

Place the blackboard about 10 feet in front of the camera.

41 Hold the camera at waist level and take the picture in such a way as to depict the details of the type in the foreground (3' to 5' from the photo point) and the generalities of the type in the background. Only the edge of the horizon should show at the top of the photo. If the camera is focused at approximately ____ feet and the picture is taken on a bright day with shutter speed of 1/50 or 1/60 of a second, and appropriate f stop, a sharp representation of both foreground and background will result.

5. On an overlay of the field aerial photo of the unit, mark and number the photo point and the direction in degrees of the photograph as follows: V-18-6-120°. In a notebook describe the type photographed as it is described on the cover type map. Make any other notes on wildlife use, etc, that are pertinent.

6. When you receive the 5" x 5" colored enlargements, on each copy in ~~India~~ ink the symbols of the type on the back of the print. On the face of the print outline with a dotted line the boundaries of the subject type if more than one type is shown.

7. Trace the overlay of the photo points onto a master overlay of the mosaic aerial photograph of the entire refuge.

8. File negatives and prints in accordance with procedures given below.

9. Although these photo points are not permanently staked, the above procedures will permit returning to the same location when the unit is again cover mapped, or inbetween times if desirable.

Unit Panoramic Photographic Series

1. The first series of these photographs will be made immediately upon completion of development in each unit. Subsequently, they will be made at the time the units are again cover mapped, and inbetween times if desirable.

2. These photos will give panoramic views of the units to graphically illustrate vegetative types, water, topographic features, and their relationships to each other.

a. Photos will be taken from a platform elevated _____ feet above ground level by means of an erectable tower mounted on a truck especially designed for this purpose.

b. A number of permanent photo points will be established in each unit to adequately illustrate the various habitat relationships that are present. Each photo point will be permanently marked by stakes, or will be located directly over identifiable structures.

c. Before taking the picture, mark with white chalk on a large blackboard (3' x 4') the description of the photo.

Example: P-2-3	P	= Panoramic photo series
270°-15°	2	= Habitat Unit 2
8/5/62	3	= Photo point #3 in unit
	270°	= Direction of photo
	15°	= Degrees camera depressed from horizontal
	8/5/62	= Month, day and year

Place the blackboard so it will appear in the lower portion (foreground) of the photo.

d. Take the photo with the camera mounted on a tripod to insure precision; otherwise follow the same procedure as outlined above, except that the focus should be set at infinity.

e. On an overlay of the aerial photo of the unit, mark and number the photo points in the manner preseribed above.

f. Identify the various types illustrated in the 5" x 5"

color enlargements by dotted lines in India ink. Number these, and on the back of the photo describe each type using the same symbols as used for cover mapping.

g. Trace the overlay of the photo points onto the same master overlay of photo points used for the Individual Vegetative Type Photo Series.

Filing and Preserving Photographic Records

A special file should be set up to preserve the photographic records in an orderly and readily usuable condition. Recommended procedures follow:

1. Sub-divide the file by habitat units. File the Field Cover Type Maps overlays, the Individual Vegetative Type Photo Series, the Unit Panoramic Photo Series, and the photo point overlays by habitat units.

2. Protect each color enlargement with a transparent plastic envelope. File all negatives in light resistant envelopes appropriately identified.

3. Provide a separate folder for each photo point, so that as subsequent pictures are taken at each photo point, they can be mounted with the previous ones (Forest Service quick flip method).

4. Store the file at room temperature and minimum light to prolong the fidelity of the colors of the photographs.

COVER MAPPING SYMBOLS*

Monte Vista Refuge

A 1 Non-porous, bare soil
MS 1 Open water, no aquatics (intermittent open water designated by MS_f 1 --- see Mgt. Practices below.
MS 2 Open water, submerged vegetation
MS 4 Emergent aquatics
MS 5 Emergents and sedges
MS 6 Mixed herbaceous
A 6 Upland mixed herbaceous on non-porous soils
MS 7 Lowland shrubs (willows)
A 7 Upland shrubs on non-porous soils (greasewood)
MS 8 Intolerant trees (cottonwood, willow)

Management Practices (sub-letters)

i Irrigated
f Flooded seasonally
p Pastured
h Hayed
a Alkali deposits
t Previously tilled

Partial List of Species Symbols

B Ranunculus (Buttercup)
Sa Sago pondweed
Z Horned pondweed
Ch Chara
C Cattail
Bl Bulrush
J Juncus
E Eleocharis
Sg Sedges
D Saltgrass
F Foxtail
G Mid-grasses
W Weeds
CT Canadian thistle
Sc Sweetclover
K Koshia weed
Sl Willows
Gw Greasewood

O Other species
B Bare ground

Density - of individual plants within stand, according to growth characteristics of species (Exponential)

\- Sparse
= Medium
≡ Dense

Density - of species in type (first exponential number)

Express as percent of type covered by this species.

Species Growth Pattern (second exponential number)

See attached sheet for examples

1 Large spotty
2 Block
3 Small spotty
4 Mixed spotty
5 Tenuous
6 Uniform scattered
7 Spotty scattered
8 Mixed spotty scattered
9 Uniform spotty

Species Vigor (first sub-number)

1 Reproduction
2 Vigorously expanding
3 Mature
4 Declining (decadent)
5 Dead

Species ~~Litter~~ Accumulation - characteristic of species (second sub-number)

0 None
1 Sparse
2 Medium
3 Heavy
4 Very heavy, dense accumulation

* Adapted from Graham, S. A., 1945, "Ecological classification of cover types", Jour. Wildl. Mgt., 9:182-190.

(Ex: 90% density)
(Ex: 75% density)
(Ex: 50% density)
(Ex: 30% density)

TYPE FORMULA DATA SHEET

Unit No. ____________

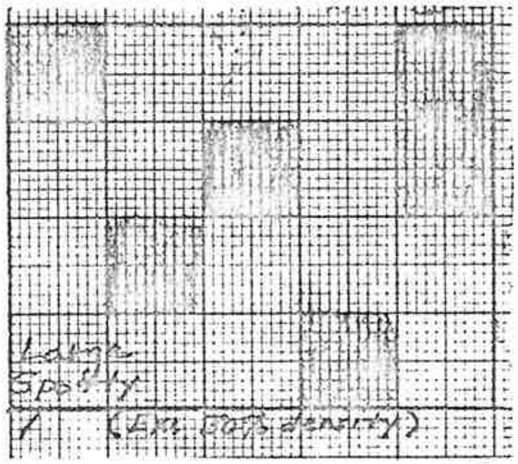
Mapper ____________

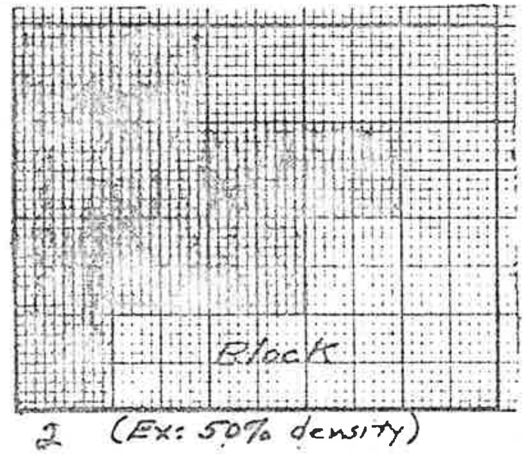
Date ____________
(Month & Year)

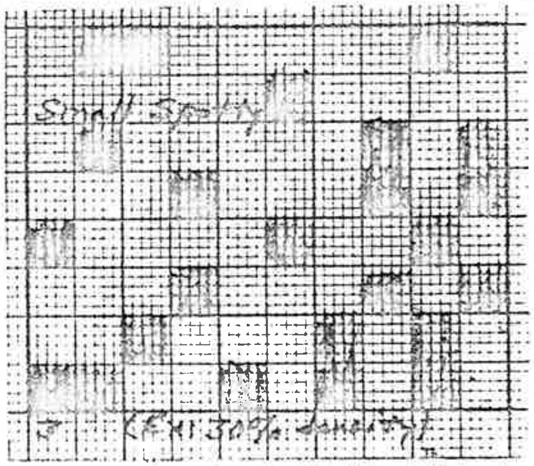
Type No.	Type Prefix	Type Acre-age	Plant Species	Growth Den-sity	% Den-sity	Growth Pat-tern	Stand Sta-tus	Vigor (Sh.& Tr.)	Stand Lit-ter

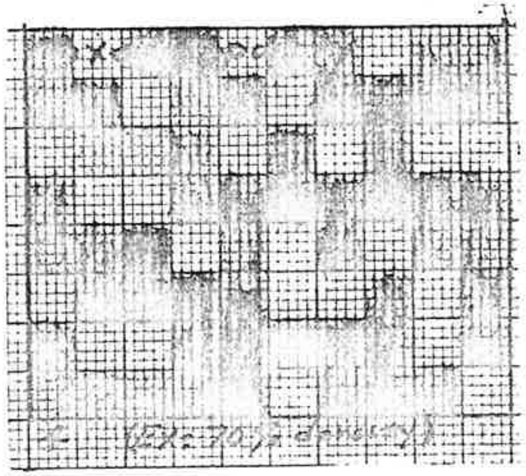
GROUND COVER DATA SHEET

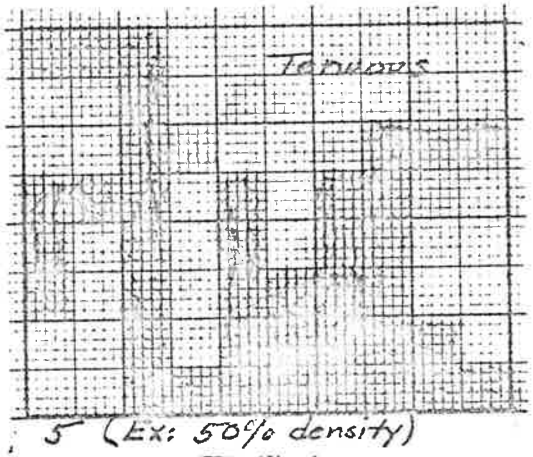
PLANT SPECIES	OCCURRENCE				TOTAL
	Whole	Half	Third	Fourth	

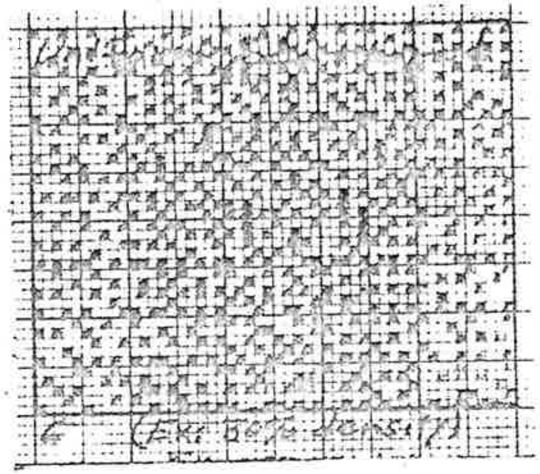

Large Spotty
1 (Ex: 50% density)

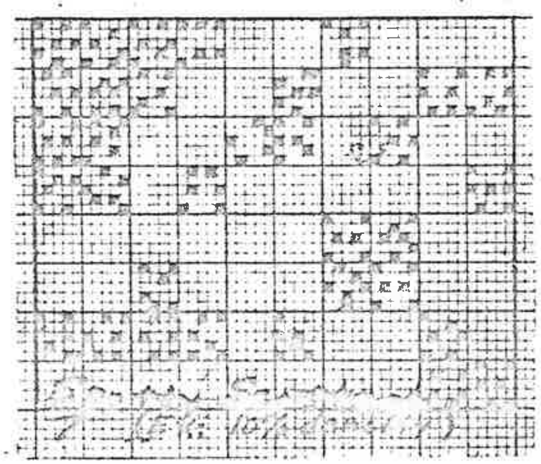

Block
2 (Ex: 50% density)

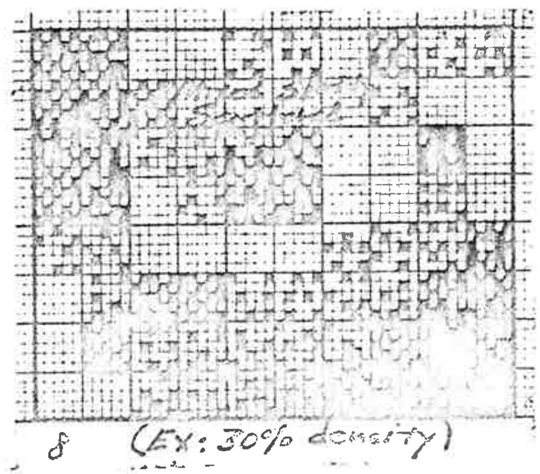

Small Spotty
3 (Ex: 30% density)

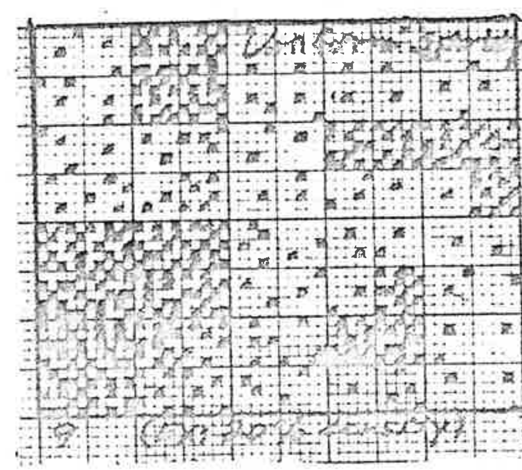



Tenuous
5 (Ex: 50% density)






8 (Ex: 30% density)



Equipment, Supplies & Materials
for Vegetative Type Mapping

Field

Aerial photos, 8" = 1 mile
Polytex overlay sheets
Protective cover for photos and overlays
Mapping instructions and legend
Ground Cover Data Sheets
Plant Formula Data Sheets
Field notebook
Acreage computer (SCS - 10 - L - 968)
Masking tape
4-6H pencils
Magnetic compass
6" loop with handle
Tally counter
Kalimar camera with Kodacolor film
Light meter
12" x 12" blackboard
White chalk
Blackboard eraser

Office

Aerial photo mosaic of refuge, 8" to 1 mile scale
36" wide polytex overlay sheets
Rapidograph inking pens, sizes 00, 0, and 1
India ink - black, red and brown
Post ink eraser for polytex overlays
Planimeter or acreage computer (SCS - 10 - L - 968)
Color pencils
Straightedge
File cabinet, folders, negative envelopes & Plastic print holders

Vegetative Type Mapping

Report of Wildlife Management Study: Final Report (Leslie F. Beaty, Student Trainee)

1 duplicate

REPORT OF

WILDLIFE MANAGEMENT STUDY

Final Report

Branch of Wildlife Refuges
Region 2
Student Trainee Report

Project: Monte Vista - 5

Reg. Code Desig: 211-12-MV

Title: Vegetative Type Mapping

Date: September 14, 1962

SECTION I: INTRODUCTION

The basis for the method of vegetative type cover mapping used on the Monte Vista National Wildlife Refuge is a system originally devised by S. A. Graham, (see Cover Mapping Key). In order to meet the specific vegetative analysis needs of this refuge, the original system has undergone modifications. These modifications are explained in detail in The Cover Type Map, Monte Vista Refuge.

SECTION II: PURPOSE

This is not a report of results. The results of my type cover mapping of Units 19, 6, and 14 may be found on the Type Map, the Type Formula Data Sheets, and the Cultural Map for each respective Unit. This information is on file at refuge headquarters, Monte Vista National Wildlife Refuge.

The purpose of this report is to outline in detail the exact method which I used in type cover mapping Units 19, 6, and 14 following the procedure explained in The Cover Type Map, Monte Vista Refuge. Through this outline it is hoped that the mapping procedure being carried out year after year by different persons will be subject to minimum individual interpretation, or misinterpretation, and will, therefore, not result in cover maps which have lost their comparibility. This standardization of procedures is extremely important since management of the entire refuge area will be based on such uniformity.

Another purpose of this report is to make recommendations of slight procedure modifications which are not covered in The Cover Type Map. These modifications do not alter the results of the mapping, but they do aid in carrying out the mapping more efficiently and possibly more accurately.

SECTION III: THE AREA TO BE TYPED

PART A: STUDY THE AREA

Before going into the unit to be typed, study the area as a whole. Look for trends in vegetation, overall dominance of a species or group of species, how the area is drained, natural water in the area, etc. All of these things will give some idea as to what type of vegetation to expect in the unit and where it might be found.

PART B: STUDY THE AERIALS

As a second step in becoming familiar with the area to be typed, study the aerial photographs of the unit. Become familiar with the larger types and how they fit together.

PART C: LEARN THE PLANT SPECIES

It is important from the standpoint of time to learn to identify the various plant species which might be encountered during the field work. Those species listed on the Plant Species Symbols list (see attached copy) must be learned since they are to be entered on the data sheets as they are encountered in pacing. Valuable time can be consumed if it is discovered that a plant species was listed by an incorrect name throughout an entire unit.

SECTION IV: INITIAL TYPE DELINEATION

PART A: THE TYPE MAP WORK OVERLAY

No. 1: The Polytex Overlay

All type maps will be on drawn polytex overlays. The types on the type map work overlay are mapped using a hard pencil (4-6H)

Each overlay will be taped, using pressure sensitive masking tape, onto an aerial photograph (scale: 8" = 1 mile) of the unit to be typed. Care should be exercised when removing the tape so that the photograph will not be torn. It will be carried into the field so that type numbers can be recorded on the overlay as the mapping progresses. As this overlay will not be part of the final report, notes may be kept on it as space permits.

No. 2: The Match Points

Orientate the work overlay in a convenient fashion and draw in the boundaries of unit to be typed. It is desirable to ink match points onto the aerial photograph and correspondingly onto the work overlay so that the overlay can be centered on the aerial quickly and correctly. The match points, in the shape of an arrowhead, should be located at boundary corners or at the intersection of the unit boundary and the margin of the aerial photograph. Three match points are sufficient.

No. 3: Outline The Types

After studying the aerial photo of the unit to be typed, tenetatively outline all types which can be distinguished. Generally, it will be found that regardless of how clear and sharp the photos are, there will be need for minor revision of the typelines once the field work begins.

No. 4: Checking the Typelines

After all types of 1 acre or more in size have been tentatively delineated, go into the field and check them. Observe transition zones in the vegetation which may mark a typeline between two types. Note the topggraphy of the unit. Generally, the higher areas will contain a different complex of vegetation than the lower areas which receive more moisture. Ditches and dikes often mark a typeline where the passage of water is blocked, and the vegetation above such a feature will not be the same as that below it. All of these, and additional clues, may be used to check, and for the most part finalize, the type lines which were originally established.

With the type lines almost definitely established it is possible to carry out the typing itself without the necessity of stopping after each type is recorded and seek out the typelines of the next type. Of course, there will be need for minor revision of the typelines as the mapping progresses, but these revisions can be held to a minimum with careful initial type delineation.

SECTION V: TYPING THE AREA

PART A: EQUIPMENT NEEDED

For the actual typing of a unit only three pieces of additional

equipment are necessary. These are the tally counter which can be carried around the neck on a small rope, the Ground Cover Data Sheets, and the Type Formula Data Sheets. It is helpful to carry along copies of the Cover Mapping Key, Plant Species Symbols list, and the Growth Patterns Sheet. These are especially important to the individual who is not altogether familiar with this method of cover mapping.

It may also be necessary to carry along the mapboard containing aerial photographs and work overlays. The mapboard is quite cumbersome and it is more convenient to leave it in one place and yet close at hand for ready reference.

PART B: PACING

No. 1: Number of Steps Per Count

Due to the variation in size of the different types the method of pacing will also vary. In a type of, say, 30 acres it would be foolish while pacing to record the vegetation on every right foot. This would necessitate taking 400 or 500 paces in order to cover the entire type. Therefore, on the larger types it is more desirable to record the vegetation on every second, third, fourth, or even fifth right foot if the size of the type warrants it.

No. 2: Number of Counts Per Type

As explained in the Cover Type Map, the number of counts to take in one type should equal 100 or a multiple of 100. This facilitates the conversion to percentages. A count is defined as an individual pace at which the vegetation is recorded. The number of counts per type is dependent upon (1) the overall size of the type, and (2) the number of steps between counts. Generally, the largest number of counts needed for a type will be 200. It is doubtful that a type will be so large as to require more than 300. Most types can be satisfactorily recorded with 100 counts. There are instances when only 50 counts are necessary. These are, for example, impoundments less than one acre of size. They must be mapped because of their ability to hold water, but it is impractical to take 100 counts in an area such as this which can be very throughly covered with 50 counts.

A check of pacing was run in Type 19-1 to determine how much variation there would be between the percentages of 100 counts, 200 counts, and 300 counts. The results of this check are as follows:

	100 Counts Every 2nd right foot	200 Counts Every right foot	300 Counts Every right foot
Wiregrass (Jba)	39%	42%	40%
Grasses (Gx)	30%	30%	27%
F.Barley (Hju)	16%	20%	23%

These results indicate the relative unimportance of the number of counts to take as long as the type is sufficiently covered in the pacing.

No. 3: Direction of Pacing

It appears unnecessary to make the original direction of pacing within a type in a cardinal direction. A type will contain minor variations in vegetative growth just as there are major variations between two types. In order to obtain a well rounded picture of each given type, it is desirable to pace in such a manner as to cut across these minor growth variations. This can be accomplished by making the original direction of pacing parallel to the longest demension of the type. This direction can readily be ascertained by glancing at the type map work overlay. For a long narrow type, this one direction may be sufficient if a count of 100, or a multiple thereof, has been reached. (See Figure I.) Figures II, III, and IV illustrate three other methods of pacing depending upon the shape of the type. In general, as stated above, regardless of the shape of a type, more accurate results can be obtained by keeping the direction of pacing parallel to the longer demensions of the type.

Fig. I

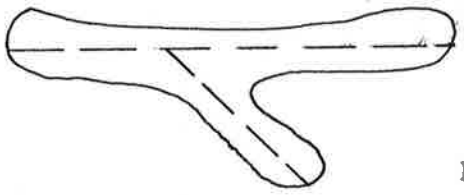


Fig. II

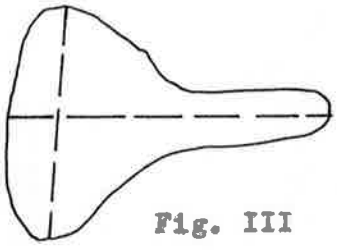


Fig. III

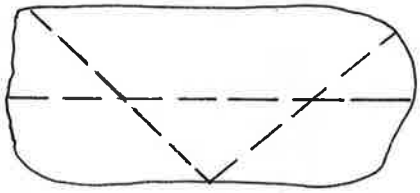


Fig. IV

No. 4: The Ground Cover Data Sheet

The Ground Cover Data Sheet (see attached copy) is a very convenient

way of keeping a record of the counts per type. Plant species are entered on consecutive lines as they are encountered during the pacing. It has been found convenient to enter the type number in the upper left-hand corner of the first line of each type in the Plant Species column and to enter the number of counts for a given type in the upper right hand corner of the same column opposite the type number. The number of counts can be entered after the type has been mapped. The type number will identify the data on the sheet and the number of counts is merely for reference.

The OCCURRENCE column of the Ground Cover Data Sheet is broken down into four sections; Whole, Half, Third, and Fourth. The ratings for each plant species encountered are entered here. (For the procedure for rating plant species see The Cover Type Map.)

With reference to The CoverType Map, Procedure, 7e, instead of recording separately on the same line a species of which both live and dead plants are present, record the live plants on one line and the dead plants on another line. Encountering both live and dead plants could very easily happen in the case of, say, Greasewood (Sve). Recording the plants in this manner would avoid confusion and also make it easier to read the Type Formula Data Sheet.

Any method of marking the counts may be used, but it has been found that in the interest of speed, the four marks and a slash, 𝍸 , work very well.

Before computing the total percentage figures, compute the percentages of Whole, Half, Third, and Fourth. This will eliminate any error which might occur in dealing with the various parts of a whole count. The percentage for each part of the occurrence may be entered in one corner of each block and these percentages added together to yield the total percentage in the TOTAL column.

In dealing with halves, thirds, and fourths, it will be found that a large portion of the time they will amount to an odd number. For example, there may be 14 counts in the Third column for a given species. When divided by 3 to give the percentage of thirds, this will yield a fractional number. Since the method of pacing is not accurate enough to yield results in fractions of percents, a fractional number is not desired. To eliminate this, several rules have been established and followed: These are:

1. Round all odd halves to the next higher number.
   Example: 15 would be rounded to 16.

2. Round all thirds to the nearest number divisible by 3.
   Example: 7 would be rounded to 6 and 8 would be rounded to 9.

3. Round all fourths to the nearest number divisible by 4. In the case of a mean number, for example, 6, round to the next higher number divisible by 4.
   Example: 13 would be rounded to 12, 14 and 15 would be rounded to 16.

Any plant species within a type whose total percentage of occurrence is less than 1%, or any species which is not encountered while pacing but which can be seen to be present within the type is recorded in the Type Formula Data Sheet and Trace is written in the % Density column.

Remember that if the number of counts taken in one type equals 200, the Whole counts must be divided by 2, the Half counts divided by 4, the Third counts divided by 6, and the Fourth counts divided by 8 to yield a grand total percentage of 100% for the type. Because of the presence of fractional numbers, the grand total percentage will sometimes not equal exactly 100%. This is unimportant since the total percentages for each individual plant species may be inaccurate by several percent. Because of these minor inaccuracies an absolute percentage of occurrence of a plant species cannot be obtained. On the other hand, relative percentages throughout the various species within a type can be quite accurate. If an overstory species, for example, greasewood (Sve), is present within the type, the grand total percentage will exceed 100% by the total percentage occurrence of the overstory species.

PART C: THE TYPE FORMULA DATA SHEET

No. 1: The Type Number

The type number consists of two parts. The first part is the number of the unit within which the type is located, and the second part is a number which is assigned to an individual type. The second part of the type number should be assigned in consecutive order as the types are mapped. Generally, it is desirable to let the mapping progress in such a manner as to keep the consecutive order among adjoining types. This will facilitate reference to a given type by its number. Having two consecutive types, for example, Type 19-7 and Type 19-8 separated by several other types is not desirable, unless unavoidable.

No. 2: The Type Prefix

Type prefixes are of three series. These are the A series, the MS series, and the T series.

The A series pertains exclusively to upland types on non-porous soils. For the Monte Vista Refuge four members of the A series

adequately describe the upland types found so far. These are A 1, A 6, A 7, and A 67.

A 1 - Non-porous, bare soil. An area which has recently been scalped (see discussion under management practices) and on which no vegetation has established itself is called an A 1.

A 6 - Upland mixed-herbaceous on non-porous soils. Because of its abundance on the refuge and its growth habit of being for the most part limited to an upland condition, saltgrass (Dst) has been used as the determining factor of an A 6 type. It is possible that an A 6 type might contain other herbaceous plant species and not contain saltgrass (Dst) at all. Due to the manipulation of water on the refuge and the ability of many of the marsh or wetland-loving herbaceous plants to adapt to an upland growing condition for a short period of time, extreme care should be exercised in calling a type which does not contain saltgrass (Dst) an A 6.

A 6 - This A 6 type is a departure from Graham's basic symbols in that it combines his A 4, A 5, and A 6 into one type series member.

A 7 - Upland shrubs on non-porous soils. Greasewood (Sve) and rabbitbrush (Crx) are the only two species encountered thus far in type mapping which fit into the category of upland shrubs. Of the two, greasewood (Sve) is by far the most dominant and has been used in determining an A 7 type.

A 67- This is a combination of both an A 6 and A 7 type. It refers to a type which is composed of both upland mixed herbaceous and upland shrubs. For example, both greasewood (Sve) and saltgrass (Dst).

The MS series deals with vegetation growing under a wet, marshy condition. Although there are 8 basic members of this series, there are many combinations of these 8 members which could conceivably occur. Some examples of these combinations will be explained later.

MS 1 - Permanent open water, no vegetation. An illustration of this type is an area which has been excavated and into which water has been channeled. If this is a year-round source of water it is termed a permanent impoundment, and since there is no vegetation within the impoundment immediately after its construction, it is an MS 1 type. With the appearance of vegetation, however, it ceases to be an MS 1 and becomes an MS 2.

MS $_f$1 Seasonal open water, no vegetation. Basically, this type is similar to an MS 1. There is one major difference. The MS 1 is permanent water while the MS $_f$1 is semi-permanent. It could be classified as an A 1 which is seasonally flooded (see discussion under management practices). During certain parts of the year an MS $_f$1 will contain open water but no vegetation and resemble an MS 1. During the drier parts of the year it will dry up and resemble an A 1. This type could easily become either an MS 1 or an A 1 by deliberately holding water in the area year-round or by preventing flood water from reaching it. An MS $_f$1 will remain so if there is enough variation between the amount of water it contains and the lack of moisture within it for a given time of year. If, however, this variation lessens, a complex of vegetation will invade which is tolerant to both a certain amount of submersion and a certain amount of dryness. Wiregrass (Jba) is one species which exemplifies this type of tolerance.

MS 2 Permanent Open Water, Submerged Vegetation. An impoundment containing permanent water in which submerged aquatics are growing would be an MS 2. The dominant species of aquatic plants on the refuge are sago pondweed (Ppe) and buttercup (Raq) and therefor are most likely to be found in this type. Algae (Clx) are also abundant in the permanent water on the refuge and can be used in determining an MS 2 type.

MS 4 Emergent Aquatics. Emergent aquatics are those plants which, while they have rigid stems and are able to support themselves above the surface of the water, are not able to survive under conditions which deprive them of the water in which they grow. Emergent aquatics are not be be confused with emergents which, due to their ecological development, are able to withstand a much drier growing condition. Some examples of emergent aquatics are cattail (Tla), softstem bulrush (Sva), hardstem bulrush (Sac), and arrowhead (Sgx).

MS 5 Emergents and Sedges. This type of vegetation has developed the ability to grow in either an emersed or a terrestrial environment. Representatives of this group include spikerush (Ex), sedge (Cx), and wiregrass (Jba). Wiregrass is probably the most hardy of this group and is now, or will be when unit development is completed, the most abundant plant species on the refuge. Generally, an MS 5 will be found in an emersed condition, at least for a large portion of the growing season. If the water level is lowered sufficiently, a marshy mixed-herbaceous appears and the type ceases to be an MS 5.

MS 6 Lowland Mixed Herbaceous. The majority of the herbaceous vegetation on this refuge grows under a wet, marshy condition. In a few areas this type of vegetation has been observed growing in an emersed condition, but, usually, it will be found where the soil is moist but there is no surface water. Areas which have been scalped several years ago exhibit now an MS 6. There are many species on the refuge which can be classed as herbaceous. A few of the more abundant ones are foxtail barley (Hju), Canada thistle (Car), and sweetclover (Mof). Those herbaceous plants which are not listed on the Plant Species Symbols list (see attached copy) are grouped into the general classification of either grass species (Gx) or weed species (Wx).

MS 7 Lowland Shrubs. An example of a lowland shrub would be willow (Sx). Vegetation of this type is not abundant on the refuge and consequently will not be encountered to any great extent while typing.

MS 8 Intolerant Trees. Like the lowland shrubs, intolerant trees are not abundant on the refuge. Their occurrence is limited chiefly to roadsides and shelterbelts. Due to the unimportance to waterfowl nesting of a few scattered trees in a unit it is undesirable to attempt to type them separately. However, if a shelterbelt should occur within a unit, then, of course, it must be typed. An example of an intolerant tree is cottonwood (Populus sp.).

As previously stated, it is possible to use a combination of two or more members of the MS series to adaquately describe the vegetative complex within a type. Some of these combinations occur so commonly that they might well be considered members of the MS series in themselves. A few of the more frequently occurring combinations are listed below.

MS 56 Emergents, sedges, and lowland mixed-herbaceous. At the present time this is a fairly common combination on the refuge. High water levels have at one time allowed the emergents and sedges to establish themselves. Then, as the water level lowered through successive drier years, herbaceous species invaded the stands of emergents and sedges resulting in a combination of an MS 5 and an MS 6, or an MS 56.

MS 24 Submerged vegetation and emergent aquatics. This type can occur in the shallower water areas which will support both submerged vegetation such as sago pondweed (Ppe) and emergent aquatics such as arrowhead (Sgx).

MS 25 Submerged vegetation, emergents and sedges. It is with a few exceptions, doubtful that this would be a stabelized type. More likely it is an ecological transition from an MS 2 to an MS 5. A type such as this could possibly be stabalized with a combination of spikerush (Ex), which is probably the most water-tolerant of all the emergents and sedges and some submerged aquatic such as sago pondweed (Ppe).

The T-Series is used to describe those areas which as a result of the manipulation of water on them are zones of an ecological transition from an A series type to an MS series type, or vica versa. These transitional areas contain representative vegetation from both the A series and the MS series. There are three members in the T-series.

T 5 Emergents, sedges, and upland mixed-herbaceous. As previously stated the majority of the herbaceous plants on the refuge can grow in both an upland and a lowland condition. For this reason saltgrass (Dst) was selected as the determining factor of a T 5 type as far as the upland herbaceous representation in the type is concerned. Saltgrass will almost never be found in a MS environment and its presence with emergents or sedges or both would indicate a transition type. An example of a T 5 type would be a complex containing wiregrass (Jba) and saltgrass (Dst).

T 6 Emergents, sedges, upland mixed-herbaceous, and upland shrubs. This is probably the most common of the transition types. The T 6 complex which occurs most frequently on the refuge contains saltgrass (Dst), wiregrass (Jba), and greasewood (Sve). Of course, other species may, and probably will, be present.

T 7 Emergents, sedges, and upland shrubs. This is probably the least common of the transition types. Generally, if water is flooded onto an A 7 type in a large enough quantity to prevent the invasion of saltgrass (Dst), wiregrass (Jba) or some other emergent or sedge (Cx) will establish itself before the greasewood (Sve) dies out from too much moisture. This would be a T 7 type.

It will be noted from the above discussion that lowland mixed-herbaceous vegetation was not taken into account when the transition types were set up. This was done for several reasons. One, as explained above, the same herbaceous species may be found growing under both an upland and a lowland condition. Because of this, it would be difficult to distinguish between, for example, a T 5 type and an MS 56 type since both could conceivably contain

exactly the same plant species. Two, the procedure for this cover mapping system was worked out with the idea in mind of adequately describing vegetation which is important from a waterfowl nesting standpoint. Past studies of waterfowl nesting have revealed a certain tendency of ducks to nest more heavily in areas described by the transition series than in areas described by either of the other two series. Because of this, the importance of the transitional zones is increased. It is not apparent at this time that lowland mixed-herbaceous plants are as important for nesting cover as is a combination of, for example, wiregrass (Jba), saltgrass (Dst), and greasewood (Sve). Therefore, these latter three have been accounted for in the transition types, while lowland mixed-herbaceous species, due to their apparent unimportance and also due to the confusion which their inclusion would cause, have been omitted as a determining factor of the transition types.

There appears to be an ecological relationship between greasewood (Sve), wiregrass (Jba), and saltgrass (Dst). It has been observed from studying types which exhibit varying degrees of transition that with the gradual introduction of water onto an A 7 type, the following ecological steps might occur. The A 7 type will give way to an A 67 type with the invasion of saltgrass (Dst). As water is held on the type, wiregrass (Jba) will follow the invasion of the saltgrass (Dst) which has become established. The type is now a T 6. As water is increased, more emergents and sedges will appear, and the greasewood (Sve) and saltgrass (Dst) will begin to decline. When they are dead, the type becomes an MS 5. If the water were slowly brought off of the area, it appears that the following would happen. Lowland mixed-herbaceous species would invade the MS 5 making it an MS 56. As the water level receded, saltgrass (Dst) would reinvade and the emergents and sedges would begin to decline. This would be a T 5 type. After a dry enough condition was reached, greasewood (Sve) would reestablish itself as the lowland mixed-herbaceous species also began to decline. At this point, before the emergents and sedges are dead, the type would be a T 6 again. With the passing of the emergents, sedges, and lowland mixed-herbaceous species, the type would be an A 67, and as the water level continued to drop creating a more and more dry condition, the saltgrass (Dst) would start to decline and eventually the original A 7 type would dominate.

In determining the Prefix of a type the problem arises of how much of a given species should be present within a type before it influences the choice of prefixes for the type. For example, how much saltgrass (Dst) must there be in an A 7 type before it becomes an A 67 type. To eliminate this problem, the following rules were established and adherred to.

1. The following plant species will influence the determination of the Type Prefix if their individual percentage

density is equal to or greater than 5%. All of the information on the Type Formula Data Sheet will be completed on the following species if their individual percentage density is equal to or greater than 5%.

Wiregrass	(Jba)	Greasewood	(Sve)
Spikerush	(Ex)	Saltgrass	(Dst)
Sedge	(Cx)	Bare	(B)

2. All other plant species will influence the determination of the Type Prefix if their individual percentage density is equal to or greater than 15%. All of the information on the Type Formula Data Sheet will be completed on all other species if their individual percentage density is equal to or greater than 15%.

Management Practices

Management practices are included in the Type Prefix to round out the description of a type by giving some idea of the physical condition of the area in which the type occurs. Generally, they indicate disturbances on the natural state of an area. Those currently in use in type cover mapping are explained below.

Irrigated (i) - This refers to those areas on which a system of ditches has been established in order to direct a controlled flow of water over the land. Both the time at which the water is applied and the amount of water applied to a given point on the area can be predetermined. Do not confuse with flooded seasonally.

Flooded Seasonally (f)- When water is allowed to run across an area with no attempt made to control its flow, and if the amount of water utilized and the time at which the water is utilized is dependent upon the amount and time at which the water is available, the area is said to be flooded seasonally. Impoundments which contain water in the spring and early summer but are dry for the remainder of the year are flooded seasonally. Likewise, the MS types which contain water only when it is available are flooded seasonally.

Pastured (p) - If an area is at the time of mapping or has been recently grazed by cattle, it is pastured. Use caution when extending type lines beyond a fence within a unit. If the fence separates an area which is pastured from an area which is not, the fence must form a typeline dividing a type which would otherwise be the same.

Hayed (h) - Those areas which are leased to private individuals under haying permits and cut annually are called hayed, and the symbol appropriately entered in the Type Prefix.

Alkali Deposits (a) - Alkali deposits occur on soils which are not porous enough to allow free drainage of water. As the water evaporates from these soils, the alkali which is held in the water will be deposited on the surface of the ground. These deposits can be seen while mapping a type and recorded accordingly.

Previously tilled (t) - An area which can be recognized as having been cultivated at some time in the past, but which in recent years has been allowed to revert back to its natural state, must be identified as such by the symbol (t) in the Type Prefix.

Scalped (s) - An area from which the topsoil has been removed. Some borrow areas, generally those made by dozers or carryalls, can be classed as scalped. When more than the topsoil is removed, the area ceased to be scalped and becomes either an impoundment or a ditch. A scalped area will, generally, not be more than one foot deep, while an impoundment or ditch may be five or six feet deep. A scalped area is not be confused with an area which has been previously tilled.

No. 3: Type Acreage

In this column is recorded the acreage of each individual type as determined with a planimeter or acreage computer. (See SECTION VII, PART A, No. 3)

No. 4: Growth Density

Growth density is used to describe how close one plant of a given species grows to another of the same species within a stand of that species. This is a subjective determination and has not been pinned down by mechanical means. Two suggestions are made for obtaining a better understanding of growth density. (1) Study of the photographs taken to illustrate, for example, what is meant by a sparse stand of spikerush (Ex) or a medium stand of wiregrass (Jba). (2) Before beginning the actual mapping, observe the growth of the various plant species on the refuge as a whole. This will give some idea of how these species grow and their varying degrees of density.

As far as individual plant species are concerned, it is hoped that the following discussion will be helpful in determining growth density of those species listed. The units of measure included in this discussion are only approximations. It is undesirable at the present time to attempt to measure the distance between the stalks of, for example, wiregrass (Jba) with any sort of measuringdevice.

Greasewood (Sve)

Sparse Growth - The shrubs are for the most part ten feet or more apart. This is taking the whole type into consideration and not just the two shrubs within the type which will be inevitably growing side by side.

Medium Growth - The shrubs are for the most part from one to ten feet apart.

Dense Growth - When the growth density is dense, the branches of adjoining shrubs should be from an almost touching condition to so intertwined that it is impossible to walk through the type.

Emergents

Sparse Growth - When the stalks of an emergent species are one inch or more apart at the base, the growth density is sparse. If only one species were present, the ground would be easily visible through the stand.

Medium Growth - When the stalks of an emergent species are from one-fourth inch to one inch apart at the base, the growth density is medium. Generally, the ground would not be visible through the stand, not because stalks are too close together to see through them, but because with medium growth the plants will probably be taller and therefore, a larger amount of vegetation present than with sparse growth.

Dense Growth - When the stalks of an emergent species are almost touching at the base, the growth density is dense.

The above discussion includes only the two most important groups of plant species as far as waterfowl nesting is concerned. Each species has its own individual growth characteristics, and for this reason, the two suggestions above comprise probably the most comprehensive method at this time learning the correct growth density of the various species.

No. 5: Percent Density

Percent density is entered in the Type Formula Data Sheet for each individual species exactly as it appears in the Total column of the Ground Cover Data Sheet with one exception. On the Type Formula Data Sheet arrange the species in decending order of percentage occurrence. The first plant species listed for each type will then be the most abundant one for that particular type, and the last species listed will be the least abundant.

No. 6: Growth Pattern

Growth pattern is another subjective determination in the type cover mapping. There are nine basic patterns from which to chose in determining the growth pattern of a given plant species within a type. It is possible to use these basic pattern in combination with one another in order to achieve a clearer picture of the growth pattern of a species. In fact, if none of the basic patterns apply to the actual growth pattern of a particular species, use two, or more patterns, if need be, in combination rather than arbitrarily chosing a basic pattern which does not fit. The following discussion may be helpful in determining which growth pattern to chose. Reference is made to the attached Growth Pattern Sheet. The percentage densities listed on the sheet for each pattern are given only as examples. During the mapping it will become evident that a growth pattern will seldom match the nine basic patterns exactly.

(1) Large Spotty - According to the basic pattern for large spotty, one of the spotty stands of a species would be approximately 47 feet long and 47 feet wide and contain 2,178 square feet. It has been the practice thus far in the type mapping to consider as large spotty a stand whose diameter is over 15 feet. If a species does grow in a large spotty pattern, it usually is not difficult to distinguish it.

(2) Block - The block pattern may vary in size. Growth in a block pattern must occur only within the block and nowhere else in the type. The growth is uniform whether it be sparse or dense. Generally, the block pattern will occur along the edge of the type.

(3) Small Spotty - Each small spotty stand of a species will be less than 15 feet in diameter. They will vary in shape and distribution throughout the type but if they are completely separate and are of this small size, then, they are called small spotty.

(4) Tenuously spotty - This is a combination of Patterns 3 and 5. The pattern of Bare (B) in an A 7 type with medium growth density of greasewood (Sve) will usually be a 4. The species growth is winding throughout the type, but there are also some separate small spotty stands.

(5) Tenuous - This pattern will occur when a species is found growing along a cultural feature such as a ditch which runs through the type.

(6) Uniform Scattered - The growth is uniformly distributed throughout the type. There are no parts of the type where it is any more dense than in others.

(7) Spotty Scattered - The growth occurs only in parts of the type but where it does occur, it is distributed in an even, uniform fashion.

(8) Mixed spotty scattered - In some parts of the type the growth is quite dense, in other parts it is sparse, and in still others it does not occur at all.

(9) Uniform spotty - The species having this growth pattern occurs in all parts of the type. In some parts the growth is dense and in other parts it is sparse.

One example of a combination of patterns would be a 23. This is a combination of the Block and the Small Spotty patterns. In one part of a type a species may grow in a block pattern, and beyond this block it may also occur in small spotty stands. This pattern would be both a 2 and a 3, hence, a 23.

When referring to the Growth Pattern Sheet in determining the growth pattern of a species remember that the size of each patterns is in relation to one acre. Therefore, the size and distribution of the components of each pattern would remain the same regardless of whether the type was one, five or fifty acres. In determining the pattern consider the type as a whole, not any particular one acre portion.

No. 7: Stand Status

Stand status describes the vigor of a stand of a given species within a type. There are five stages of vigor by which the stands are identified. These stages may be used in combination if the situation warrants it.

(1) Invading - Only immature plants of a species are present within the type. Generally, these plants will be of sparse growth, and their percentage of occurrence will not be great. It is difficult to distinguish between invading emergents and those which have already become established. If a species is in the invading stage there will be practically no accumulation of litter. This can be used as a guide line in the determination of an invading stand status.

(2) Expanding -An expanding stand will contain both immature and mature plants. The immature and mature plants of greasewood (Sve) are easily discernible, while those of, again, emergents are not. Those stands of emergents is which there is an accumulation of litter and which exhibit a dark green color are usually expanding. This will not always hold true, of course, and if there is any doubt whether a stand is expanding or, say, mature, use the two in combination and call it 23.

(3) Mature - A stand is mature if there are only mature plants present. There may be sexual reproduction occurring on the mature plants, but there is no evidence of immature plants within the type.

(4) Declining -A stand of a given species whose vigor is decreasing is a declining stand. A sickly, dried up appearance of a stand may indicate declination. When saltgrass (Dst) is declining from lack of water the leaves will become involute, and when it is declining from too much water, the leaves will take on a yellowish tinge. Emergents, when denied water, will dry up from the tip of the culm toward the base. Therefore, a declining stand of, say, wiregrass (Jba) will turn a dark brown at the upper end of the culm. Of course, this will also be noticed in the early winter when the wiregrass (Jba) is naturally dying from a freeze. If this occurs during the summer, the stand will be classed as declining. Greasewood (Sve) is declining when only a small portion of each shrub of a stand contains live growth. The dead portions of the shrubs indicates that the stand in the past was much more vigorous.

(5) Dead - If there is no live growth of a species present, and yet there is identifiable litter of the species within a type, the species is considered

dead. As previously explained (See SECTION V, PART B, No. 4) if both live and dead plants occur within the same type, record them separately and enter a 5 for stand status opposite the dead plants in the Type Formula Data Sheet.

No. 8: Vigor (Shrubs & Trees)

This category was established to describe the vigor of an individual shrub or tree rather than the vigor of a stand of shrubs or trees. Due to its abundance on the refuge and the overall absence of any other shrub or tree, Shrub Density will be used almost exclusively to describe greasewood (Sve). If rabbitbrush (Crx) is encountered, it will be treated in exactly the same fashion as greasewood (Sve). There are 2 three member sets of growth characteristics which are used in combination to create nine descriptions of the vigor of a shrub or tree. These sets are as follows:

Average Size/Plant - The three members of this group are (1) Small, (2) Medium, and (3) Large. The second member of the set could also be called normal because those shrubs which fall into the medium size range are of normal height as far as growth on this refuge is concerned. Those which are of less than normal height, of course, fall into the Small range, and those which are of greater than normal height fall into the Large size range.

(1) Small - Those shrubs which are less than approximately two feet in height are classified as small.

(2) Medium - Those shrubs which are between two and four feet in height are classified as medium.

(3) Large - Those shrubs which are over approximately four feet in height are classified as large.

Average Density/Shrub- This set is composed of (a) Sparse, (b) Moderate, and (c) Dense shrubs. Moderate could also have been called normal because moderate density defined the normal density of shrubs on this refuge. A shrub of sparse density has less live growth than does one of moderate density, and a shrub of dense density has more live growth than the one of moderate density.

(a) Sparse- A shrub in which the live growth is scattered to the extent that visibility through the shrub is not hindered is generally of sparse density. Declining shrubs will, a large portion of the

time, be of sparse density. The growth of an understory under a sparse shrub will not be inhibited because of lack of sunlight due to the fact that the growth within the shrub is not dense enough to block the rays of the sun. As a rule there will be almost as much dead growth as live growth on the shrub.

(b) Moderate- The foliage is well developed and uniform throughout the shrub but is not conjested as in dense density. Generally, there is room under the canopy of the shrub for the growth of an understory, and because it can still get sufficient sunlight through the foliage, an understory is often present.

(c) Dense- The foliage within the shrub is conjested and so dense that it is impossible for light to penetrate it. There will almost never be an understory. Often the canopy of the shrub will extend downward and come in contact with the ground.

The above two sets are combined to form the following combinations: 1a, 1b, 1c, 2a, 2b, 2c, 3a, 3b, and 3c. In order to obtain a clearer picture of Vigor (Shrubs and Trees), a study of the filed photographs which illustrate some of the above combinations is recommended.

No. 9: Stand Litter

The five categories of stand litter describe the amount of dead accumulation of a given species within a type. As stated in The Cover Type Map, Stand litter is important when dealing with those plant species whose litter provides nesting cover for waterfowl early in the spring. The importance of the litter of certain weeds (Wx) and grasses (Gx) to waterfowl nesting is questionable. The five categories of stand litter are discussed below.

(0) None- This, of course, indicates that there is no evidence of litter of a given plant species present within the type.

(1) Sparse- This is litter which is 'next to nothing'. The accumulation is very light, and, in the case of emergents, usually indicates a newly established stand. The ground should be visible through sparse litter, and on the average it is less than one inch in depth.

(2) Medium- Greasewood (Sve) of 2a vigor and medium growth

density should exhibit a medium amount of litter. Emergent litter between one and four inches in average depth could be classified as medium.

(3) Dense- Dense litter of emergents will be of an average depth of from four to seven inches.

(4) Very Dense- Litter which is very dense is impenetrable. Emergent litter over seven inches in average depth is classified as very dense.

Stand litter is difficult to determine and for the most part is quite subjective. A study of the varying amounts of litter throughout the entire refuge is recommended before the actual mapping is begun.

SECTION VI: THE WORK MAP OF CULTURAL FEATURES

The cultural map is a record of all of the cultural features within a unit at the time of mapping. As the mapping progresses the various ditches, fences, dikes, roads, etc. should be noted and recorded on the cultural overlay in the field so that their correct positions may be established. This is important since those features which were constructed after the aerial photographs were taken will not show up on them. Generally, the aerials can be used in mapping the cultural features, and their use is recommended in order that the features be recorded accurately. As the features are recorded, temporarily identify them in any manner suitable. On the final cultural map their identification will become standardized. Photo points will also be recorded on the work map. They will be discussed later. (See SECTION VIII, PART B, No. 3)

SECTION VII: PREPARING THE REPORT

In the interest of time, all field work should be completed before beginning the preparation of the report. In order that no part of the report be forgotten until there is enadequate time to devote full attention to it, the following order of discussion is recommended as the consecutive steps in preparing the report.

PART A: THE TYPE MAP

No. 1: Orientating The Final Type Map Overlay

It is possible that two or more aerial photographs may have been required in mapping a unit due to the fact that each photo contained only a portion of the unit. Since the final type map

and its corresponding aerial photograph, or photographs, will be used in the field at a later date for reference to typelines, etc., the map should be orientated on the aerial photograph(s) in the most convenient manner possible. The work overlays of several different aerials should never be placed together on one final type map overlay. If the final type map overlay is orientated properly, no portion of it should extend beyond the margin of the aerial photograph.

With the final type map overlay properly orientated, ink onto the overlay the matchpoints and the boundaries of the unit typed. For all inking on the final type map overlay use permanent, waterproof, black, drawing ink and a number 00 Koh-i-noor Rapidograph.

With the boundaries of the unit now recorded on the final type map overlay, the typelines can be inked.

No. 2: Inking The Typelines

Orientate the final type map overlay on the type map work overlay so that the matchpoints are aligned. Check to make sure that the unit boundaries are also aligned.

With the two overlays aligned, the typelines may be traced in ink onto the final type map overlay from the type map work overlay. Be very careful not to overlook any typelines, since the absence of one will surely cause confusion at a later date.

No. 3: Computation Of Type Acreage

Determination of the individual type acreages may be accomplished by using either a planimeter or an acreage computer, grid dot pattern, (SCS-10-L-968). More accurate results can be obtained with a planimeter, and since the types are usually quite small and typelines irregular, it is desirable to use this method.

After obtaining the individual type acreages, determine, with the planimeter, the total acreage of the unit typed. Check this figure against the sum of the individual type acreages. The total acreage should exceed the sum of the individual acreages by a few acres if there are any dikes, roads, ditches, or other untyped areas within the unit. If the difference is great, it indicates that there is one or more errors in the individual type acreages, and these must be recomputed to eliminate the error. Because of the time that this recomputation would involve, it is recommended that the initial acreage determination be carried out in a careful and deliberate manner.

As the acreages are computed they will be entered on the Type

Formula Data Sheet in the appropriate column.

No. 4: Entering The Type Data

After the typelines have been inked and the individual type acreages computed, the type data may be recorded on the final type map overlay. The types will generally be large enough so that the type data may be written within it. If the type is too small or irregular, place the type data in a large adjacent type and use an arrow to indicate to which type the data belongs. If there is no available space adjacent to the type, place the data along either the right or left-hand margin of the overlay. If this is done, also include the type number within or near the type itself to identify it.

The type data will consist of (1) the type number, (2) the type prefix, and (3) the type acreage. This information will be arranged with the following example as a guide.

6-14
MSfp56
2.9

No. 5: The Legend

The legend will identify the final type map overlay and will be entered in the lower right-hand corner of the overlay. It will consist of (1) the name of the overlay, (2) the unit represented by the map, (3) the date (month and year) during which the mapping was conducted, (4) the name of the mapper, and (5) the number of the aerial photograph to which the overlay corresponds. This information will be arranged with the following example as a guide.

Type Map Unit 10
July, 1962 John Q. Doe
Photo #15

PART B: THE FINAL TYPE FORMULA DATA SHEET

No. 1: Checking The Data Sheets

Before typing the final copy of the Type Formula Data Sheets it is well to check them for correctness and completeness. Two major errors to look for are incorrect Type Prefix and Plant Species not in decending order of percentage occurrence. Once the final typing begins, such errors could be included without any knowledge of their presence.

No. 2: Typing The Final Data Sheets

After the data sheets have been checked, they are ready to be typed. Make sure that on the final copy the types are arranged in consicutive order according to Type Number. Type an asterisk(*) in those columns opposite the plant species for which the information was not recorded. Enter the date (month and year) during which the unit was mapped, not the date on the typing of the final data sheets.

In the Plant Species column of the data sheet, enter the species with their common names first, followed by their scientific abbreviations in parentheses. Keep the left margin of both the common names and scientific abbreviations even to facilitate quick reference. (See attached PLANT SPECIES SYMBOLS)

PART C: THE CULTURAL MAP

No. 1: Orientating The Final Cultural Map Overlay

The entire cultural map may be placed on one overlay if space permits due to the fact that it will not be used as extensively in the field as will the type map overlays. Sufficient space should be left in the lower right-hand corner of the overlay for the legend. With the final cultural map overlay properly orientated on the cultural map work overlay, the cultural features can be traced in.

No. 2: Coloring The Features

In order to avoid a complex, confusing cultural map, the various features will be recorded on the overlay in different colored drawing pencils. The following color scheme will be used.

Roads-	Brown	Fences-	Red
Ditches-	Green	Dikes-	Yellow

Proposed features are also recorded on the cultural map overlay. They are taken from the unit development map, Master Plan of the Monte Vista Refuge. A blue colored drawing pencil is used to identify these features. The different types of proposed cultural features are distinguished by using the symbols on the unit development map. A list of the symbols used are as follows.

Dike without road (4' top)-

Dike with road (16' top)-

Road, graveled-

Ditch-

Ditch, drain- 

Contour dike (14' top)- 

No. 3: Recording The Photo Points

A discussion of photo points is contained in SECTION VIII, PART B, No. 3. It is sufficient here to say that the photo points are recorded on the final cultural map overlay in black ink.

No. 4: The Legend

The legend for the final cultural map overlay will be exactly the same as for the final type map overlay with the exception that the name of the map will, of course, be Cultural Map instead of Type Map. When more than one aerial was used for a given unit, record each aerial number of all aerials used in the legend.

No. 5: The Key

The final cultural map overlay should contain a key in a location on the overlay where space permits which identifies the various colors and symbols used on the map. The key should be arranged so that the existing features are listed first and the proposed features following

SECTION VIII: THE VEGETATIVE TYPE PHOTOGRAPHIC SERIES

PART A: PURPOSE OF PHOTOGRAPHS

The most important purpose of the photographs is to illustrate the various symbols used in the mapping. Some of these symbols as explained in SECTION V, PART C are quite subjective and the photographs are taken with the idea in mind of pinning down these subjective symbols as much as possible

PART B: PHOTOGRAPHIC PROCEDURE

No. 1: Equipment Needed

All photographs will be taken with the 2¼ x 2¼ single lens reflex Kalimar camera available at the refuge. Other equipment needed for the photography are listed below.

Kodacolor film	Cultural map work overlay
Light meter	12" x 12" blackboard
Magnetic compass	White chalk

Photograph Record Forms	Blackboard eraser
Tripod	Type map work overlay

No. 2: Planning The Photographs

It is not advisable to begin the photography until a clear understanding of the mapping symbols has been achieved. This will avoid filing photographs which do not accurately portray the vegetative characteristics for which the photographs were taken. These inaccuracies would nullify any value they might have by causing a great deal of confusion at a later date.

Generally, through one's own experience with the mapping and a study of the existing photographs, it can be determined what additions should be made to the file. As the mapping progresses, keep a record of those locations where a photograph would be desirable. Then, when a list of possible locations has been accumulated, take the camera equipment into the field and secure the photographs. This is much more efficient than tramping across a 640 acre unit searching for one spot to take a picture.

No. 3: Taking The Photographs

So that no part of the photography procedure will be omitted, the following steps are recommended as the order of practice.

Step 1- Set up the camera

Place the camera on the tripod and situate it so that the line of sunlight is at or about a 90° angle with the line of focus of the camera. This will cause a shadow on one side of all stems, branches, and leaves and thereby cause them to stand out more sharply in the photograph. The height of the camera above the ground will depend upon the subject and how closely the camera must be located in order to bring out the desired details in the photograph.

Step 2- Record the photo number

For purposes of recording each photograph, The Photograph Record Form (see attached copy) has been devised. The Photo Number is a permanent, consecutive number assigned to each individual photograph for identification. The photo number is recorded in the space provided on the form.

Step 3- Take light reading and record F-Stop

The light meter available at the refuge is used for this purpose. Set the index of the meter at 40 and hold the meter immediately in front of the lens of

the camera so that the plane of the sensitive eye of the meter is perpendicular to the line of focus. Read the meter, refer to the recommended F-Stop shown on the meter, and set the camera at this position. Record the F-Stop in the appropriate blank on the Photograph Record Form.

Step 4 - Take bearing of photograph

With the magnetic compass sight along the line of focus of the camera and take a magnetic bearing. Since the magnetic declination on the Monte Vista Refuge is approximately 15° East, add 15° to the magnetic bearing to convert the figure to a true bearing.

Step 5 - Record the photo point

The photo point consists of four parts as are listed below

Example: V Vegetative type photographic series
6 Unit in which the photograph is taken
12 Number of the photograph within that unit
95° True bearing of the photograph

This information is recorded on both the cultural map overlays and in the Photograph Record Form in the following manner:

V-6-12-95°

Step 6 - Map the photo point

The location of the camera is recorded on the overlays by a point. The photo point information identifies this point as the location at which the given photograph was taken. In order that the point may be found quickly on the overlay, draw an arrow from the photo point information to the point itself. This manner of mapping of the photo points should be followed for both the cultural map work overlay and the final cultural map overlay.

Step 7 - Letter the blackboard

Although the photograph will be permanently filed, there may be occasions arise at a later date when it will be temporarily removed. In order to identify the individual photograph, a blackboard is positioned close to the subject of the picture so that the information on the blackboard may be read from the

photograph. The blackboard shall include the following information:

Example: # 24 - The permanent, consecutive print number.
10-17 - The type number in which the photograph was taken
7/14/62 - The date the photograph was taken.

Step 8 - Position the blackboard

The blackboard should be positioned so that the information is in focus and therefor clearly ledgible. It should also be located in such a manner as not to obstruct a view of the subject of the photograph. Generally, the most convenient position of the blackboard is so that it will show up along either the right or left-hand margin of the photograph.

Step 9 - Complete the photograph record form

After the blackboard has been positioned, complete the photograph record form. All categories of the form are self-explanatory with the exception of sunlight for which symbols are used. These symbols are as follows:

B/S - Bright Sunlight

C/S - Clouded Sunlight

H/S - Hazed Sunlight

In the space marked Description of Photo include a description of the subject of the photograph. Explain what characteristics of the subject the photograph is intended to illustrate. Include such items as type prefix shown, growth density of the species shown, stand status, shrub density of the species shown, stand litter, etc.

All photographs will be taken at a shutter speed of 1/50 of a second. This is recorded on the Photograph Record Form and the camera left at this setting.

Step 10 -Close the shutter diaphram

The Kalimar camera which will be used is equipped with a shutter diaphram which is opened when the camera is being focused. This diaphram must be closed before the shutter is snapped or too much light will enter the camera and ruin the photograph.

Step 11- Attach the filter

Use a Chrome F, 85-c light filter for all outside color photography. The filter is attached to the camera with a filter adapter. Because of the very unstable attachment of the filter adapter increasing the possibility of its being knocked off, do not attach the filter until immediately before the photograph is taken.

Never transport the camera with any filter attached. For photography for which the subject is less than 18 inches from the camera lens, use the close-up filter, specially designed for this purpose.

Step 12- Take the picture

Insure that the camera is securely mounted on the tripod before taking the picture. Do not jiggle the camera in any fashion when snapping the shutter, or the photograph will not be as clear and sharp as desirable. Shade the camera lens while the shutter is snapped so that sunlight cannot fall on the lens and detract from the photograph.

PART C: FILING THE PHOTOGRAPHS

All photographs of the Vegetative Type Photographic Series will be filed in the Remington Rand Kardex flip file. The photographs will be entered in the file in consecutive order according to Print Number.

No. 1: Cutting the Prints

The photographs will be cut to 4" x 5" size in order to fit the flip file. They will be cut along either the upper or lower margin or both. The amount to be removed each margin will be governmed by the importance of that portion of the photograph which will be eliminated.

No. 2: Installing the Prints

Since there are no slots in the Kardex pockets for the installation of the 4" x 5" photographs, appropriate slots must be cut. A previously cut pocket may be used as a pattern. Each photograph is enclosed in a plastic envelope provided for this purpose and inserted on its respective pocket.

No. 3: The Print Legend

For identifying each photograph in the flip file, a legend will be

inserted into the plastic tab at the lower margin of each pocket. The legend will follow the form of previous print legends and contain this information. Print Number, Type Number, Date Taken, Photo Point, Shutter Speed, F-Stop, and Sunlight. These data will be typed onto 5" x 8" plain white cards, cut to the proper demensions, and installed in the appropriate pocket tabs.

No. 4: The Print Description Card

These cards are installed so that each card for a given photograph is located on the back of the immediately preceding pocket. Each card will contain the Print Number, the Photographer, the Date that the pictures were filed, and a Description of the Photo. This description will follow closely the description for the photo on the Photograph Record Form. If, however, when the film has been processed and the prints returned, it is found that certain characteristics described on the Photograph Record Form are not distinguishable on the photograph, the description must be corrected to match what is visible of the photograph.

No. 5: The Index

As more photographs are added to the file, the index should be brought up to date using the form previously established. The index will be entered in the uppermost pockets of the file.

SECTION IX: DISCUSSION

It is anticipated that due to the subjective nature of some of the mapping symbols, there will occur as the mapping progresses year after year a variation in the concept of these symbols. This is unavoidable, although undesirable, because of the differences of interpretation of the symbols among individuals. The most logical method of eliminating This subjective interpretation would be to devise a mechanical system of measuring which could be applied to the various plant species in determining their growth characteristics. Unfortunately, there is not sufficient time at present to devise such a system, but it is strongly recommended that this be accomplished before the mapping on this refuge proceeds to such a point that the comparability of the mapping results of successive years is lost.

In order to offer some comparison between the nesting survey of a unit and the type map of that unit and also to give a clearer picture of the cover of the nests, it is recommended that certain of the mapping symbols be used in describing the cover of the individual nests. These symbols could include the plant species, growth density, shrub density, and stand litter. Additional information concerning the general appearance of the area in which

the nest was found could be obtained by referring to the type map of that unit.

A form is attached (See NESTING SURVEY DATA SHEET) which could be used or modified for the above purpose. Examples is included on the data sheet to illustrate how it could be utilized.

SECTION X: SUMMARY

Because of the nature of the material contained in this report it is impractical to summarize it. It is sufficient to say that this report contains discussions of all of the major procedures which an individual will follow in vegetative type cover mapping.

Submitted by: Leslie F. Beaty
Leslie F. Beaty, Student Trainee

Date: September 17, 1962

Reviewed by: _____
Charles R. Bryant, Refuge Manager

Date: _____

Reviewed: _____
Regional Office

Date: _____

Table of Contents

Table of Contents (Cont.) Page

Table of Contents (Cont.)

BUREAU OF SPORT FISHERIES AND WILDLIFE

INTER-OFFICE TRANSMITTAL

ATTENTION OF:

RECEIVED
MAY 5 '72
MONTE VISTA
NWR 30930

☐ Director, _____

☐ Regional Director, _____

☑ Project Leader, Monte Vista NWR
Monte Vista, Colorado

☐ _____

☐ Regular Mail

☐ Air Mail

☐ Action

☑ Information

From	Office	Date
A. O.	Refuges	5/3/72

Subject

Pete – Per our telecon, this is a copy of the "Whole Thing" on Beaty's Vegetative Study, for your files.
His copies have been forwarded to him at Mark Twain.

Bob

3-1908
(Rev. 6/63)

(Attach securely to material to be transmitted & mail through regular channels)

WILDLIFE MANAGEMENT STUDY OUTLINE

Branch of Wildlife Refuges, Region 2 — Project: Monte Vista-5

Student Trainee Project-Summer-C.Y. 1962 — Reg. Code Design: 211-12-MV

1. Title of Study: Vegetative Type Mapping

2. Objectives: To identify and map cover types on that part of the Monte Vista Nat'l W/L Refuge that is scheduled for development in F. Y. 1963.

3. Justification: This project is required to be able to evaluate the effect of development. It is also needed as a tool to be used in future management and for use in setting up future vegetative trend transects. This is the second segment of a continuing project to cover map the entire refuge just prior to development. Vegetative trend transects, based on these cover maps and developments, will be established immediately following development.

4. Procedure:

   a. Literature review.
   The trainees will make a study of available herbarium material. They will also review available references on Colorado flora and cover mapping procedures.

   b. Data collecting.
   The area to be cover mapped under this segment are Units 6 and 14.

   Aerial photographs at a scale of 8" to a mile will form the basis for the map. Type mapping in the field will be done on polytex drafting film overlays of the aerial photos. Types will be determined by ground checks and reference to the photos. All types 2½ acres or greater in size will be mapped. Any complex of gegetation which varies from another in any significent degree (species, density, height, uniformity, etc.) will be deliniated as a separate type.

   Graham's ecological system of cover type mapping will be used to symbolically describe types. Page 4:3 of the Manual of Game Investigational Techniques describes this method. A specialized key adapted for use at the Monte Vista Refuge is attached. Additional modifications and refinements of the key will be made if advisable.

   Photographs will be taken of all major types. In most cases it will be desirable to have a closeup and an

overall view of each type. The panoramic photos will be taken from as great an elevation as is feasible (ie, cab of pickup). Each photo will be identified by date, location, direction of shot in degrees, height, and major types photographed. An aerial photo overlay will show the location and direction of each photographic point. Fine grain film and custom developing and enlarging to 5 x 7, or equivalent, prints will help assure standard quality photographs. If available, a 2¼ x 2¼ camera will be used. Otherwise any camera that can insure quality work will be satisfactory.

c. Reporting
The final report will include:

1) Thorough description of techniques and procedures used.
2) Detailed key to symbols on map.
3) Inked field overlays of cover ypes mapped.
4) Identification, cross referencing, and filing of negatives and enlargements.
5) Recording of photographic points on overlays.

5. Cooperators: None

6. Responsibility: All Student Trainees work on the project will be under the direct supervision of the Refuge Manager or the Assistant Refuge Manager. The Wildlife Management Biologist will give technical assistance to the Student Trainees on this project.

Trainee Beaty will be primarily responsible for the performance of this project as directed by the Refuge Manager; he will be assisted in the work by Trainee Grossman.

7 & 8 Cost & Schedule: The Refuge will furnish all needed supplies and equipment.

Item	Schedule	Man-days	Cost F.Y. 1963
Literature review	July 30-Aug. 3	10	$ 160
Cover mapping	Aug. 6-17	20	320
Report preparation	Aug. 20-24	5	80
		35	$ 560

9. Reports: Trainee Beaty is responsible for the report. All mapping and the report are to be submitted to the Refuge Manager on or before August 25.

Distribution of report copies:

Central Office	1
Regional Office	1
Refuge Manager	1 (with overlay)
Wildlife Mgt. Biologist	1
Student Trainee	1

10. Publication: Not planned

11. Submitted by: Robert M. Ballou
Robert M. Ballou, Wildlife Mgt. Biologist

Date: April 6, 1962

12. Endorsed by: _____
Charles R. Bryant, Refuge Manager

Date: _____

13. Approved by: _____

Date: _____

COVER MAPPING SYMBOLS*

A 1	Non-porous, bare soil
MS 1	Open water, no aquatics (intermittent open water designated by MS 1 --- see Mgt. Practices below)
MS 2	Open water, submerged vegetation
MS 4	Emergent aquatics
MS 5	Emergents and sedges
MS 6	Mixed herbaceous
A 6	Upland mixed herbaceous on non-porous soils
MS 7	Lowland shrubs
A 7	Upland shrubs on non-porous soils (greasewood)
MS 8	Intolerant trees (cottonwood)
9	Mid-tolerant trees
10	Tolerant trees

Management Practices
(sub-letters)

i	Irrigated
f	Flooded seasonally
p	Pastured
h	Hayed
a	Alkali deposits

Uniformity (of stand-species-within type)
(exponential)

-	Scattered	(0-30%)
=	Spotty	(30-70%)
≡	Uniform	(70-100%)

Density (of species within stand)
(sub-numbers)

1	Scattered
2	Medium (penetrable)
3	Dense (not penetrable)

Height (of species within stand)
(exponential)

'	Short
"	Medium
'''	Tall

Species**

B	Ranunculus (Buttercup)
Sa	Sago pondweed
Z	Horned pondweed
Ch	Chara
C	Cattail
Bl	Bulrush
J	Juncus***
Sg	Sedges****
D	Salt grass
G	Mid-grasses (Brome, foxtail, etc)
W	Weeds
Sc	Sweetclover
Sl	Willows
Gw	Greasewood

Litter (of species within stand)
(Sub-numbers)

%	Ground Cover
4	Scattered (0-30%)
5	Spotty (30-70%)
6	Uniform (70-100%)

Accumulation

7	Sparse (but is penetrable)
8	Medium (provides support above ground)
9	Heavy (matted and not penetrable)

* Adapted from Graham, S. A., 1945, "Ecological Classification of Cover Types", Jour. Wildl. Mgt., 9:182-190

** Each area will develop its own species list and codes.

*** Type dominated by tall, coarse Juncus Salticus, although other sedges may be present.

**** May include less thrifty Juncus Balticus as a relatively minor component of mixture including Carex, Eleocharis, etc.

COVER MAPPING KEY*

Type Series and Members

A 1	Non-porous, bare soil
A 6	Upland mixed-herbaceous on non-porous soils**
A 7	Upland shrubs on non-porous soils
MS 1	Permanent open water, no vegetation
MS$_f$1	Seasonal open water, no vegetation
MS 2	Permanent open water, submerged vegetation
MS 4	Emergent aquatics
MS 5	Emergents and sedges
MS 6	Lowland mixed-herbaceous
MS 7	Lowland shrubs
MS 8	Intolerant trees
T 5	Emergents, sedges, and upland mixed-herbaceous
T 6	Emergents, sedges, upland mixed-herbaceous, and upland shrubs
T 7	Emergents, sedges, and upland shrubs

Management Practices

i	Irrigated
f	Flooded seasonally
p	Pastured
h	Hayed
a	Alkali deposits
t	Previously tilled
s	Scalped

Growth Density

-	Sparse
=	Medium
≡	Dense

Growth Pattern

1	Large Spotty
2	Block
3	Small Spotty
4	Tenuously Spotty
5	Tenuous
6	Uniform Scattered
7	Spotty Scattered
8	Mixed Spotty Scattered
9	Uniform Spotty

Stand Status

1	Invading
2	Expanding
3	Mature
4	Declining
5	Dead

Vigor (Shrubs and Trees)

Average Size/Plant

1	Small
2	Medium
3	Large

Average Density/Plant

a	Sparse
b	Moderate
c	Dense

Stand Litter

0	None
1	Sparse
2	Medium
3	Heavy
4	Very heavy, dense accumulation

* Adapted from Graham, S.A., 1948, "Ecological Classification of Cover Types", Jour. Wildl. Mgt., 9:182-190. Also see Mosby, Henry S., 1960, "Manual of Game Investigational Techniques", 4:2 - 4:5, The Wildlife Society.

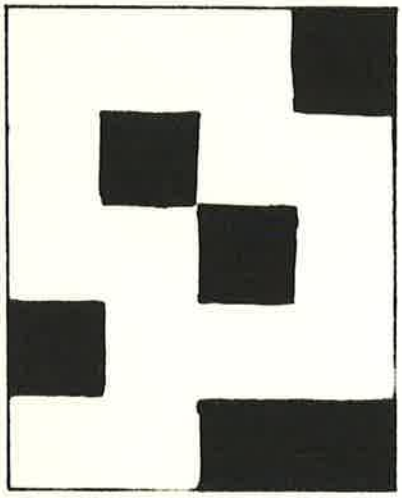
**Does not follow Graham's basic symbols. (See SECTION V, PART C, No. 2)

PLANT SPECIES SYMBOLS

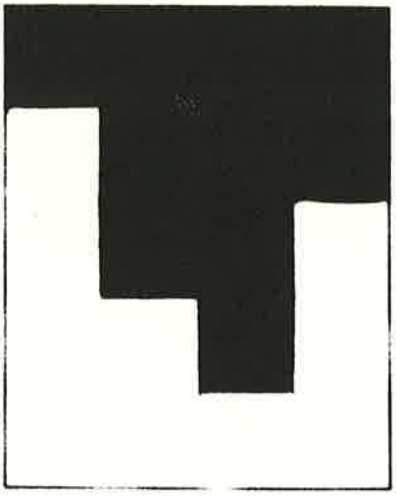
Sci. Abbr.	Scientific Name	Common Name	Type Formula Abbr.
Clx	Chlorophyceae species	Green Algae	Green Algae (Clx)
Lmi	Lemna minor	Duckweed	Duckweed (Lmi)
Raq	Ranunculus aquatilis	Buttercup	Buttercup (Raq)
Ppe	Potamogeton pectinatus	Sago Pondweed	S. Pondweed (Ppe)
Zpa	Zannichellia palustris	Horned Pondweed	H. Pondweed (Zpa)
Chx	Chara species	Muskgrass	Muskgrass (Chx)
Sgx	Sagittaria species	Arrowhead	Arrowhead (Sgx)
Tla	Typha latifolia	Cattail	Cattail (Tla)
Sva	Scirpus validus	Softstem Bulrush	S. Bulrush (Sva)
Sac	Scirpus acutis	Hardstem Bulrush	H. Bulrush (Sac)
Jba	Juncus balticus var. littoralis	Wiregrass	Wiregrass (Jba)
Ex	Eleocharis species	Spikerush	Spikerush (Ex)
Cx	Carex species	Sedge	Sedge (Cx)
Dst	Distichlis stricta	Saltgrass	Saltgrass (Dst)
Hju	Hordeum jubatum	Foxtail Barley	F. Barley (Hju)
Car	Cirsium arvense	Canadian Thistle	C. Thistle (Car)
Mof	Melilotus officinalis	Sweetclover	Sweetclover (Mof)
Ksc	Kochia scoparia	Kochia Weed	Kochia Weed (Ksc)
Sx	Salix species	Willow	Willow (Sx)
Sve	Sarcobatus vermiculatus	Greasewood	Greasewood (Sve)
Crx	Chrysothamnus species	Rabbit Brush	Rabbit Brush (Crx)
Gx	Grass species (other than listed)		Grasses (Gx)
Wx	Weed species (other than listed)		Weeds (Wx)
B	Bare ground and debris		Bare (B)
OW	Open water		Open Water (OW)

x - indicates species

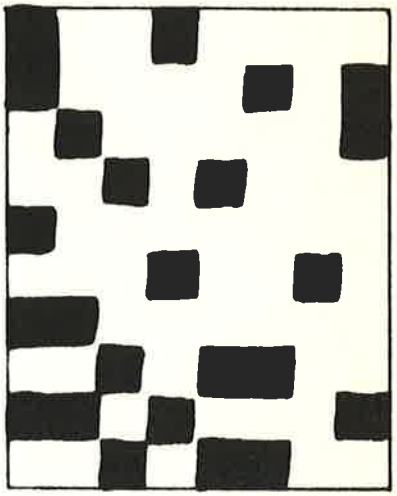
GROWTH PATTERN SHEET



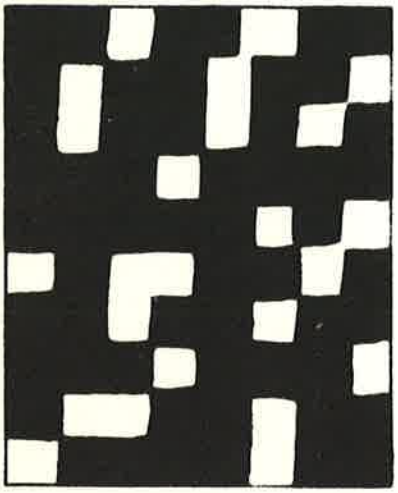
(1) Large Spotty



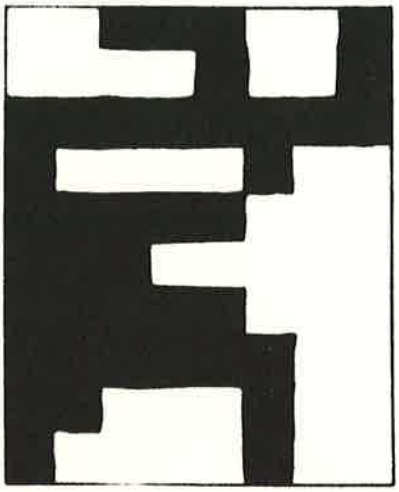
(2) Block



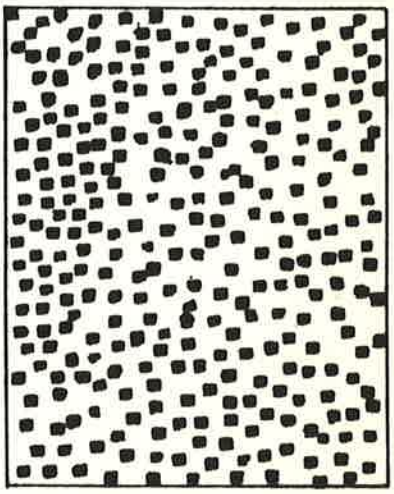
(3) Small Spotty



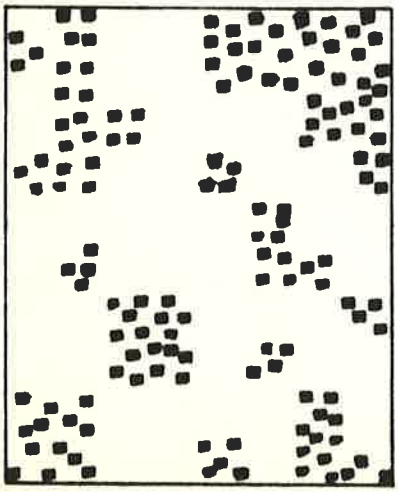
(4) Tenuously Spotty



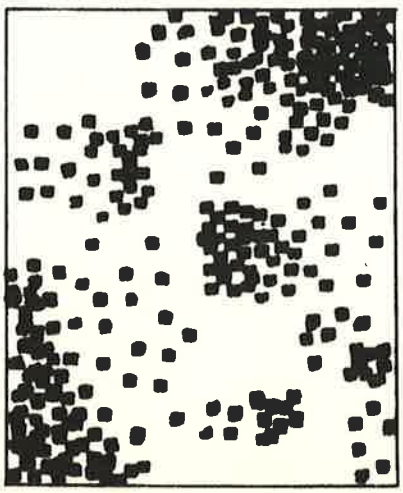
(5) Tenuous



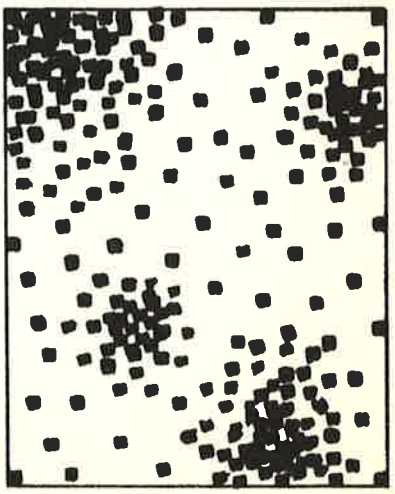
(6) Uniform Scattered



(7) Spotty Scattered



(8) Mixed Spotty Scattered



(9) Uniform Spotty

GROUND COVER DATA SHEET

PLANT SPECIES	OCCURRENCE				TOTAL
	Whole	Half	Third	Fourth	
4-31 (100)					
Grass	2	28	11	0	41
Weeds	12	24	11	0	47
Barley	0	1	11	0	12
Juncus	0	0	0	0	Trace
4-32 (100)					
Juncus	14	17	9	2	42
Barley	0	5	6	2	13
Carex	2	11	4	2	19
Weeds	0	4	2	2	8
Eleocharis	0	4	1	1	6
Grass	4	2	5	1	12
4-33 (100)					
Greasewood	54	0	0	0	54
Bare	68	0	0	0	68
Weeds	22	3	0	0	25
Saltgrass	4	1	0	0	5
Juncus		2	0	0	2
Greasewood (Dead)	4	0	0	0	4

TYPE FORMULA DATA SHEET

Unit No.: 4 **Mapper:** John Q. Doe

Date: July, 1962 (Month & Year)

Type No.	Type Prefix	Type Acreage	Plant Species	Growth Density	% Density	Growth Pattern	Stand Status	Vigor (Sh. & Tr.)	Stand Litter
4-31	MS p 6	5.1	Weeds (Wx)	-	47	6	2	*	1
			Grass (Gx)	=	41	6	2	*	1
			Barley (Hju)	*	12	*	*	*	*
			Wiregrass (Jba)	*	Trace	*	*	*	*
4-32	MS $_{f}$p 5	2.6	Wiregrass (Jba)	=	42	8	3	*	2
			Sedge (Cx)	-	19	7	3	*	1
			Barley (Hju)	*	13	*	*	*	*
			Grass (Gx)	-	12	3	2	*	1
			Weeds (Wx)	*	8	*	*	*	*
			Spikerush (Ex)	*	6	*	*	*	*
4-33	Aa 67	20.2	Bare (B)	*	68	4	*	*	*
			Greasewood (Sve)	=	54	8	2	2b	2
			Weeds (Wx)	-	25	7	2	*	1
			Saltgrass (Dst)	-	5	7	2	*	1
			Dead Greasewood (Sve)	*	4	*	*	*	*
			Wiregrass (Jba)	*	2	*	*	*	*

PHOTOGRAPH RECORD FORM

Print No. Type No. Date Taken Photo Point Shutter Speed F-Stop Sunlight

Description of Photo:

Print No. Type No. Date Taken Photo Point Shutter Speed F-Stop Sunlight

Description of Photo:

Print No. Type No. Date Taken Photo Point Shutter Speed F-Stop Sunlight

Description of Photo:

Print No. Type No. Date Taken Photo Point Shutter Speed F-Stop Sunlight

Description of Photo:

Print No. Type No. Date Taken Photo Point Shutter Speed F-Stop Sunlight

Description of Photo:

Print No. Type No. Date Taken Photo Point Shutter Speed F-Stop Sunlight

Description of Photo:

Print No. Type No. Date Taken Photo Point Shutter Speed F-Stop Sunlight

Description of Photo:

NESTING SURVEY DATA SHEET

Nest Data							Cover Data					
Nest No.	Species	Flushed Yes	Flushed No	No. Eggs	Hatched Yes	Hatched No	Plant Species	Gr. Den.	Sh. Den.	St. Lit.	Date	Remarks
14-41	Mallard	✓		7		✓	Sve	=	2b	1	6/14/62	
							Jbs	=	/	3		
14-42	Gadwall(?)		✓	4		✓	Jbs	=	/	2	6/14/62	Eggs may be deserted. Species (duck) not definite
							Hju	—	/	0		
							Ow	/	/	/		

219 East Magnolia
Fort Collins, Colorado
September 21, 1962

Wildlife Mgt. Biologist
Monte Vista N/W Refuge
P.O. Box 566
Monte Vista, Colorado

Dear Bob,

Here are the forms for the photo flip file index. The plant species that I have listed under Growth Density, Stand Litter, and Stand Status are only examples. Those species that we have photos of will go there. The list on each card can be added to to a certain extent.

The photo numbers under the MS-series are also only examples.

You may want to modify the forms somewhat so that they will conform to the revised revision of the original revised revision.

I'm all registered now and waiting around for the shooting match to start, which is Monday. Am taking Mammalogy, Wildlife Management Techniques, Principles of Range Management, and Physics this quarter. Appears to be an awesome lineup but I'm looking forward to getting into them.

Sincerely,

Scoop

NESTING SURVEY DATA SHEET

Nest Data							Cover Data					
Nest No.	Species	Flushed Yes	Flushed No	No. Eggs	Hatched Yes	Hatched No	Plant Species	Gr. Den.	Sh. Den.	St. Lit.	Date	Remarks

PLANT SPECIES SYMBOLS

Sci. Abbr.	Scientific Name	Common Name	Type Formula Abbr.
Clx	Chlorophyceae species	Green Algae	Green Algae (Clx)
Lmi	Lemna minor	Duckweed	Duckweed (Lmi)
Raq	Ranunculus aquatilis	Buttercup	Buttercup (Raq)
Ppe	Potamogeton pectinatus	Sago Pondweed	S. Pondweed (Ppe)
Zpa	Zannichellia palustris	Horned Pondweed	H. Pondweed (Zpa)
Chx	Chara species	Muskgrass	Muskgrass (Chx)
Sgx	Sagittaria species	Arrowhead	Arrowhead (Sgx)
Tla	Typha latifolia	Cattail	Cattail (Tla)
Sva	Scirpus validus	Softstem Bulrush	S. Bulrush (Sva)
Sac	Scirpus acutis	Hardstem Bulrush	H. Bulrush (Sac)
Jba	Juncus balticus var. littoralis	Wiregrass	Wiregrass (Jba)
Ex	Eleocharis species	Spikerush	Spikerush (Ex)
Cx	Carex species	Sedge	Sedge (Cx)
Dst	Distichlis stricta	Saltgrass	Saltgrass (Dst)
Hju	Hordeum jubatum	Foxtail Barley	F. Barley (Hju)
Car	Cirsium arvense	Canadian Thistle	C. Thistle (Car)
Mof	Melilotus officinalis	Sweetclover	Sweetclover (Mof)
Ksc	Kochia scoparia	Kochia Weed	Kochia Weed (Ksc)
Sx	Salix species	Willow	Willow (Sx)
Sve	Sarcobatus vermiculatus	Greasewood	Greasewood (Sve)
Crx	Chrysothamnus species	Rabbit Brush	Rabbit Brush (Crx)
Gx	Grass species (other than listed)		Grasses (Gx)
Wx	Weed species (other than listed)		Weeds (Wx)
B	Bare ground and debris		Bare (B)
OW	Open water		Open Water (OW)

x - indicates species

PHOTOGRAPH RECORD FORM

Print No. Type No. Date Taken Photo Point Shutter Speed F-Stop Sunlight

Description of Photo:

Print No. Type No. Date Taken Photo Point Shutter Speed F-Stop Sunlight

Description of Photo:

Print No. Type No. Date Taken Photo Point Shutter Speed F-Stop Sunlight

Description of Photo:

Print No. Type No. Date Taken Photo Point Shutter Speed F-Stop Sunlight

Description of Photo:

Print No. Type No. Date Taken Photo Point Shutter Speed F-Stop Sunlight

Description of Photo:

Print No. Type No. Date Taken Photo Point Shutter Speed F-Stop Sunlight

Description of Photo:

Print No. Type No. Date Taken Photo Point Shutter Speed F-Stop Sunlight

Description of Photo:

COVER MAPPING KEY*

Type Series and Members

A 1	Non-porous, bare soil
A 6	Upland mixed-herbaceous on non-porous soils**
A 7	Upland shrubs on non-porous soils
MS 1	Permanent open water, no vegetation
MS_f 1	Seasonal open water, no vegetation
MS^f 2	Permanent open water, submerged vegetation
MS 4	Emergent aquatics
MS 5	Emergents and sedges
MS 6	Lowland mixed-herbaceous
MS 7	Lowland shrubs
MS 8	Intolerant trees
T 5	Emergents, sedges, and upland mixed-herbaceous
T 6	Emergents, sedges, upland mixed-herbaceous, and upland shrubs
T 7	Emergents, sedges, and upland shrubs

Management Practices

i	Irrigated
f	Flooded seasonally
p	Pastured
h	Hayed
a	Alkali deposits
t	Previously tilled
s	Scalped

Growth Density

-	Sparse
=	Medium
≡	Dense

Growth Pattern

1	Large Spotty
2	Block
3	Small Spotty
4	Tenuously Spotty
5	Tenuous
6	Uniform Scattered
7	Spotty Scattered
8	Mixed Spotty Scattered
9	Uniform Spotty

Stand Status

1	Invading
2	Expanding
3	Mature
4	Declining
5	Dead

Vigor (Shrubs and Trees)

Average Size/Plant

1	Small
2	Medium
3	Large

Average Density/Plant

a	Sparse
b	Moderate
c	Dense

Stand Litter

0	None
1	Sparse
2	Medium
3	Heavy
4	Very heavy, dense accumulation

* Adapted from Graham, S.A., 1948, "Ecological Classification of Cover Types", Jour. Wildl. Mgt., 9:182-190. Also see Mosby, Henry S., 1960, "Manual of Game Investigational Techniques", 4:2 - 4:5, The Wildlife Society.

**Does not follow Graham's basic symbols. (See SECTION V, PART C, No. 2)

GROUND COVER DATA SHEET

PLANT SPECIES	OCCURRENCE				TOTAL
	Whole	Half	Third	Fourth	

TYPE FORMULA DATA SHEET

Mapper ______________________

Unit No. ________________

Date ______________________
(Month & Year)

Type No.	Type Prefix	Type Acre-age	Plant Species	Growth Den-sity	% Den-sity	Growth Pat-tern	Stand Sta-tus	Vigor (Sh.& Tr.)	Stand Lit-ter

TYPE FORMULA DATA SHEET

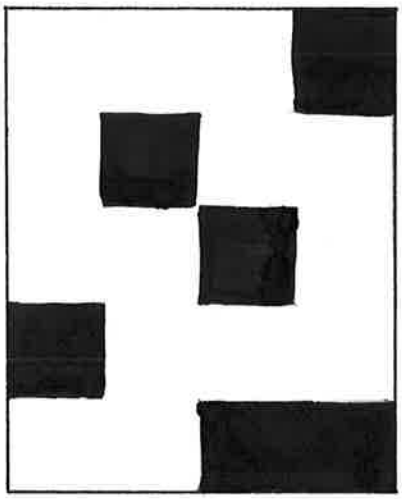
Mapper: ______________________

Unit No.: ____________________

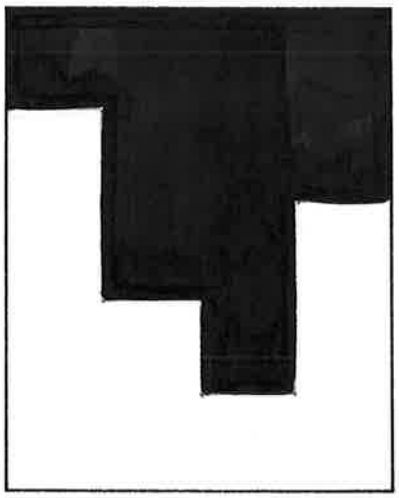
Date: ______________________
(Month & Year)

Type No.	Type Prefix	Type Acre-age	Plant Species	Growth Den-sity	% Den-sity	Growth Pat-tern	Stand Sta-tus	Vigor (Sh. & Tr.)	Stand Lit-ter

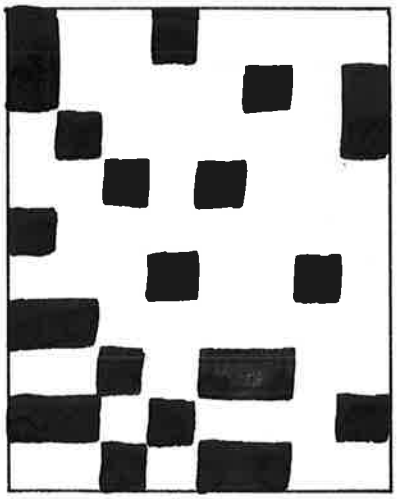
GROWTH PATTERN SHEET



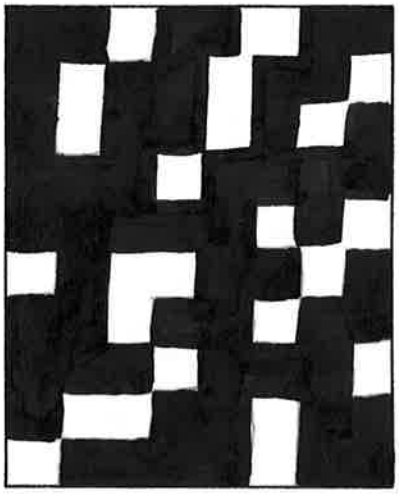
(1) Large Spotty



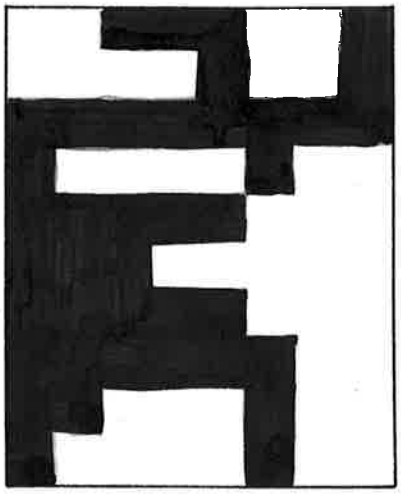
(2) Block



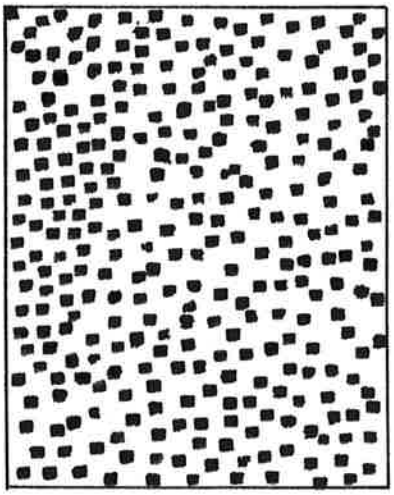
(3) Small Spotty



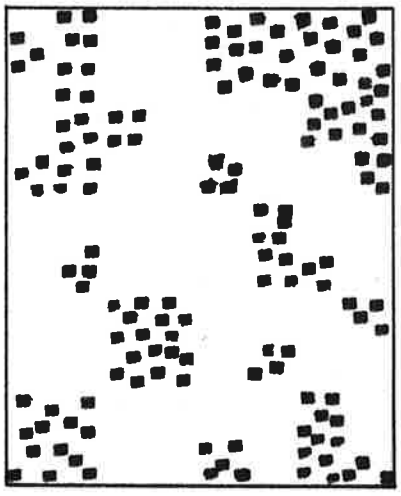
(4) Tenuously Spotty



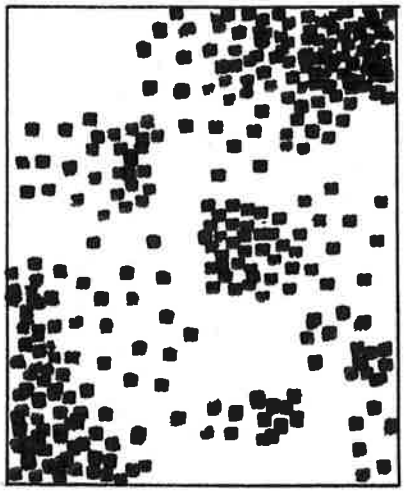
(5) Tenuous



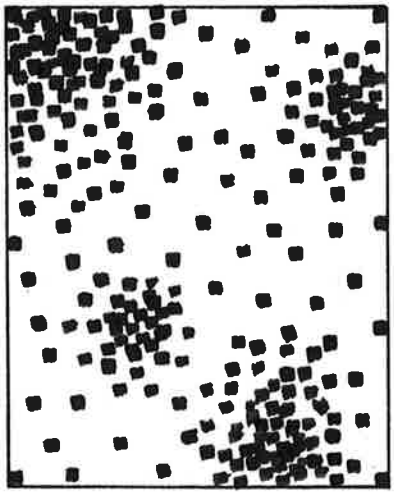
(6) Uniform Scattered



(7) Spotty Scattered



(8) Mixed Spotty Scattered



(9) Uniform Spotty

Nesting and Brood Survey: Raymond E. Grossman (student trainee)

BUREAU OF SPORT FISHERIES AND WILDLIFE

Director
Bureau of Sport Fisheries and Wildlife — September 7, 1962
Washington, D. C.

Acting Regional Director, Region 2 — 2-B
Albuquerque, New Mexico

Nesting Survey - Monte Vista National Wildlife Refuge

For your information, we are enclosing a copy of a Monte Vista National Wildlife Refuge nesting survey for 1962. This was prepared by Raymond E. Grossman a freshman trainee.

We feel that Mr. Grossman did a very good job in preparing this nesting survey.

Carey H. Bennett

Enclosure

cc: Monte Vista Refuge

Regional Director, Fish and Wildlife Service 8/31/62
P. O. Box 1306 Albuquerque, New Mexico

Refuge Manager, Monte Vista National Wildlife Refuge
P. O. Box 566 Monte Vista, Colorado

Nesting Survey, Monte Vista National Wildlife Refuge, 1962

Please find attached nesting survey information on the Monte Vista National Wildlife Refuge for 1962, which was carried out by Raymond E. Grossman, Student Trainee.

It will be noted in the report that several of the nesting plots which were checked were subject to flooding this year, therefore, were not as acceptable to the birds as they were during 1961. This does not represent a decrease in nesting birds inasmuch as other locations in the general area were used and possibly we should have shifted the plots back into the fringe area rather than studying those areas which were flooded.

Charles R. Bryant

Attachment

CRB/mg

Student Trainee

WILDLIFE MANAGEMENT STUDY OUTLINE

Branch of Wildlife Refuges, Region 2 — Project: Monte Vista-5

Student Trainee Project-Summer-C.Y. 1962 — Reg. Code Design: 211-12-MV

1. Title of Study: Vegetative Type Mapping

2. Objectives: To identify and map cover types on that part of the Monte Vista Nat'l W/L Refuge that is scheduled for development in F. Y. 1963.

3. Justification: This project is required to be able to evaluate the effect of development. It is also needed as a tool to be used in future management and for use in setting up future vegetative trend transects. This is the second segment of a continuing project to cover map the entire refuge just prior to development. Vegetative trend transects, based on these cover maps and developments, will be established immediately following development.

4. Procedure:

   a. Literature review.
   The trainees will make a study of available herbarium material. They will also review available references on Colorado flora and cover mapping procedures.

   b. Data collecting.
   The area to be cover mapped under this segment are Units 6 and 14.

   Aerial photographs at a scale of 8" to a mile will form the basis for the map. Type mapping in the field will be done on polytex drafting film overlays of the aerial photos. Types will be determined by ground checks and reference to the photos. All types 2½ acres or greater in size will be mapped. Any complex of vegetation which varies from another in any significant degree (species, density, height, uniformity, etc.) will be deliniated as a separate type.

   Graham's ecological system of cover type mapping will be used to symbolically describe types. Page 413 of the Manual of Game Investigational Techniques describes this method. A specialized key adapted for use at the Monte Vista Refuge is attached. Additional modifications and refinements of the key will be made if advisable.

   Photographs will be taken of all major types. In most cases it will be desirable to have a closeup and an

overall view of each type. The panoramic photos will be taken from as great an elevation as is feasible (ie, cab of pickup). Each photo will be identified by date, location, direction of shot in degrees, height, and major types photographed. An aerial photo overlay will show the location and direction of each photographic point. Fine grain film and custom developing and enlarging to 5 x 7, or equivalent, prints will help assure standard quality photographs. If available, a 2¼ x 2¼ camera will be used. Otherwise any camera that can insure quality work will be satisfactory.

c. Reporting
The final report will include:

1) Thorough description of techniques and procedures used.
2) Detailed key to symbols on map.
3) Inked field overlays of cover ypes mapped.
4) Identification, cross referencing, and filing of negatives and enlargements.
5) Recording of photographic points on overlays.

5. Cooperators: None

6. Responsibility: All Student Trainees work on the project will be under the direct supervision of the Refuge Manager or the Assistant Refuge Manager. The Wildlife Management Biologist will give technical assistance to the Student Trainees on this project.

Trainee Beaty will be primarily responsible for the performance of this project as directed by the Refuge Manager; he will be assisted in the work by Trainee Grossman.

7 & 8 Cost & Schedule: The Refuge will furnish all needed supplies and equipment.

Item	Schedule	Man-days	Cost F.Y. 1963
Literature review	July 30-Aug. 3	10	$ 160
Cover mapping	Aug. 6-17	20	320
Report preparation	Aug. 20-24	5	80
		35	$ 560

9. Reports: Trainee Beaty is responsible for the report. All mapping and the report are to be submitted to the Refuge Manager on or before August 25.

Distribution of report copies:

Central Office	1	
Regional Office	1	
Refuge Manager	1	(with overlay)
Wildlife Mgt. Biologist	1	
Student Trainee	1	

10. **Publication:** Not planned

11. Submitted by: Robert M. Ballou
Robert M. Ballou, Wildlife Mgt. Biologist

Date: April 6, 1962

12. Endorsed by: Charles R. Bryant
Charles R. Bryant, Refuge Manager

Date: April 6, 1962

13. Approved by: [signature]

Date: 4/12/62

COVER MAPPING SYMBOLS*

A 1	Non-porous, bare soil
MS 1	Open water, no aquatics (intermittent open water designated by MS 1 --- see Mgt. Practices below)
MS 2	Open water, submerged vegetation
MS 4	Emergent aquatics
MS 5	Emergents and sedges
MS 6	Mixed herbaceous
A 6	Upland mixed herbaceous on non-porous soils
MS 7	Lowland shrubs
A 7	Upland shrubs on non-porous soils (greasewood)
MS 8	Intolerant trees (cottonwood)
9	Mid-tolerant trees
10	Tolerant trees

Management Practices (sub-letters)

i	Irrigated
f	Flooded seasonally
p	Pastured
h	Hayed
a	Alkali deposits

Uniformity (of stand-species-within type) (exponential)

-	Scattered	(0-30%)
=	Spotty	(30-70%)
≡	Uniform	(70-100%)

Density (of species within stand) (sub-numbers)

1	Scattered
2	Medium (penetrable)
3	Dense (not penetrable)

Height (of species within stand) (exponential)

'	Short
"	Medium
'''	Tall

Species**

R	Ranunculus (Buttercup)
Sa	Sago pondweed
Z	Horned pondweed
Ch	Chara
C	Cattail
Bl	Bulrush
J	Juncus***
Sg	Sedges****
D	Salt grass
G	Mid-grasses (Brome, foxtail, etc)
W	Weeds
Sc	Sweetclover
Sl	Willows
Gw	Greasewood

Litter (of species within stand) (sub-numbers)

%	Ground Cover
4	Scattered (0-30%)
5	Spotty (30-70%)
6	Uniform (70-100%)

Accumulation

7	Sparse (but is penetrable)
8	Medium (provides support above ground)
9	Heavy (matted and not penetrable)

* Adapted from Graham, S. A., 1945, "Ecological Classification of Cover Types", Jour. Wildl. Mgt., 9:182-190

** Each area will develop its own species list and codes.

*** Type dominated by tall, coarse Juncus Balticus, although other sedges may be present.

**** May include less thrifty Juncus Balticus as a relatively minor component of mixture including Carex, Eleocharis, etc.

WILDLIFE MANAGEMENT STUDY OUTLINE

Branch of Refuges, Region 2 — Project: Monte Vista 6

Student Trainee Project-Summer-C.Y. 1962 — Reg. Code Design: 111-22-MV

1. Title of Study: Waterfowl Production on Study Areas

2. Objectives:

   1) To compare waterfowl production on five areas that were studied last year as an aid in estimating refuge waterfowl production.

   2) To conduct a refuge-wide brood survey for comparison with last year's (and previous years') data.

3. Justification: The Monte Vista Refuge is currently developing a comprehensive procedure under another study for estimating waterfowl production. In the interim, refuge production estimates are, and have been, largely derived from nesting surveys of a number of study areas, coupled with more extensive brood counts. Although subject to a number of limitations, particularly as the size of the refuge increases and habitat changes, this method has provided continuity of production estimates over the years and permits comparison of nesting success on the study plots between years. This study proposes to carry out this work for another year.

4. Procedure:

   a. Literature review.
   The trainees will review past years' reports of this study and become acquainted with the study areas and waterfowl species and nests.

   b. Data Collecting.
   Four of the study areas will be identical with the ones used for this project last year and will not be described here.

   A fifth study area will be included for comparison with data collected last year under Project: Monte Vista-2 (Reg. Code Design: 111-11-MV). This area is described as follows: SE¼ NW¼, SW¼ NE¼, NW¼ SE¼, NE¼ SW¼, Sec. 5, T. 37 N., R. 8 E.

   Nests will be plotted on overlays of 8" to 1 mile aerial photographs. Nests will be marked by placing a numbered stake near them. Data on species, clutch

size, cover type, success of nesting attempt and other local conditions affecting nesting will be recorded in a notebook. Nesting cover types will be analyzed by percent use and nests per acre of each cover type. The fate of each nest will be determined.

A brood survey will be conducted on the larger brooding areas of the Refuge to ascertain the average brood size of each species. Broods will be recorded by species, age class and number.

5. Cooperators: None

6. Responsibility: All Student Trainee work on the project will be under the direct supervision of the Refuge Manager or the Assistant Refuge Manager. The Wildlife Management Biologist will give technical assistance to the Student Trainees on this project.

Trainee Grossman will be primarily responsible for the performance of this project as directed by the Refuge Manager; he will be assisted in the work by Trainee Beaty.

7 & 8 Costs & Schedule: The Refuge will furnish all needed supplies and equipment.

Item	Schedule	Man-days	Cost F.Y.1962	F.Y.1963
Review & Preparation	June 11-15	10	$160	
Nesting survey	June 18-29	20	320	
Brood surveys	July 2-Aug. 3	10		160
Report preparation	Aug. 20-24	5		85
		45	480	245

9. Reports: Trainee Grossman is responsible for the report. All data, overlays and the report are to be submitted to the Refuge Manager on or before August 25.

Distribution of report copies:

Central Office	1
Regional Office	1
Refuge Manager	1 (with data & overlays)
Wildlife Mgt. Biologist	1
Student Trainee	1

10. Publication: Not planned

11. Submitted by: Robert M. Ballou
Robert M. Ballou, Wildlife Mgt. Biologist

Date: April 6, 1962

12. Endorsed by: Charles R. Bryant
Charles R. Bryant, Refuge Manager

Date: April 6, 1962

13. Approved by: Ernest Bromley

Date: April 12, 1962

There are two ways to figure production from survey data.

The formula used in the CY 872 folder is as follows:

160.25 miles of transects times 5,280 feet per mile times 24 feet in width equals 20,306,880 sq. feet in sample. Divided by 43,560 equals 466.18 acres covered in survey.

11,570 acres in refuge surveyed divided by 466.18 acres in sample equals 24.8 nests total for each nest found.

99 nests were found X 24.8 -- 2455.2 total nests X 40% nest success is 982.08 nests hatched.
982.02 X 6.43 ducklings per brood equals 6,314.7 Ducklings

The other method used to calculate production is:

466.18 acres covered now divided by 641 acres in original sample equals 72.72% coverage.

99 nests found divided by 466.18 acres in dample equals 0.2123 nests per acre.

0.2123 X 11,570 acres sampled -- 2457 total nests X 40% success equals 982.82 nests hatched.

982.82 broods times 6.43 average brood size equals 6,319 ducklings.

Mallard brood sizes were significantly higher than the average

(6.64 d/brood) as were gadwall (7.08) and the total estimated production from the survey data is 7,494 ducklings

This does not count any redhead, ruddy duck, or late hatching gadwalls.

NESTING AND BROOD SURVEY

SUMMER, 1962

MONTE VISTA NATIONAL WILDLIFE REFUGE

By

Raymond E. Grossman
Student Trainee

August 27, 1962

TABLE OF CONTENTS

OBJECTIVE

The purpose of this report is to present data collected during the 1962 waterfowl nesting survey on the Monte Vista National Wildlife Refuge. Data from similar surveys conducted in past years will also be presented; however, this report will not set forth as fact conclusions that might be drawn from comparison of information from past surveys with that of this year's survey.

The objective of the nesting project itself is to collect information that will indicate how nesting density, nesting success, and choice of vegetation utilized has varied on a given plot from year to year. The project also serves to familiarize a new employee with the refuge area and management.

PROCEDURE

Before entering the field, the procedures data, and areas of past surveys were studied in order to prepare for and become familiar with the method and purpose of a nesting survey.

Four of the five plots studied this year were located in the same areas as the plots of the past two years. A fifth plot was located in a recently developed area on which a nesting survey was conducted for the first time in 1961 by Mr. Robert Ballou, Wildlife Management Biologist.

The study plots were searched according to natural areas by three to five persons walking parallel lines. In order to achieve complete coverage of the area, the lines were varying distances apart according to the density of the nesting cover. In this way, the majority of nests could be found by causing the hen to flush or by sighting unattended nests. Such unattended nests were difficult to identify and unless the eggs, down, and general status of the nests were enough to make identification fairly certain, they were classified as species unknown.

For each nest found, the species, number of eggs, vegetation used, and general remarks such as predation, bird flushed, nest hatched, or partially hatched were recorded. The nest was then marked with a numbered stake placed six to eight feet to the west of the nest, and its location marked on an aerial photo overlay. Upon leaving, the nests were covered with down or grass to conceal the eggs in order to prevent predation.

VEGETATION

A knowledge of what types of cover are most heavily used by ducks is necessary in order to achieve the greatest possible waterfowl production through development and water management designed to produce these types of cover. Consequently, of all of the data the nesting survey yielded

probably the most useful to the refuge as a whole are the information concerning the types of nesting cover preferred by waterfowl.

Since the study plots were relatively small and since many factors affect nesting, the average nesting density and production data for these plots cannot be used to project figures for the whole refuge. However, when birds exhibit an obvious preference for a certain vegetative complex within a plot which offered several varied complexes, it would seem likely that this same complex would be preferred on other areas of the refuge also; that is, when the proximity of water and other conditions are similar.

It is impossible to determine whether or not there has been a shift in the vegetative habitat most often used. This is due to the manner in which past reports handled that information and the areas past surveys covered. The areas studied in 1961 were different in size and percent composition of vegetative complexes from the areas studied in 1962. Therefore, the percentage of total nests found in a Juncus complex in 1961, for example, cannot be compared to the percentage found in the same complex in 1962. The areas studied in 1961 may have been primarily Juncus; hence, a great percentage of the total nests found would have been in a Juncus type even though that might not have been the choice nesting habitat. This percentage is meaningless when compared to data derived from a plot predominantly of greasewood.

The most meaningful way to try to indicate a preference for a certain nesting habitat would be to determine the approximate area within a plot covered by each complex along with the percentage of all nests on the plot which were found in each complex.

Since the unit 15 plot was a large area with a sampling of most vegetative complexes and since there was a detailed study made of the area in 1961, there will be a more detailed discussion of data concerning vegetation used on this area. Other study areas were too small and without a good sampling of cover types.

Most of the nesting cover could generally be catagorized as being a complex of greasewood, Juncus, sedge, weed, grass, bulrush, or reed. The greasewood complexes composed of a mature greasewood overstory with a sparce to medium Juncus, saltgrass, or weed understory seemed to be the favorite nesting habitat. Of course some species will not nest in this type of cover, but this complex was heavily used by the more abundant species on the area.

TABLE I - VEGETATION USED ON UNIT 15 PLOT

	Acres in Area	% of Total Area	No. of Nests	% of Total Nests	Nests Per Acre
Greasewood complexes	51.75	32.3	108	52.7	2.09
Greasewood-Juncus			35	17.4	
Greasewood-Saltgrass			33	16.4	
Greasewood-Weed			16	8	
Greasewood-Alkali			24	11.9	
Juncus sedge complex	59	35.6	68	33.8	1.15
Weed complex			17	8.5	
Reed			5	2.5	
Saltgrass			3	1.5	

Although birds seemed to favor a nesting site with overhead cover, such as a greasewood bush, they would utilize a Juncus complex when growth was dense enough to provide good concealment yet not so dense as to be impenetrable. Flooded Juncus was not often used by ducks. As indicated by the survey in 1961 also, Juncus seemed to be a second choice as nesting cover for mallard and gadwall.

Weed saltgrass and reed cover were used in much the same way as Juncus stands. However, they were not as favored as Juncus and did not support so many nests since they were much less extensive in area. Again the amount of overhead cover the type offered seemed to be a deciding factor.

The vegetative use information for the unit 15 study plot seemed representitive of all areas studied and very similar to Mr. Ballou's findings in 1961. Greasewood complexes received equally heavy use on the same general areas in 1961.

Table II gives the percentage of nests of each species found in various complexes. However, this table is apt to be misleading because equal areas of each complex were not sampled and because there was insufficient data on redhead, ruddy, shoveller, and pintail.

TABLE II - PERCENTAGE USE OF VEGETATION BY SPECIES

	Greasewood Complex	Juncus Complex	Weed Complex	Saltgrass	Reed	Bulrush	Total
Mallard	41.1	43.1	10.7	3.9	1		99.8
Gadwall	56.2	25	18.7				99.9
Teal	34.8	56.5		8.7			100
Pintail	40	40	10	10			100
Redhead	10	40				50	100
Ruddy						100	100
Shoveller		100					100
Unknown	46.1	32.4	9.3	6.2	3	3	100

Also, complexes should be greatly subdivided to be really useful. Future surveys would yield much more meaningful information if the cover in which each nest is found would be typed using the same symbols and detailed system as the cover type mapping project presently being conducted on the refuge.

STUDY AREAS

UNIT 11 PLOT

Location

The east one-half of the NW ¼ of the NE ¼, S 31, T 38 N, R 9 E.

Discussion

The twenty acre study plot was covered with a sedge-Juncus complex broken by a few small saltgrass highs with a sparse scattering of greasewood.

Water was reportedly more abundant this spring on the refuge than it has been for the past few years. As a result, at least sixty percent of the plot was under water, making it undesirable to many species. This probably explains the difference in this and last year's nesting density.

TABLE III - NESTING DENSITY ON UNIT ELEVEN PLOT

	Number Nests	Nests per Acre
1961	35	1.75
1962	18	.9

In all the plots studied, with the exception of the one in Unit 15, it would be useless to determine the percentage of nests found in each vegetative complex in the plot since not all complexes were present or were of unknown area when present

Nesting Results

TABLE IV - NESTING RESULTS ON UNIT 11 PLOT

	Mallard	Redhead	Gadwall	Unknown
Hatched completely	2		1	3
Hatched all but one				1
Hatched all but two		1		1
Hatched all but three	1			
Destroyed completely		1		3
Flooded	2			2

As Table IV illustrates, flooding and predation by magpies each accounted for the loss of 22.2 percent of the nests on the area. In 1961 there were no losses due to flooding, and predation accounted for 14.3 percent of the nests.

UNIT 7 PLOT

Location

The study plot in Unit 7 was five acres in area, and located in the SE ¼ of the NE ¼ of S 32. The triangular plot was bounded on the east by the section line between S 32 and S 33, on the northwest by the South Meadow ditch lateral and on the south by the quarter section line.

Discussion

This area was totally under water except for the bordering ditch bank; however, the area was dry when rechecked. Cover was sparse to medium stands of Juncus, sedges, and weeds. In addition to being flooded, most of the cover was too sparse for nesting.

TABLE V - NESTING DENSITY ON UNIT 7 PLOT

	Number Nests	Nests per Acre
1961	8	1.6
1962	4	.8

Nesting Results

TABLE VI - NESTING RESULTS ON UNIT 7 PLOT

	Mallard	Unknown	% of Total
Hatched completely	1		25
Flooded		3	75

The biggest factor affecting nesting on this plot also was the water level, 75 percent of the nests being lost due to flooding.

UNIT 14 PLOT

Location

A third study plot, 29.5 acres, was located in the SE ¼ of S 6 and bounded on the east by the section line between S 6 and S 5, on the west by the meadow ditch take out, on the north by the ponds east of Real Property 121, and on the south by the south edge of Pond 14PL.

Discussion

The land area of this plot was largely underwater, at least 65 percent of it. Water levels in some of the ponds in the area had dropped three feet by the time nests were rechecked.

Juncus, sedge and weed complexes were predominate; however, there were four or five acres of greasewood and saltgrass cover.

Again the abundance of water is probably responsible for the significant difference between nesting density in 1961 and 1962.

TABLE VII - NESTING DENSITY IN UNIT 14 PLOT

	Number Nests	Nests per Acre
1961	68	2.35
1962	25	.84

TABLE VIII - NESTING RESULTS FOR UNIT 14 PLOT

	Mallard	Gadwall	Teal	Unknown	% of Total
Hatched completely	2		3	2	28
Hatched all but one		1		2	12
Hatched all but two	1				4
Hatched all but three			1		4
Destroyed by predators	4	2		5	44
Results uncertain	1			1	8

44 percent of the nests were predatorized, 24 percent by magpie, 20 percent by badger or skunk, as compared to 5.8 percent in 1961. Previously active nests in which no shells or eggs could be found upon recheck were listed as results uncertain although they were probably predatorized.

UNIT 17 PLOT

Location

Three seperate study areas were located in the east one-half of S 3. The first, approximately three acres, was the bulrush islands on the large pond.

The second was about twenty acres in area and bounded on the north, west and south by the boundaries of the NW ¼ of the NE ¼ of S 3 and on the east by the Empire Canal.

The third was a thirty acre rectangle centered on the quarter section line between the NE ¼ and SE ¼ of S 3 such that the NE corner of the plot was on the Empire Canal.

Discussion

On the first area, the bulrush islands were so dense they were very difficult to search and locate nests. Coot, ruddy, redhead, black-crowned night heron, egret, marsh wren, blackbird, and bittern seemed to especially like to nest in the islands.

50 percent of the land area of the second area was flooded. Nesting cover was mostly Juncus, grasses, and weeds with a sprinkling of greasewood.

The third area changed gradually from a uniform cover of grass and weeds to the west to one of dense flooded Juncus along pond 17P3.

Nesting densities for all three areas in Unit 17 were lower than in 1961. Again the high water level during the early part of the nesting season is probably the reason. However, this shouldn't have greatly affected nesting in the bulrush islands.

TABLE IX - NESTING DENSITY ON UNIT 17 PLOTS

Area 1		Area 2		Area 3	
No. Nests	Nests/Acre	No. Nests	Nests/Acre	No. Nests	Nests/Acre
45	...	29	1.45	41	1.4
14	...	15	.75	10	.3

Nesting Results

TABLE X - NESTING RESULTS FOR UNIT 17 PLOTS

	Mallard	Gadwall	Pintail	Ruddy	Redhead	Teal	Unknown	% of Total
Hatched completely	3		2				4	21.4
Hatched all but one	3		1					9.5
Destroyed by predators	1				1	1	9	28.5
Deserted				4		1		11.9
Flooded				1	3			9.5
Results uncertain			2	3	2		1	19

Predation accounted for loss of 9.5 percent of the nests in 1961.

UNIT 15 PLOT

Location

This study area of 160 acres was made up of the four center quarters of the quarter sections of S 5.

Discussion

Unit 15 was developed recently, and the survey in 1962, as well as the one in 1961, show it to be an excellent nesting area.

This plot had a representative sampling of practically all types of nesting habitat on the refuge. Greasewood and Juncus complexes comprised the major portion of the ground cover. As shown in Table I

in the discussion of cover most often used by ducks on this plot, greasewood complexes were the choice nesting habitat.

Unlike the other study areas, this plot was not flooded enough to affect nesting. However, one-fourth of the area had been heavily grazed and offered only scant weed cover for nesting. The difference between the number of nests found in 1961 and 1962 did not seem great enough to indicate a trend.

TABLE XI - NESTING DENSITY ON UNIT 15 PLOT

	Number of Nests	Nests per Acre
1961	236	1.45
1962	205	1.3

Nesting Results

It was difficult to determine the outcome of all nests on this area because so many were disturbed by predators. It was often impossible to tell whether a nest had partially or completely hatched before a predator disturbed it. When this was the case, the results for the nest were listed as uncertain.

TABLE XII - NESTING RESULTS FOR UNIT 15 PLOT

	Mallard	Teal	Gadwall	Redhead	Pintail	Unknown	% of Total
Hatched completely	44	5	16		5	33	52.6
Hatched all but one	10	4	1		1	10	12.6
Hatched all but two	10	2	1			4	8.5
Hatched all but three	3		2			4	4.3
Destroyed by predators	6		7		1	8	10.6
Deserted	4	2	1	1		4	5.8
Flooded				1			.4
Results uncertain	0	3	2	1		2	6.8

ALL STUDY AREAS

All study areas had a decrease in nesting density. This was apparently due to high water levels which flooded a good deal of four of the five study plots.

However, loss due to predation seemed to have increased markedly since 1961. Predation by badger and skunk, especially, had increased.

BROOD SURVEY

Average brood sizes were determined by making early morning and late evening counts on brood areas of the refuge

TABLE XIII - AVERAGE CLUTCH AND BROOD SIZES

	1961		1962	
	Clutch	Brood	Clutch	Brood
Mallard	6.8	6.2	7.7	6.5
Gadwall	7.7	8.0	9.7	7.6
Pintail	5.8	4.5	7.1	8.0
Teal	8.5	7.9	8.7	7.4
Redhead	---	---	11.8	5.8
Ruddy	5.0	5.0	7.8	6.7
Shoveller	---	---	9.0	8.1
Unknown	4.9	4.6	7.0	7.6

The value of a brood survey conducted this way is doubtful for several reasons. First of all, some species such as gadwall are bold and easily counted while others, such as mallards, are shy and very difficult to count. Secondly, the brood areas on the refuge are many and widely scattered and afford good concealment for broods. It is virtually impossible to observe more than a fraction of the broods on the area; therefore, brood surveys cannot be used to project total production on the refuge. At best the brood survey only provides average brood sizes. This is also difficult without close attention to age classification of broods.

Coot

The relationship between coot and duck on the refuge is uncertain but important in view of the rapid increase of the coot population. The nesting survey of 1961 indicated a large increase in coot production over the previous year, and the 1962 survey indicated another large

increase. In 1961, 34 coot nests were found. In 1962, 50 nests were found on the same areas. Estimated production in 1961 was 250 coot; however, no estimation was made for 1962 since coot were very shy and difficult to count except on large open water areas.

Coot invariably nested over water and usually deserted their nests when water was removed from the area.

As open water became more concentrated later in the summer, the coot gathered on the few remaining open water areas. As many as 350 were counted on Pond 17P3 at one time. With the coot and duck population concentrated this way, there was possibly a conflict between coot and duck resulting from the competion for food. Conflicts due to other factors may also have arisen.

Conclusion

This nesting survey indicates only a trend or change on particular study areas. The areas are far too small and easily influenced by various factors, such as high water, to indicate a trend on the whole refuge. It is useful in finding nesting densities on newly developed areas, to discover trends in vegetation utilized, and to familiarize a new employee with the refuge.

Summary

The 1962 nesting survey indicated that greasewood complexes with medium understories of grass, Juncus, or weed are heavily used for nesting.

Nesting decreased on four of the five study areas apparently because of the high water levels. Because of the flooding, it was impossible to determine nesting trends for four of the study areas. The fifth area which was not flooded had a slight decrease in nesting.

Predation by skunk and badger was greater in 1962 than in 1961.

The coot population on the refuge seemed to have rapidly increased. Thirty-four coot nests were found in 1961 and fifty in 1962.

Dated: August 27, 1962

Submitted by:

Raymond E. Grossman
Student Trainee

Reviewed: Regional Office

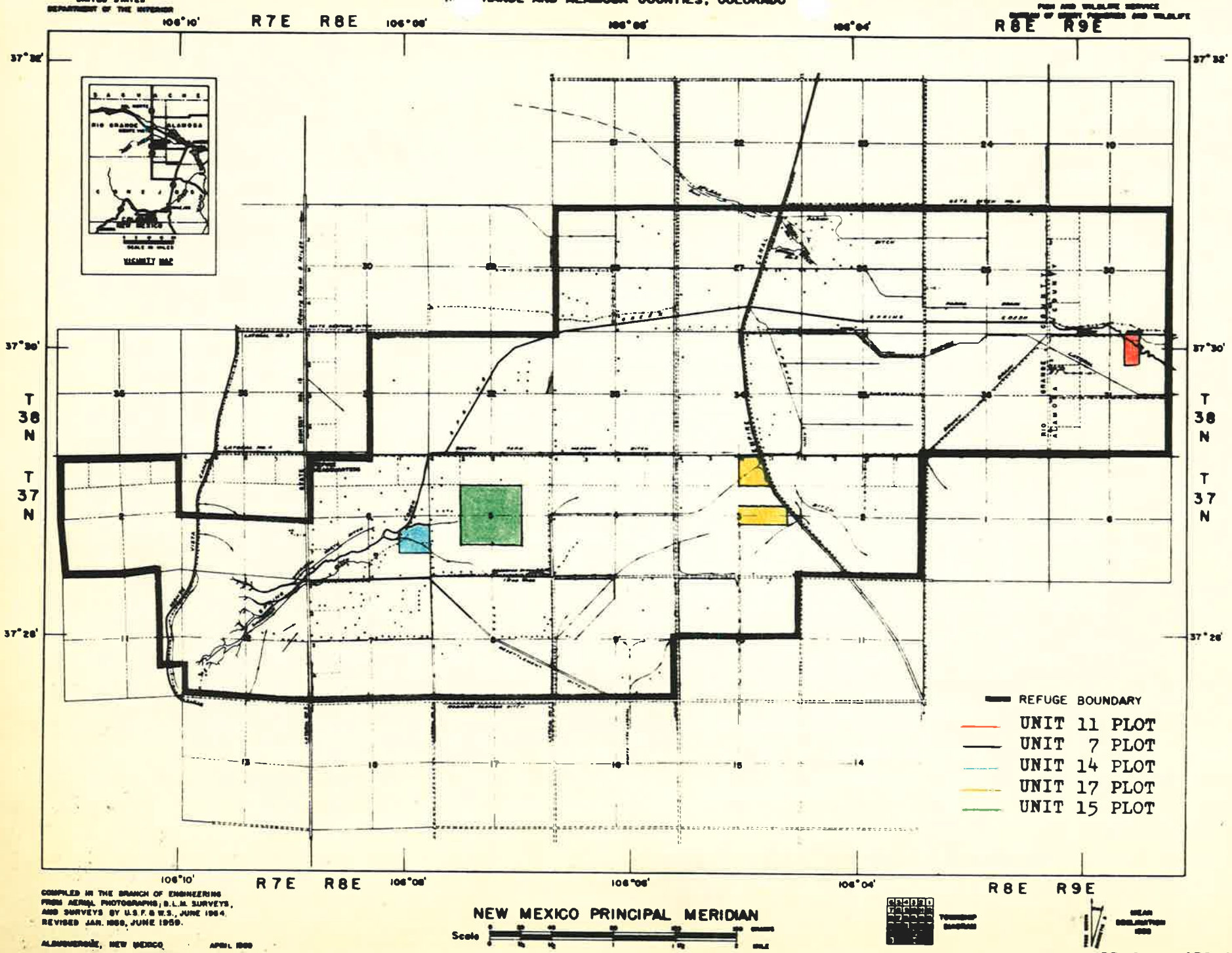
Reviewed by:

Charles R. Bryant
Refuge Manager

_____

MONTE VISTA NATIONAL WILDLIFE REFUGE

R[illegible]RANDE AND ALAMOSA COUNTIES, COLORADO



COMPILED IN THE BRANCH OF ENGINEERING FROM AERIAL PHOTOGRAPHS; B.L.M. SURVEYS, AND SURVEYS BY U.S.F. & W.S., JUNE 1964. REVISED JAN. 1966, JUNE 1969.

ALBUQUERQUE, NEW MEXICO APRIL 1969

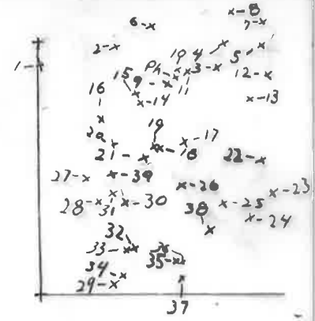
NEW MEXICO PRINCIPAL MERIDIAN

Scale

2R COLO. 480 407

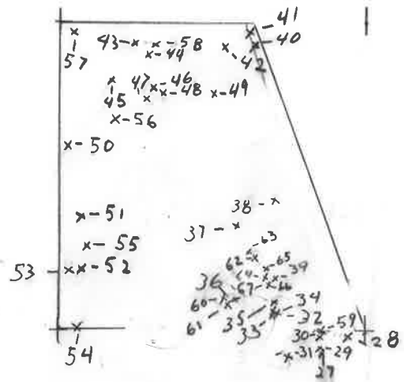
2-x
1
3-x
4-x
Unit 7
Sec. 32
4.5 Acres
Photo 25
Nests
1960 - 14
1961 - 8
1962 - 4
N

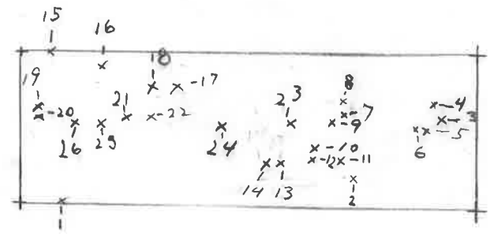
UNIT 7



Unit 14
Sec 6
29.5 Acres
Photo 37
Nests
1960 – 37
1961 – 68
1962 – 25
Coot – 12

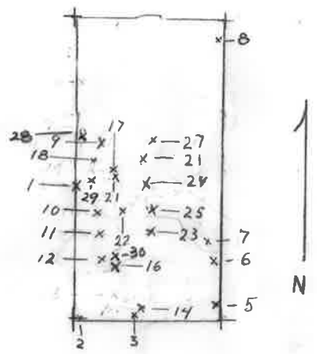
N



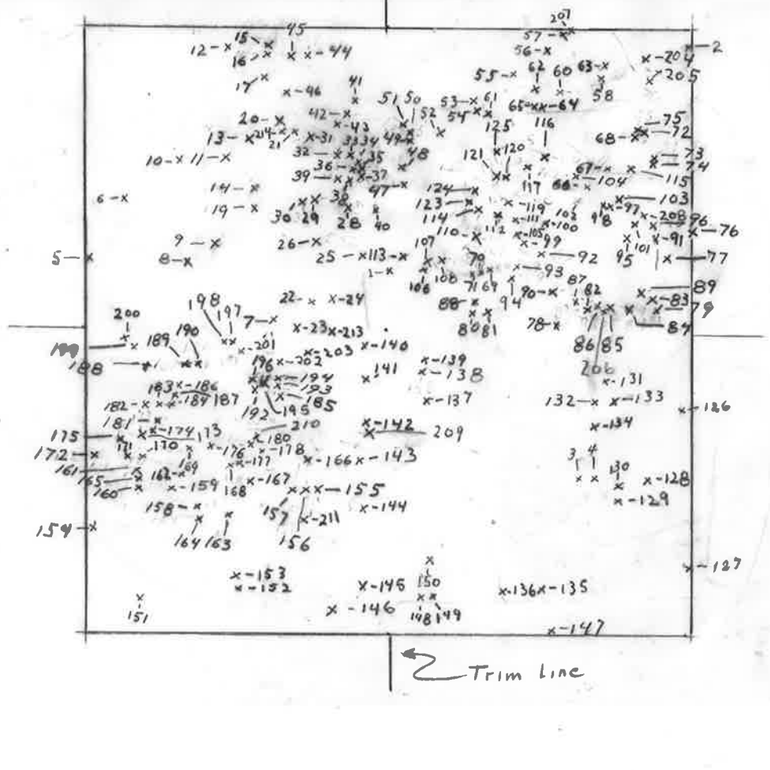


Unit 17
Sec. 3
62 Acres total
Photo 26
Nests
1960 - 50
1961 - 115
1962 - 92
Coot - 27

N



Sanderson Unit 11
Sec. 31
20 Acres
Photo 10
Nests
1960 - 20
1961 - 35
1962 - 18
Coot - 11



Unit 15
Sec. 5
160 Acres
Small Photo
Nests
1961 - 236
1962 - 205
Coot - 6.