

## APPENDIX F

### SHRUB AND TREE CANOPY COVER\* BY SAMPLE SITE FOR WOODLAND SITES – VEGETATION STUDY AREA STARK COUNTY, NORTH DAKOTA, 2006-2007

Ecological Group and Site	Table	Page
<b>WOODLAND</b>		
Riparian Woodland (RW)	F1	F-1
Deciduous Tree Woodland (DTW)	F2	F-4
<b>LOAMY</b>		
Loamy Overflow (LyOv)	F3	F-5

#### Footnote for the tables in Appendix F:

Binomials follow Great Plains Flora Association (1986).

\*Two field methods were used to estimate shrub and tree canopy cover: Line intercept was recorded for each shrub and tree species along a 50-meter transect at each sample site. Ocular estimation of canopy cover was recorded for each shrub and tree species within a 0.03-hectare (10-meter radius) circular plot centered at the 50m transect mid-point.

TABLE F1

PERCENT COVER OF SHRUB AND TREE SPECIES COMPARING LINE INTERCEPT AND OCULAR ESTIMATION METHODS\*  
AT 32 SAMPLE SITES IN THE RIPARIAN WOODLAND VEGETATION TYPE – VEGETATION STUDY AREA

	RIPARIAN WOODLAND																						
	Sample Site Number																						
	RW-1		RW-2		RW-3		RW-4		RW-5		RW-6		RW-7		RW-8		RW-9		RW-10		RW-11		
	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	
<b>LOW SHRUBS</b>																							
<i>Ribes americanum</i>							0.3										0.8	0.3					
<i>Ribes setosum</i>		0.3		0.3		0.3				0.3				0.3									
<i>Rosa woodsii</i>					8.0	15.0				0.3							4.4	9.0	2.2	9.0			
<i>Symphoricarpos occidentalis</i>		0.3		0.3	35.2	40.0	5.0	5.0	2.8	12.0	1.2	1.0	5.4	4.0			20.8	23.0	15.2	18.0			
<b>TALL SHRUBS</b>																							
<i>Cornus stolonifera</i>							1.0			0.3													
<i>Crateagus rotundifolia</i>					6.6	2.0																	
<i>Lonicera tatarica</i>					3.6	0.3																	
<i>Prunus americana</i>																							
<i>Prunus virginiana</i>					0.8	0.3					0.2	0.3		0.3	32.6	18.0							
<i>Ribes odoratum</i>						0.3																	
<i>Salix exigua</i>																			0.3				
<i>Salix lutea</i>																	8.8	4.0					
<i>Shepherdia argentea</i>							0.3										30.6	42.0	24.8	5.0			
<b>TREES</b>																							
<i>Acer negundo</i>	24.4	8.0	5.2	4.0	0.2	1.0	15.0	42.0	59.2	48.0	18.6	18.0		3.0	18.4	22.0					9.6	1.0	
<i>Elaeagnus angustifolia</i>																							
<i>Fraxinus pennsylvanica</i>	43.8	54.0	35.6	58.0	7.2	14.0	6.2	30.0	22.2	16.0	14.4	16.0	17.2	28.0	14.8	36.0	19.6	14.0	7.0	13.0	8.4	14.0	
<i>Populus deltoides</i>																							
<i>Salix amygdaloides</i>					16.2	1.0																	
<i>Ulmus americana</i>					40.0	24.0					0.3					27.0							
<b>TOTAL LOW SHRUBS</b>		0.6		0.6	43.2	55.3	5.0	5.3	2.8	12.6	1.2	1.0	5.4	4.3			26.0	32.3	17.4	27.0			
<b>TOTAL TALL SHRUBS</b>					11.0	2.9		1.3		0.3	0.2	0.3		0.3	32.6	18.0	39.4	46.3	24.8	5.0			
<b>TOTAL SHRUBS</b>		0.6		0.6	54.2	58.2	5.0	6.6	2.8	12.9	1.4	1.3	5.4	4.6	32.6	18.0	65.4	78.6	42.2	32.0			
<b>TOTAL TREES</b>	68.2	62.0	40.8	62.0	63.6	40.0	21.2	72.0	81.4	64.3	33.0	34.0	17.2	31.0	33.2	85.0	19.6	14.0	7.0	13.0	18.0	15.0	

\*Line intercept (L.I.) was recorded for each shrub and tree species along a 50-meter transect at each sample site. Ocular (Ocul) estimation of canopy cover was recorded for each shrub and tree species within a 0.03-hectare (10-meter radius) circular plot centered at the 50m transect mid-point.

TABLE F1

PERCENT COVER OF SHRUB AND TREE SPECIES COMPARING LINE INTERCEPT AND OCULAR ESTIMATION METHODS\*  
AT 32 SAMPLE SITES IN THE RIPARIAN WOODLAND VEGETATION TYPE – VEGETATION STUDY AREA

	RIPARIAN WOODLAND																					
	Sample Site Number																					
	RW-12		RW-13		RW-14		RW-15		RW-16		RW-17		RW-18		RW-19		RW-20		RW-21		RW-22	
	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul
<b>LOW SHRUBS</b>																						
<i>Ribes americanum</i>																						
<i>Ribes setosum</i>				0.3		0.3		0.3		0.3		0.3		0.3		0.3	1.6	0.3		0.3		
<i>Rosa woodsii</i>									0.4	1.0	0.4	0.3			0.6	2.0		3.0	1.2	3.0		
<i>Symphoricarpos occidentalis</i>			1.4	0.3	9.0	32.0	6.8	15.0	14.2	36.0	53.4	56.0	18.0	38.0	20.2	26.0	41.6	44.0	21.8	42.0		
<b>TALL SHRUBS</b>																						
<i>Cornus stolonifera</i>																						
<i>Crateagus rotundifolia</i>																				4.0		
<i>Lonicera tatarica</i>							1.0								0.3		3.0		0.3			
<i>Prunus americana</i>													7.4	4.0	0.4	0.3						
<i>Prunus virginiana</i>			18.4	52.0	0.8	0.3					2.4		5.8	0.3	0.4	1.0	0.6	1.0				
<i>Ribes odoratum</i>					1.8	4.0																
<i>Salix exigua</i>																						
<i>Salix lutea</i>															10.6	4.0						
<i>Shepherdia argentea</i>																						
<b>TREES</b>																						
<i>Acer negundo</i>	14.8	26.0	11.6	4.0		1.0	45.0	38.0	6.2	8.0	8.2	23.0			14.8	28.0	6.4	20.0			10.8	26.0
<i>Elaeagnus angustifolia</i>																						
<i>Fraxinus pennsylvanica</i>	34.0	20.0	83.2	70.0	9.8	37.0	12.6	30.0	41.4	36.0	17.6	52.0	76.0	65.0	37.0	26.0	62.0	58.0	20.0	10.0	40.8	50.0
<i>Populus deltoides</i>																						
<i>Salix amygdaloides</i>							2.0															
<i>Ulmus americana</i>				8.0	8.8				13.6	16.0		0.3	0.8	2.0		0.3			10.8	28.0		
<b>TOTAL LOW SHRUBS</b>			1.4	0.6	9.0	32.3	6.8	15.3	14.6	37.3	53.8	56.6	18.0	38.3	20.8	28.3	43.2	47.3	23.0	45.3		
<b>TOTAL TALL SHRUBS</b>			18.4	52.0	2.6	4.3		1.0			2.4		13.2	4.3	11.4	5.6	0.6	4.0		4.3		
<b>TOTAL SHRUBS</b>			<b>19.8</b>	<b>52.6</b>	<b>11.6</b>	<b>36.6</b>	<b>6.8</b>	<b>16.3</b>	<b>14.6</b>	<b>37.3</b>	<b>56.2</b>	<b>56.6</b>	<b>31.2</b>	<b>42.6</b>	<b>32.2</b>	<b>33.9</b>	<b>43.8</b>	<b>51.3</b>	<b>23.0</b>	<b>49.6</b>		
<b>TOTAL TREES</b>	<b>48.8</b>	<b>46.0</b>	<b>94.8</b>	<b>82.0</b>	<b>18.6</b>	<b>38.0</b>	<b>57.6</b>	<b>70.0</b>	<b>61.2</b>	<b>60.0</b>	<b>25.8</b>	<b>75.3</b>	<b>76.8</b>	<b>67.0</b>	<b>51.8</b>	<b>54.3</b>	<b>68.4</b>	<b>78.0</b>	<b>30.8</b>	<b>38.0</b>	<b>51.6</b>	<b>76.0</b>

\*Line intercept (L.I.) was recorded for each shrub and tree species along a 50-meter transect at each sample site. Ocular (Ocul) estimation of canopy cover was recorded for each shrub and tree species within a 0.03-hectare (10-meter radius) circular plot centered at the 50m transect mid-point.

TABLE F1

PERCENT COVER OF SHRUB AND TREE SPECIES COMPARING LINE INTERCEPT AND OCULAR ESTIMATION METHODS\*  
AT 32 SAMPLE SITES IN THE RIPARIAN WOODLAND VEGETATION TYPE – VEGETATION STUDY AREA

	RIPARIAN WOODLAND																					
	Sample Site Number																				Mean	
	RW-23		RW-24		RW-25		RW-26		RW-27		RW-28		RW-29		RW-30		RW-31		RW-32		n=32	
	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul
<b>LOW SHRUBS</b>																						
<i>Ribes americanum</i>																					0.03	0.02
<i>Ribes setosum</i>					0.3	1.4	0.3	0.2	0.3	1.2	0.3						1.0		0.3	0.14	0.21	
<i>Rosa woodsii</i>																				0.54	1.33	
<i>Symphoricarpos occidentalis</i>			5.4	9.0		0.3		0.3		2.0	12.0		0.3	0.8	0.3		1.0	0.4	2.0	8.77	13.07	
<b>TALL SHRUBS</b>																						
<i>Cornus stolonifera</i>																						0.04
<i>Crateagus rotundifolia</i>			2.8	1.0																0.29	0.22	
<i>Lonicera tatarica</i>																				0.11	0.15	
<i>Prunus americana</i>																				0.24	0.13	
<i>Prunus virginiana</i>			6.2	0.3					0.3				0.3							2.13	2.33	
<i>Ribes odoratum</i>																				0.06	0.13	
<i>Salix exigua</i>																					0.01	
<i>Salix lutea</i>																				0.61	0.25	
<i>Shepherdia argentea</i>																				1.73	1.48	
<b>TREES</b>																						
<i>Acer negundo</i>		1.0		2.0	11.6	17.0	4.6	14.0					10.2	13.0		3.0	18.6	34.0		8.0	9.79	12.91
<i>Elaeagnus angustifolia</i>										0.3												
<i>Fraxinus pennsylvanica</i>	11.6	5.0	4.4	13.0		3.0	16.6	18.0	58.0	62.0	16.6	15.0		17.0	17.8	13.0	17.0	29.0	21.4	6.0	24.82	29.00
<i>Populus deltoides</i>											12.4	6.0									0.39	0.19
<i>Salix amygdaloides</i>									21.6	5.0											1.18	0.25
<i>Ulmus americana</i>			10.6	5.0							10.4	2.0									2.97	3.53
<b>TOTAL LOW SHRUBS</b>			5.4	9.0		0.6	1.4	0.6	0.2	0.3	3.2	12.3		0.3	0.8	0.3		2.0	0.4	2.3	9.47	14.63
<b>TOTAL TALL SHRUBS</b>			9.0	1.3						0.3				0.3							5.18	4.74
<b>TOTAL SHRUBS</b>			14.4	10.3		0.6	1.4	0.6	0.2	0.6	3.2	12.3		0.6	0.8	0.3		2.0	0.4	2.3	14.64	19.37
<b>TOTAL TREES</b>	11.6	6.0	15.0	20.0	11.6	20.0	21.2	32.0	79.6	67.3	39.4	23.0	10.2	30.0	17.8	16.0	35.6	63.0	21.4	14.0	39.15	45.87

\*Line intercept (L.I.) was recorded for each shrub and tree species along a 50-meter transect at each sample site. Ocular (Ocul) estimation of canopy cover was recorded for each shrub and tree species within a 0.03-hectare (10-meter radius) circular plot centered at the 50m transect mid-point.

**TABLE F2**

**PERCENT COVER OF SHRUB AND TREE SPECIES COMPARING LINE INTERCEPT AND OCULAR ESTIMATION METHODS\* AT TWO SAMPLE SITES IN THE DECIDUOUS TREE WOODLAND VEGETATION TYPE - VEGETATION STUDY AREA**

	DECIDUOUS TREE WOODLAND					
	Sample Site Number				Mean	
	DTW-1		DTW-3		n=2	
	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul
<b>LOW SHRUBS</b>						
<i>Atriplex nuttallii</i>	0.2				<b>0.10</b>	
<i>Ribes americanum</i>	0.4	2.0			<b>0.20</b>	<b>1.00</b>
<i>Ribes setosum</i>	1.6	1.0	1.8	2.0	<b>1.70</b>	<b>1.50</b>
<i>Rosa arkansana</i>		1.0				<b>0.50</b>
<i>Rosa woodsii</i>	3.2	2.0		0.3	<b>1.60</b>	<b>1.15</b>
<i>Symphoricarpos occidentalis</i>	18.8	20.0	6.4	8.0	<b>12.60</b>	<b>14.00</b>
<b>TALL SHRUBS</b>						
<i>Amelanchier humilis</i>	8.0	14.0			<b>4.00</b>	<b>7.00</b>
<i>Cornus stolonifera</i>	4.4	7.0			<b>2.20</b>	<b>3.50</b>
<i>Prunus virginiana</i>	6.6	26.0	0.2	1.0	<b>3.40</b>	<b>13.50</b>
<i>Ribes odoratum</i>		1.0				<b>0.50</b>
<i>Shepherdia argentea</i>	4.2	9.0		1.0	<b>2.10</b>	<b>5.00</b>
<b>TREES</b>						
<i>Fraxinus pennsylvanica</i>	60.4	56.0	49.4	44.0	<b>54.90</b>	<b>50.00</b>
<i>Ulmus americana</i>				16.0		<b>8.00</b>
<b>TOTAL LOW SHRUBS</b>	24.2	26.0	8.2	10.3	<b>16.20</b>	<b>18.15</b>
<b>TOTAL TALL SHRUBS</b>	23.2	57.0	0.2	2.0	<b>11.70</b>	<b>29.50</b>
<b>TOTAL SHRUBS</b>	47.4	83.0	8.4	12.3	<b>27.90</b>	<b>47.65</b>
<b>TOTAL TREES</b>	<b>60.4</b>	<b>56.0</b>	<b>49.4</b>	<b>60.0</b>	<b>54.90</b>	<b>58.00</b>

<sup>1</sup>Line intercept (L.I.) was recorded for each shrub and tree species along a 50-meter transect at each sample site. Ocular (Ocul) estimation of canopy cover was recorded for each shrub and tree species within a 0.03-hectare (10-meter radius) circular plot centered at the 50m transect mid-point.

**TABLE F3**

**PERCENT COVER OF SHRUB AND TREE SPECIES COMPARING LINE INTERCEPT AND OCULAR ESTIMATION METHODS\* AT FOUR SAMPLE SITES IN THE LOAMY OVERFLOW ECOLOGICAL SITE – VEGETATION STUDY AREA STARK COUNTY, NORTH DAKOTA, 2006-2007**

	LOAMY OVERFLOW									
	Sample Site Number								Mean	
	LyOv-1		LyOv-2		LyOv-3		LyOv-4		n=4	
	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul	L.I.	Ocul
<b>LOW SHRUBS</b>										
<i>Artemisia cana</i>	0.3	2.0	0.6	4.0		0.3	0.5	0.3	<b>0.35</b>	<b>1.65</b>
<i>Rosa woodsii</i>			0.1	0.3	0.1	3.0	0.1	3.0	<b>0.08</b>	<b>1.58</b>
<i>Symphoricarpos occidentalis</i>	11.8	36.0	19.0	42.0	30.0	52.0	25.7	54.0	<b>21.63</b>	<b>46.00</b>
<b>TREES</b>										
<i>Fraxinus pennsylvanica</i>					0.7	0.3		0.3	<b>0.18</b>	<b>0.15</b>
<b>TOTAL LOW SHRUBS</b>	12.1	38.0	19.7	46.3	30.1	55.3	26.3	57.3	<b>22.05</b>	<b>49.23</b>
<b>TOTAL TALL SHRUBS</b>										
<b>TOTAL SHRUBS</b>	12.1	38.0	19.7	46.3	30.1	55.3	26.3	57.3	<b>22.05</b>	<b>49.23</b>
<b>TOTAL TREES</b>					0.7	0.3		0.3	<b>0.18</b>	<b>0.15</b>

\*Line intercept (L.I.) was recorded for each shrub and tree species along a 50-meter transect at each sample site. Ocular (Ocul) estimation of canopy cover was recorded for each shrub and tree species within a 0.01-hectare (5.64-meter radius) circular plot centered at the 50m transect mid-point.