

## Responses of Florida Scrub Vegetation to Water Additions from a Groundwater Treatment Project and to Hurricane Disturbance

Paul A. Schmalzer\* and Tammy E. Foster

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**Table S1.** Mean cover (%)  $\geq 0.5$  m (N=4) of the CCF scrub site, transects closest to water distribution system. Site was cut and burned in 1996. Sampling began in May 2002; water addition began in October 2002. Site was impacted by Hurricane Matthew (Oct. 2016) and Hurricane Irma (Sept. 2017).

Taxa	May 2002	May 2003	May 2004	April 2005	May 2006	May 2007	May 2008	May 2009	May 2010	May 2011
<i>Bejaria racemosa</i>	-	-	-	-	-	0.2	-	-	-	-
<i>Cassytha filiformis</i>	-	-	1.2	-	-	-	-	-	-	-
<i>Galactia elliotii</i>	4.6	4.0	4.9	1.3	4.9	2.1	1.2	2.4	0.9	0.5
<i>Lyonia ferruginea</i>	0.3	-	1.7	2.3	3.2	4.0	4.0	2.0	2.2	1.7
<i>Lyonia fruticosa</i>	4.0	3.5	3.1	3.3	6.3	6.2	3.7	4.6	5.3	4.3
<i>Lyonia lucida</i>	2.0	4.4	2.5	3.0	4.0	3.8	3.8	3.2	1.2	2.2
<i>Myrica cerifera</i>	2.0	6.7	3.7	2.7	2.2	2.2	0.3	-	-	-
<i>Pteridium aquilinum</i>	-	-	1.0	0.3	-	0.7	-	-	-	-
<i>Quercus chapmanii</i>	10.2	10.0	13.0	13.0	16.4	14.0	16.5	14.7	16.3	22.2
<i>Quercus geminata</i>	7.2	13.4	18.9	16.4	17.8	19.1	15.8	19.8	15.3	16.2
<i>Quercus myrtifolia</i>	24.1	30.8	31.9	31.6	29.3	36.3	37.7	35.1	40.3	38.2
<i>Rhus copallinum</i>	0.1	0.7	0.7	0.5	0.2	0.7	0.5	0.9	0.5	0.2
<i>Sereinoa repens</i>	35.2	40.5	59.5	49.9	53.0	57.5	69.0	62.7	70.8	73.5
<i>Smilax auriculata</i>	4.5	2.0	7.7	7.7	10.8	7.6	11.5	8.8	5.0	4.2
<i>Tillandsia</i> spp.	-	-	-	-	-	-	-	-	-	-
<i>Vaccinium myrsinites</i>	0.2	0.5	1.2	0.6	0.2	0.5	0.8	-	0.2	-
<i>Vaccinium stamineum</i>	-	-	-	-	-	0.5	-	0.5	1.2	-
<i>Vitis rotundifolia</i>	0.1	-	1.2	1.3	1.0	0.2	0.5	0.3	0.2	0.8
<i>Ximenia americana</i>	-	-	-	-	-	-	-	-	-	-
Total Cover	94.3	116.5	152.0	133.8	149.2	155.4	165.0	154.9	159.3	163.9
Vegetation Height (cm)	68.3	84.1	150.1	173.4	178.3	204.7	229.3	227.3	254.3	261.6

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Table S1. continued

Taxa	June 2012	June 2013	June 2014	June 2015	June 2016	May 2017	May 2018	May 2019
<i>Bejaria racemosa</i>	-	-	-	-	-	-	-	0.2
<i>Cassytha filiformis</i>	-	-	-	-	-	-	-	-
<i>Galactia eliottii</i>	0.8	0.5	0.5	0.6	0.7	-	-	-
<i>Lyonia ferruginea</i>	4.8	2.5	3.3	3.0	2.8	0.8	0.3	0.5
<i>Lyonia fruticosa</i>	1.8	3.5	3.5	3.4	4.7	2.5	2.5	2.5
<i>Lyonia lucida</i>	3.0	2.8	1.7	2.0	1.8	1.8	0.2	1.3
<i>Myrica cerifera</i>	-	-	-	-	-	-	-	-
<i>Pteridium aquilinum</i>	-	-	-	-	-	-	-	-
<i>Quercus chapmanii</i>	16.2	18.5	25.3	22.2	16.9	10.7	11.2	10.3
<i>Quercus geminata</i>	16.7	15.2	20.5	18.8	17.5	11.5	9.9	11.7
<i>Quercus myrtifolia</i>	42.8	38.8	36.7	48.9	46.7	30.0	27.9	29.7
<i>Rhus copallinum</i>	-	-	-	-	-	-	-	-
<i>Serenoa repens</i>	77.8	80.7	79.0	79.0	77.7	77.5	74.0	68.5
<i>Smilax auriculata</i>	4.1	4.1	4.3	2.1	5.2	9.2	9.6	8.0
<i>Tillandsia</i> spp.	-	0.7	-	-	-	-	-	-
<i>Vaccinium myrsinites</i>	0.2	-	-	-	-	-	-	-
<i>Vaccinium stamineum</i>	0.5	-	-	0.3	0.7	0.7	0.6	0.7
<i>Vitis rotundifolia</i>	-	0.2	0.3	0.3	0.5	-	-	0.9
<i>Ximenia americana</i>	-	-	-	-	-	-	-	0.5
Total Cover	168.6	167.5	175.1	180.5	175.1	144.6	136.0	134.7
Vegetation Height (cm)	263.3	259.5	280.3	288.8	284.9	283.9	244.3	229.9

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**Table S2.** Mean cover (%) <0.5 m (N=4) of the CCF scrub site, transects closest to water distribution system. Site was cut and burned in 1996. Sampling began in May 2002; water addition began in October 2002. Site was impacted by Hurricane Matthew (Oct. 2016) and Hurricane Irma (Sept. 2017).

Taxa	May 2002	May 2003	May 2004	April 2005	May 2006	May 2007	May 2008	May 2009	May 2010	May 2011
Bare Ground	7.1	2.9	0.3	-	0.3	1.0	0.3	0.7	-	0.7
<i>Bejaria racemosa</i>	-	0.2	-	-	-	-	-	-	-	-
<i>Dichantheium</i> spp.	0.2	-	0.1	0.1	-	-	-	0.1	0.1	-
<i>Eustachys petraea</i>	0.1	-	-	-	-	-	-	-	-	-
<i>Galactia elliotii</i>	5.5	2.9	2.8	1.2	2.3	2.7	2.5	2.8	1.0	0.9
<i>Gaylussacia dumosa</i>	0.2	0.1	-	-	-	-	-	-	-	-
<i>Lyonia ferruginea</i>	0.4	0.3	-	-	-	-	-	-	0.7	0.3
<i>Lyonia fruticosa</i>	0.9	0.3	0.2	-	0.3	0.6	0.8	0.7	0.3	1.0
<i>Lyonia lucida</i>	0.3	1.4	0.3	-	0.7	0.3	1.4	1.6	1.9	0.3
<i>Myrica cerifera</i>	3.6	5.2	1.7	2.0	2.3	3.3	1.8	0.8	1.2	0.4
<i>Pteridium aquilinum</i>	-	-	0.3	-	0.8	-	-	-	-	0.8
<i>Quercus chapmanii</i>	1.1	0.3	0.6	1.4	0.2	0.2	-	0.3	0.2	0.3
<i>Quercus geminata</i>	2.7	3.4	2.8	0.1	0.2	0.9	0.3	0.2	-	0.8
<i>Quercus myrtifolia</i>	7.1	5.0	2.4	0.2	0.4	-	0.7	1.3	1.7	1.8
<i>Rhus copallinum</i>	-	-	-	0.2	-	-	-	-	-	-
<i>Rhynchospora megalocarpa</i>	-	-	0.3	1.2	-	-	-	-	-	-
<i>Serenoa repens</i>	1.8	3.2	-	0.5	-	0.3	0.5	0.3	-	0.7
<i>Smilax auriculata</i>	0.1	0.1	0.3	-	-	0.1	0.2	-	0.1	0.2
<i>Tillandsia</i> spp.	-	-	-	-	-	-	-	-	-	0.2
<i>Vaccinium myrsinites</i>	1.3	0.5	0.1	0.5	0.6	-	-	0.7	0.5	0.2
<i>Vaccinium stamineum</i>	0.3	1.0	0.7	1.6	2.2	1.4	2.5	1.4	0.7	2.0
<i>Vitis rotundifolia</i>	0.5	0.3	-	0.2	-	0.2	-	-	-	-
<i>Ximenia americana</i>	-	-	-	-	-	-	-	-	-	0.2
Total Cover	25.9	24.1	12.4	9.0	9.9	9.9	10.8	10.0	8.2	10.1

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Table S2. continued

Taxa	June 2012	June 2013	June 2014	June 2015	June 2016	May 2017	May 2018	May 2019
Bare Ground	0.5	0.2	-	-	-	0.7	4.7	5.2
<i>Bejaria racemosa</i>	-	-	-	-	-	-	-	0.4
<i>Dichanthelium</i> spp.	-	-	0.1	-	-	-	0.1	-
<i>Eustachys petraea</i>	-	-	-	-	-	-	-	-
<i>Galactia eliottii</i>	0.7	1.3	0.4	0.7	-	0.1	0.3	0.2
<i>Gaylussacia dumosa</i>	-	-	-	-	-	-	-	-
<i>Lyonia ferruginea</i>	-	-	-	0.3	-	-	0.8	0.5
<i>Lyonia fruticosa</i>	0.1	0.3	0.5	0.3	0.2	0.5	0.5	0.5
<i>Lyonia lucida</i>	0.3	1.2	1.7	0.6	-	0.2	0.4	0.7
<i>Myrica cerifera</i>	0.2	0.5	0.5	0.3	-	0.2	0.2	0.2
<i>Pteridium aquilinum</i>	-	0.2	0.8	-	-	0.3	0.2	0.3
<i>Quercus chapmanii</i>	0.2	-	0.2	-	0.3	0.9	1.2	0.3
<i>Quercus geminata</i>	0.2	0.4	-	0.2	-	0.4	0.4	1.1
<i>Quercus myrtifolia</i>	0.3	2.7	1.3	1.5	2.3	5.3	2.8	3.0
<i>Rhus copallinum</i>	-	-	-	-	-	0.2	-	-
<i>Rhynchospora megalocarpa</i>	-	-	-	-	-	-	-	-
<i>Serenoa repens</i>	-	-	-	-	0.3	2.8	0.8	0.3
<i>Smilax auriculata</i>	-	-	-	-	0.2	0.1	-	-
<i>Tillandsia</i> spp.	-	-	-	-	-	-	-	-
<i>Vaccinium myrsinites</i>	-	0.2	0.5	0.2	-	0.2	-	-
<i>Vaccinium stamineum</i>	0.9	0.7	0.7	0.7	0.8	1.1	0.8	0.3
<i>Vitis rotundifolia</i>	-	-	-	-	0.2	0.2	1.2	0.2
<i>Ximenia americana</i>	-	-	-	-	-	-	-	0.3
Total Cover	2.9	7.4	6.7	4.7	4.3	12.4	9.7	8.4

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**Table S3.** Mean cover (%)  $\geq 0.5$  m (N=4) of the CCF scrub site, transects distant to water distribution system. Site was cut and burned in 1996. Sampling began in May 2002; water addition began in October 2002. Site was impacted by Hurricane Matthew (Oct. 2016) and Hurricane Irma (Sept. 2017).

Taxa	May 2002	May 2003	May 2004	April 2005	May 2006	May 2007	May 2008	May 2009	May 2010	May 2011
<i>Bejaria racemosa</i>	0.5	-	-	-	-	-	0.2	0.2	-	-
<i>Clitoria mariana</i>	0.1	-	-	-	-	-	-	-	-	-
<i>Galactia elliotii</i>	3.8	1.9	2.9	0.8	3.1	1.8	1.8	3.3	2.8	1.4
<i>Galactia volubilis</i>	-	-	-	-	-	-	-	-	-	-
<i>Lyonia ferruginea</i>	-	0.7	-	-	-	-	-	-	-	-
<i>Lyonia fruticosa</i>	2.3	0.5	0.8	0.9	-	0.6	0.9	1.3	0.8	2.1
<i>Lyonia lucida</i>	6.7	6.9	8.0	4.1	4.0	2.8	5.2	5.4	6.3	6.3
<i>Myrica cerifera</i>	0.2	0.7	0.8	0.7	1.1	1.1	1.5	0.3	0.2	0.8
<i>Pteridium aquilinum</i>	2.7	3.1	0.8	1.4	0.3	-	1.7	0.7	1.5	0.3
<i>Quercus chapmanii</i>	11.4	13.5	11.9	9.7	13.7	15.3	15.2	17.0	16.4	17.9
<i>Quercus geminata</i>	8.1	10.8	11.6	6.8	10.1	9.9	9.2	8.2	10.4	13.2
<i>Quercus myrtifolia</i>	43.4	43.7	51.8	51.5	46.3	38.9	44.5	47.5	50.8	49.3
<i>Rhus copallinum</i>	1.3	-	-	-	-	-	-	-	-	-
<i>Rhynchospora megalocarpa</i>	-	-	-	-	0.2	-	-	0.3	-	-
<i>Serenoa repens</i>	24.0	31.9	28.9	33.1	33.9	36.2	40.9	41.4	40.5	41.9
<i>Smilax auriculata</i>	1.6	2.4	2.3	1.9	3.8	3.6	1.8	2.6	4.2	4.7
<i>Solidago odora</i> var. <i>chapmanii</i>	0.2	0.3	0.1	-	-	-	-	-	-	-
<i>Vaccinium myrsinites</i>	-	-	-	-	-	-	-	-	0.2	0.3
<i>Vaccinium stamineum</i>	-	-	-	-	-	-	-	-	-	-
<i>Vitis rotundifolia</i>	-	0.2	0.4	-	-	-	-	0.2	0.3	0.3
<i>Ximenia americana</i>	-	-	-	-	-	-	-	-	-	-
Total Cover	106.1	116.5	120.2	110.6	116.5	110.1	122.8	128.1	134.3	138.4
Vegetation Height (cm)	86.1	93.0	92.2	102.9	100.7	115.4	120.7	111.0	126.8	138.2

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Table S3. continued

Taxa	June 2012	June 2013	June 2014	June 2015	June 2016	May 2017	May 2018	May 2019
<i>Bejaria racemosa</i>	-	-	-	-	0.3	0.3	-	-
<i>Clitoria mariana</i>	-	-	-	-	0.2	-	-	-
<i>Galactia elliottii</i>	1.0	2.4	-	0.9	0.8	0.4	0.7	0.5
<i>Galactia volubilis</i>	0.1	-	0.1	-	-	-	-	-
<i>Lyonia ferruginea</i>	-	-	-	-	-	-	-	-
<i>Lyonia fruticosa</i>	0.8	1.4	1.4	0.5	0.8	0.5	0.5	1.7
<i>Lyonia lucida</i>	6.8	8.0	7.6	4.9	8.0	7.5	4.4	9.3
<i>Myrica cerifera</i>	0.8	0.8	0.3	1.3	1.2	0.7	0.5	0.7
<i>Pteridium aquilinum</i>	1.7	0.7	1.2	0.2	-	-	-	0.4
<i>Quercus chapmanii</i>	16.7	19.4	19.6	22.8	20.0	14.9	15.3	16.2
<i>Quercus geminata</i>	10.8	18.8	14.4	19.0	16.2	13.8	10.9	18.5
<i>Quercus myrtifolia</i>	51.9	57.4	54.7	52.4	55.3	47.8	37.7	40.8
<i>Rhus copallinum</i>	-	-	-	-	-	-	-	-
<i>Rhynchospora megalocarpa</i>	0.2	0.3	-	-	-	-	-	-
<i>Serenoa repens</i>	47.2	46.2	47.7	48.9	52.4	48.2	42.6	43.8
<i>Smilax auriculata</i>	2.3	4.7	2.2	3.2	0.5	4.0	4.0	0.3
<i>Solidago odora</i> var. <i>chapmanii</i>	-	-	-	0.1	-	-	-	-
<i>Vaccinium myrsinites</i>	0.2	0.3	0.3	0.7	-	-	-	0.3
<i>Vaccinium stamineum</i>	-	-	-	-	-	-	-	-
<i>Vitis rotundifolia</i>	0.3	0.2	-	-	0.3	0.1	0.5	-
<i>Ximenia americana</i>	-	-	-	-	0.2	-	0.3	0.8
Total Cover	140.7	160.6	149.4	154.7	156.1	138.0	117.3	133.2
Vegetation Height (cm)	146.9	158.7	167.9	165.0	177.0	149.6	150.4	168.9

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**Table S4.** Mean cover (%) <0.5 m (N=4) of the CCF scrub site, transects distant to water distribution system. Site was cut and burned in 1996. Sampling began in May 2002; water addition began in October 2002. Site was impacted by Hurricane Matthew (Oct. 2016) and Hurricane Irma (Sept. 2017).

Taxa	May 2002	May 2003	May 2004	April 2005	May 2006	May 2007	May 2008	May 2009	May 2010	May 2011
<i>Andropogon</i> spp.	0.3	-	-	-	-	-	-	-	-	-
<i>Aristida stricta</i>	-	-	-	-	0.1	0.1	-	-	-	-
Bare Ground	6.6	3.0	2.6	2.8	5.0	4.0	2.8	2.4	1.0	1.7
<i>Bejaria racemosa</i>	0.3	0.2	-	-	-	-	0.2	-	0.2	0.2
<i>Clitoria mariana</i>	0.3	-	0.2	-	-	-	-	-	-	-
<i>Dichanthelium</i> spp.	0.2	0.2	0.3	-	0.1	-	-	-	-	-
<i>Galactia elliotii</i>	4.8	2.3	3.8	2.5	2.7	3.1	2.8	2.2	3.2	2.7
<i>Galactia volubilis</i>	-	-	-	-	-	-	-	-	-	-
<i>Gaylussacia dumosa</i>	-	0.1	-	-	0.1	0.1	0.4	-	-	0.2
<i>Lyonia ferruginea</i>	-	-	-	-	-	-	-	-	-	-
<i>Lyonia fruticosa</i>	1.0	0.9	1.0	0.8	0.7	0.6	0.8	0.9	0.6	0.9
<i>Lyonia lucida</i>	1.1	0.9	0.9	1.4	0.3	1.2	2.9	2.4	1.8	1.4
<i>Myrica cerifera</i>	1.9	1.7	0.3	1.4	1.9	1.0	1.5	1.7	3.1	1.9
<i>Pteridium aquilinum</i>	5.7	2.2	4.8	7.3	4.3	8.2	4.6	1.9	3.2	3.3
<i>Quercus chapmanii</i>	2.3	1.7	0.8	1.0	-	0.5	1.4	1.0	0.4	1.0
<i>Quercus geminata</i>	4.2	3.7	1.7	2.9	1.5	2.9	2.3	2.8	2.3	4.1
<i>Quercus myrtifolia</i>	3.7	4.5	1.7	2.3	3.4	6.8	6.7	5.5	8.5	6.3
<i>Rhus copallinum</i>	-	0.2	-	-	0.1	0.2	-	-	-	-
<i>Rhynchospora megalocarpa</i>	-	-	-	-	0.2	0.1	0.8	0.3	0.5	0.3
<i>Serenoa repens</i>	0.2	0.8	0.8	0.5	2.0	3.0	1.8	1.3	0.3	0.9
<i>Seymeria pectinata</i>	-	-	-	-	-	-	-	-	-	-
<i>Smilax auriculata</i>	0.1	-	0.3	-	0.2	0.3	0.2	0.2	0.7	0.3
<i>Solidago odora</i> var. <i>chapmanii</i>	-	-	0.2	-	0.2	-	-	0.1	-	-
<i>Vaccinium myrsinites</i>	1.3	1.3	1.2	0.5	1.2	0.3	0.7	0.7	0.4	0.9
<i>Vaccinium stamineum</i>	1.2	0.5	0.4	-	0.3	0.3	-	0.2	-	-
<i>Vitis rotundifolia</i>	0.2	-	-	-	-	-	-	-	-	-
<i>Ximenia americana</i>	-	-	-	-	-	0.2	-	-	-	0.2
Total Cover	28.5	21.0	18.0	20.5	19.1	28.7	26.9	21.0	24.9	24.5

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Table S4. continued

Taxa	June 2012	June 2013	June 2014	June 2015	June 2016	May 2017	May 2018	May 2019
<i>Andropogon</i> spp.	-	-	-	-	-	-	-	-
<i>Aristida stricta</i>	-	-	-	-	-	-	-	-
Bare Ground	2.0	0.7	1.2	2.5	1.2	4.9	8.5	5.0
<i>Bejaria racemosa</i>	-	-	-	-	-	-	-	0.3
<i>Clitoria mariana</i>	-	-	-	-	-	-	-	-
<i>Dichanthelium</i> spp.	-	-	-	-	-	-	-	-
<i>Galactia elliotii</i>	1.8	2.1	0.7	0.6	0.9	0.7	0.3	1.5
<i>Galactia volubilis</i>	-	-	-	-	-	0.1	-	-
<i>Gaylussacia dumosa</i>	0.2	-	0.1	0.2	-	-	0.3	0.1
<i>Lyonia ferruginea</i>	0.3	-	-	-	-	-	-	-
<i>Lyonia fruticosa</i>	0.4	-	0.3	0.6	0.5	0.5	0.5	2.3
<i>Lyonia lucida</i>	0.9	1.4	1.7	1.7	1.9	4.4	2.3	2.5
<i>Myrica cerifera</i>	2.6	3.1	2.1	1.2	1.3	2.2	1.2	2.5
<i>Pteridium aquilinum</i>	3.4	5.3	4.8	2.4	1.9	2.8	4.4	3.1
<i>Quercus chapmanii</i>	1.7	0.6	0.8	-	0.5	2.1	1.8	1.5
<i>Quercus geminata</i>	2.7	1.4	0.8	0.4	0.2	0.5	1.9	1.6
<i>Quercus myrtifolia</i>	3.9	3.9	2.7	3.1	2.1	3.9	7.0	6.8
<i>Rhus copallinum</i>	-	-	-	-	-	-	-	-
<i>Rhynchospora megalocarpa</i>	0.3	0.3	-	-	-	-	-	-
<i>Serenoa repens</i>	1.2	1.2	1.0	1.3	1.2	3.2	4.3	3.4
<i>Seymeria pectinata</i>	-	-	0.2	-	-	-	-	-
<i>Smilax auriculata</i>	0.1	0.1	-	0.2	-	0.2	0.2	0.3
<i>Solidago odora</i> var. <i>chapmanii</i>	-	-	-	-	-	0.1	-	0.1
<i>Vaccinium myrsinites</i>	-	0.1	0.3	0.2	0.5	1.0	1.3	0.9
<i>Vaccinium stamineum</i>	0.3	0.8	-	0.6	-	0.3	0.8	0.8
<i>Vitis rotundifolia</i>	-	-	-	-	-	-	-	-
<i>Ximenia americana</i>	-	0.2	0.2	0.2	-	-	-	-
Total Cover	19.6	20.3	15.5	12.5	10.8	21.8	26.2	27.7