



COLLABORATIVE RIPARIAN RESTORATION IN GLEN CANYON NRA

**Larry Stevens, Senior Ecologist
Grand Canyon Wildlands Council
20 October 2015**

Restoration of Northern Leopard Frog in Glen Canyon National Recreation Area

Partnership

NPS, FWS, AGFD, GCWC, AWPF, PC & Other VIPs

Tasks

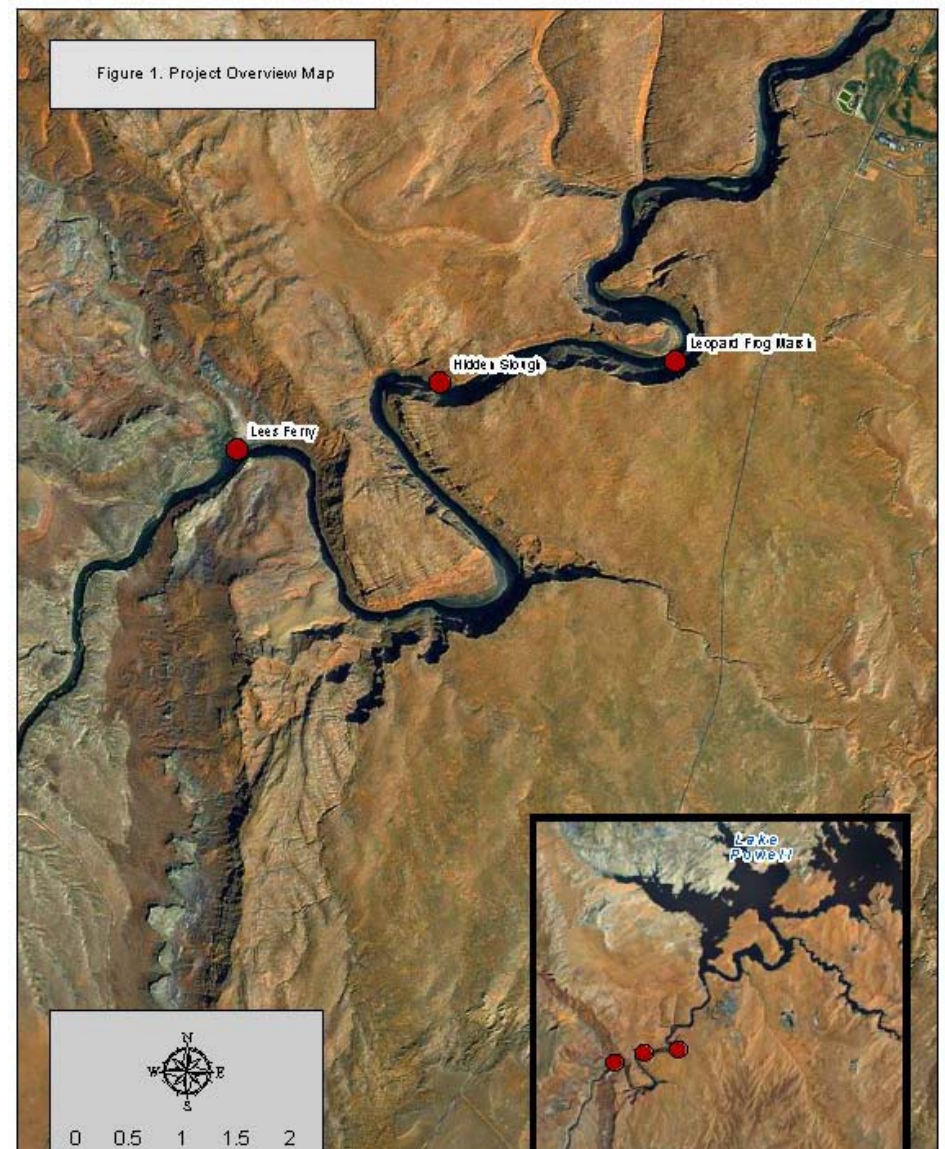
Planning and design

Compliance

Pre-construction monitoring

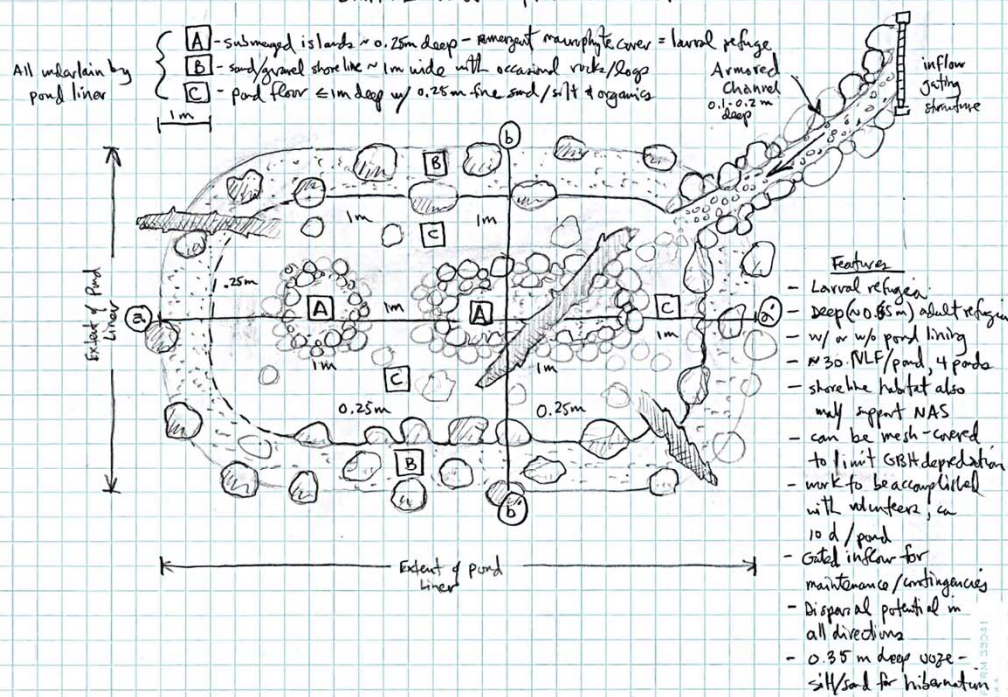
Construction

Post-construction monitoring

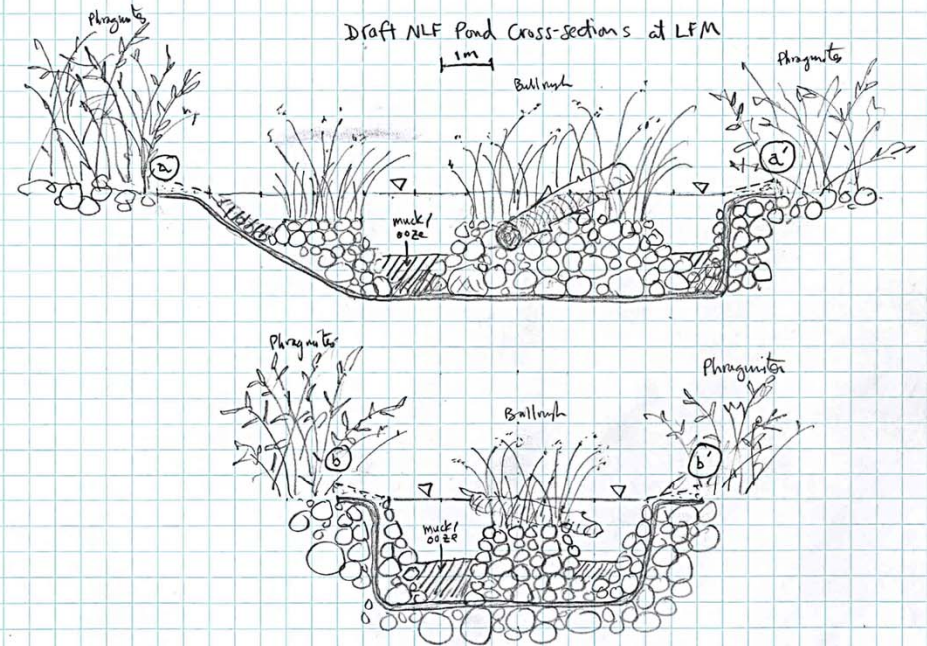


Pond Design

Draft NLF Pond Concept Planview at LFM



Draft NLF Pond Cross-sections at LFM



Leopard Frog Marsh Upper Pond Construction 2014



LFM – Middle Pond, May to August 2015



LFM – Lower Pond, May to August 2015



Hidden Slough (-6.5R) Pond Construction 2014

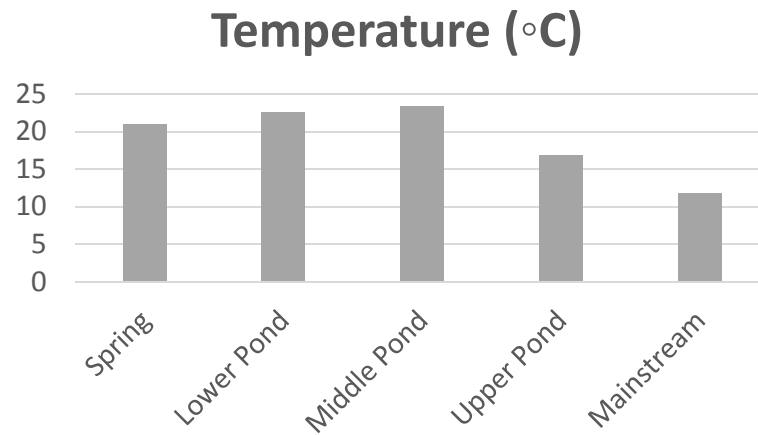
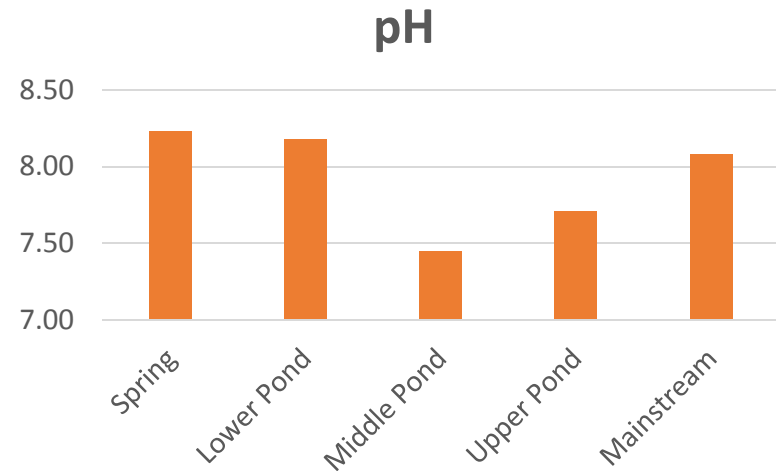
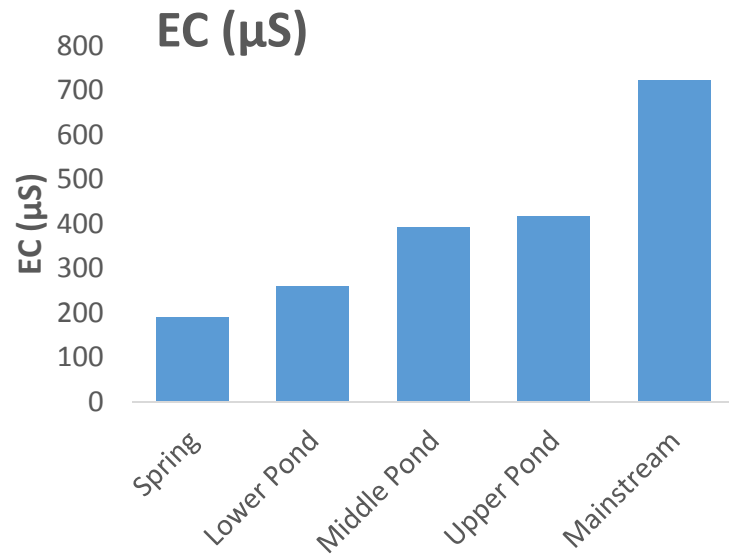


Monitoring 2014-2015



Location	Date	Time	Site	Air Temp °C	pH	DO (mg/L)	Salinity (ppm)	EC (uS)	H ₂ O Temp °C	Σ Alk (mg/L)	Flow (L/s)	Max. Depth (m)
Hidden Slough	3/3/2015	---	Mainstream	10.5	7.79	8.0	390	777	9.7	125	---	---
Hidden Slough	3/18/2015	13:25	Mainstream	---	7.96	5.5	391	783	10.0	140	---	---
Hidden Slough	10/25/2014	14:00	Pond	20.0	8.19	4.5	1928	3861	16.5	1148	---	0.3
Hidden Slough	3/3/2015	---	Pond	10.8	7.82	7.0	275	505	10.4	160	---	0.3
Hidden Slough	3/18/2015	13:06	Pond	---	8.23	5.0	403	808	19.1	240	---	---
Hidden Slough	8/13/2015	11:20	Pond	27.8	7.80	5.0	505	1008	26.2	240	---	0.8
Hidden Slough	3/3/2015	---	Slough	10.8	7.56	5.0	330	659	10.4	140	---	0.5
Hidden Slough	3/18/2015	13:20	Slough	---	8.18	4.8	397	795	17.2	210	---	---
Hidden Slough	8/13/2015	11:00	Slough	27.8	7.91	4.8	385	768	20.4	210	---	0.5
Leopard Frog Marsh	3/18/2015	11:20	Lower Pond	---	---	---	---	---	---	---	---	---
Leopard Frog Marsh	5/29/2015	15:30	Lower Pond	26.5	8.18	6.5	129	259	23.3	133	---	---
Leopard Frog Marsh	8/13/2015	6:20	Lower Pond	19.4	7.67	2.5	138	275	21.6	120	---	1.2
Leopard Frog Marsh	5/29/2015	15:30	Mainstream	26.5	8.33	5.5	360	722	10.1	140	---	---
Leopard Frog Marsh	8/13/2015	8:30	Mainstream	19.4	8.08	4.0	363	726	13.4	120	---	---
Leopard Frog Marsh	5/29/2015	15:30	Middle Pond	26.5	7.45	5.0	196	392	25.0	110	---	---
Leopard Frog Marsh	8/13/2015	7:35	Middle Pond	19.4	7.60	3.5	215	430	21.7	220	---	1.0
Leopard Frog Marsh	10/25/2014	10:00	Spring	---	8.21	5.5	100	200	20.4	92	5.18	0.1
Leopard Frog Marsh	3/18/2015	12:00	Spring	---	8.23	5.5	95	191	21.2	80	4.18	---
Leopard Frog Marsh	5/29/2015	15:30	Spring	26.5	8.51	5.5	93	187	21.0	80	4.40	---
Leopard Frog Marsh	8/13/2015	7:15	Spring	19.4	8.42	4.0	101	202	21.5	100	2.35	0.1
Leopard Frog Marsh	10/25/2014	11:00	Upper Pond	11.5	7.61	4.5	218	436	10.6	270	---	0.8
Leopard Frog Marsh	3/18/2015	11:20	Upper Pond	---	7.62	5.5	215	432	12.8	106	---	---
Leopard Frog Marsh	5/29/2015	15:30	Upper Pond	26.5	7.91	5.5	195	387	22.9	106	---	---
Leopard Frog Marsh	8/13/2015	8:00	Upper Pond	19.4	7.70	2.5	204	408	21.5	180	---	0.8

Leopard Frog Marsh Water Quality



Site	CRUS Ostracoda	AMPH Gammaridae Gammarus lacustris	MOLL Physidae <i>Physa</i>	MOLL Hydrobiidae Potamopyrgus antipodarum	DIP Chironomidae <i>Chironomus</i>	EPH Baetidae	HEM Notonectidae <i>Notonecta</i>	ODO Aeshnidae <i>Rhionaeschna multicolor</i>	ODO Aeshnidae larvae	ODO Coenagrionidae <i>Argia</i>	ODO Coenagrionidae <i>Enallagma</i>	ODO Libellulidae <i>Pachydiplax longipennis</i> ad	ODO Libellulidae <i>Paltothemis lineatipes</i>	ODO Libellulidae <i>Libellula saturata</i>	HERP Ambystomidae Ambystoma m. mauvortum?	HERP Bufonidae Anaxyrus punctatum	HERP Bufonidae Anaxyrus woodhousei
LFM - Lower Pond			X			X		X	X		X	X	X	X		X	X
LFM - Middle Pond	X		X			X		X	X		X		X	X		X	X
LFM - Upper Pond	X	X	X		X		X				X			X	X	X	X
LFM - Spring										X							
Mainstream		X															
HS - Slough		X	X	X				X			X			X			
HS - Pond									X		X	X	X	X			





**Thanks to the many volunteers who assisted with these projects,
especially Tim Stephenson, Herman Griego, and Prescott College**