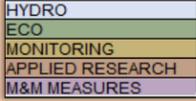


Draft Report 2 Implementation Matrix

Category	Synopsis	#	Recommendation	Workshop Input	Implementation Recommended	Compliance-oriented	Fiscally-feasible	Feasible	Implementation Strategy	Comments
Research Priorities Moving Forward 	Some specific applied research foci are especially important given the HCP's management objectives.	1	The 2017 project to establish better relationships between the fountain darter and the different species and coverages of submerged aquatic vegetation (including Ludwigia) in both systems is critically important.	General agreement; Population studies should try to include all species, not just the CSR, for use as a baseline (using an empirical model)	Done and may potentially be examined further through future Applied Research.	No	Yes, with the caveat that budget only extends until 2019.	Yes	To be conducted through the Refugia research program.	1. Research to be conducted in 2018 and 2019 was established by the 2017 Research Work Group. Generally, this list is more comprehensive than what has been provided by NAS; 2. 2018 and 2019 are the last two years of Applied Research.
		2	Research to better understand the life history of listed species and identifying effective sampling techniques rightfully deserves high priority.		Yes	No	Yes, with the caveat that budget only extends until 2019.	Yes		
Application and Limitations to Application for Existing Applied Research Results	Applied research study results can and should be used to inform management efforts; in some cases, caution is warranted in applying these results, however.	3	The CSR temp and oxygen study's use of surrogates is of questionable relevance for the CSR.	General agreement, and the following specific comments: The Spring Communities should: maintain focus on planting and using native plant species in both systems; promote native plant species for restoration but not to the detriment of surrounding species.	No action required	No	Yes, with the caveat that budget only extends until 2019.	Yes	HCP staff agrees with this comment.	
		4	The CSR temp and oxygen study's use of lab environments may not provide a relevant test of CSR behavior in its natural environment.		No action required	No	Yes, with the caveat that budget only extends until 2019.	Yes	HCP staff agrees with this comment.	
		5	Areas where Hygrophylla is of concern should be targeted for Ludwigia establishment where restoration efforts are being carried out.		In process	No	Yes, with the caveat that budget only extends until 2019.	Yes	This recommendation is available to NB and SM/TXSTATE for consideration as they implement the submerged aquatic vegetation schedule/regime established through AMP; City of New Braunfels already doing this.	
		6	The competitive advantage of Ludwigia against Hygrophylla should be communicated to the submerged aquatic vegetation modeling team and incorporated into their efforts.		Done	No	Yes, with the caveat that budget only extends until 2019.	Yes	The submerged aquatic vegetation research was conducted by members of the modeling team.	
		7	Additional consideration of the interactions between Hydrilla and Ludwigia is needed before conclusions are made or further application of this research occurs.		No action required	No	Yes, with the caveat that budget only extends until 2019.	Yes	HCP staff agrees with this comment.	
		8	Ludwigia should be seriously considered for use in the San Marcos system.		In process	No	Yes, with the caveat that budget only extends until 2019.	Yes	This recommendation will be made available to SM/TXSTATE for consideration as they implement the submerged aquatic vegetation schedule/regime established through AMP	
		9	miniDOT oxygen sensors in Landa Lake and Upper Spring Run should be continued as part of a routine integrated water quality and biological monitoring program		Yes	No	Yes, with the caveat that budget only extends until 2019.	Yes	EAHCP added a sonde to Landa Lake; CONB plans to add through 2018 Work Plans (not yet approved).	

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		10	The Committee recommends that aeration not be used routinely as a mitigation measure.		TBD through Landa Lake DO Mgmt. Plan under development.	No	Yes, with the caveat that budget only extends until 2019.	Yes	NB is currently conducting research to establish a DO Mgmt. Plan for Landa Lake; may pursue AMP next year.	
CSRB Population and Sampling Techniques	Several issues remain to be addressed with regards to CSRB population and sampling.	11	There should be a method to provide standardized data that accounts for the amount of time that the cotton lure has been deployed.	General agreement, and the following specific comments: A study looking CSRB population abundance using a model that incorporated the entire system, not just the sample reached identified in the HCP; • Ensure continued use and implementation of a CSRB sampling Standard Operating Procedure; • A large scale population/abundance study on CSRB is needed.	Done	No	Yes, with the caveat that budget only extends until 2019.	Yes	Done through the 2016 CSRB Cotton Lure SOP Work Group.	
		12	The CSRB trophic study should be looked at with a view to possibly identifying an alternative sampling approach for the CSRB that could be a reasonable reflection of population densities.		No; already completed.	No	Yes, with the caveat that budget only extends until 2019.	Yes	The purpose for this study is basic biology, not sampling methodology; however, if there's any finding that may be relevant, it will be considered.	
		13	Identifying the type, and estimate the relative amount, of organic matter near or at the cotton lure placement locations should be included as part of the cotton-lure SOP for CSRB.		Done	No	Yes, with the caveat that budget only extends until 2019.	Yes	Done through the 2016 CSRB Cotton Lure SOP Work Group.	
		14	A validation study encompassing repeated sampling from the same and new spring outlets to account for potential life history and flow effects on the population estimates is highly recommended.		Done	No	No	Yes	Data from the new database and other sampling entities would have to be compiled and examined.	
		15	Studies on the importance of Peck's cave amphipod-predation on the CSRB may be warranted.		No	No	Yes, with the caveat that budget only extends until 2019.	Yes	It is understood that the amphipod is a predator, however, this project is not a priority at this time.	
		16	Key lab experiments involving the CSRB (e.g., connectivity study) should be validated using creative field studies where variables can be manipulated.		No	No	No	?	The HCP has a current and ongoing research program on the CSRB that is not yet finished; other field studies have been conducted by outside researchers as well.	
		17	<i>Attempts to understand the population abundances of the CSRB should be undertaken.</i>		TBD	No	Yes, with the caveat that budget only extends until 2019.	Yes	EAA, the Science Committee, and TPWD are looking into these projects; caution is urged concerning scope creep and precedent-setting nature of HCP undertaking some of these projects. May be limited to only those beetles at the surface (rather than having any subterranean component).	The HCP is not required to produce population estimates of the CSRB. Rather the HCP is required to produce "take" estimates. 7 CSRB studies have been conducted to date. In addition, an SOP has been established to standardize and enhance cotton lure methodology used by various researchers in the region.
		18	<i>Attempts to better quantify the CSRB population densities should be undertaken.</i>		TBD	No	Yes, with the caveat that budget only extends until 2019.	Yes		

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		19	Attempts to better calibrate the cotton-lure method of sampling to be efficient and reliable for estimating populations should be made.		TBD	No	Yes, with the caveat that budget only extends until 2019.	Yes		
Administrative/Logistical Considerations Associated with the Applied Research Program	There are several administrative and/or logistical considerations that should be considered for the improvement of the Applied Research program.	20	The window of time for an RFP to be open to final deadline should be extended.	General agreement and the following specific comments: • The EAA should make changes to the procurement process to attract academic institutions by allowing longer response times to RFPs, creating multi-year contracts, reducing specifications regarding invoicing, payments, reporting, and deliverables; • EAA should develop a method to access and fund MS and PhD students to conduct research in the springs, thereby training new scientists familiar with the springs and creating more data from their research; • Request a reduction of overhead/indirect costs to make it more affordable to work with universities; • There should be a way to try to integrate new data with existing data.	Done	No	Yes	Yes	The time period will be extended from 3 weeks to 8 weeks for 2018/2019 RFPs.	
		21	The EAA should continue to look for ways to remove conditions that restrict the pool of potential Applied Research applicants.		Done - continual	No	Yes	Yes	See comments.	Efforts have been made to greatly increase the distribution of RFPs to the scientific community; efforts are being made to extend the application window (see #20); the program is entering Y2 of its first ever two-year project.
		22	The EAA should use the data management system being implemented to allow greater data discovery and access by the outside scientific community and the public.		Yes	No	No	Yes	Currently there are no plans or resources to make the database accessible online. However, EAA is committed to providing all data when requested.	
		23	The cause for the large mortalities of CSRFB at the FAB still need to be definitively identified and resolved through additional study.		Done	No	No	No		There have been no issues since additional precautions and upgrades were implemented by TXSTATE; a report was provided by Juan Guerra detailing measures taken.
		24	The EAA should be prepared to invest in additional research projects in life history of listed species and sampling techniques that span multiple years, if necessary.		Done	No	Yes	Yes	This research is already funded through the refugia program.	CSRFB life history study began first two years in Applied Research and will continue through Refugia; other life history studies will be undertaken through Refugia as well.
		25	Monitoring effectiveness of M&M measures should not be part of the Applied Research Program, but should instead be incorporated within long-term monitoring programs.		Yes; however, certain exceptions may be warranted for specific projects	No	Yes	Yes		While this may be true for long term monitoring, the Applied Research program may be useful for snapshot monitoring questions and issues (e.g., sediment study).
		26	Resources for ongoing data management activities will need to be allocated throughout the lifetime of the HCP.		No	No	No, but prudent as long as within existing resources and looking for additional funding opportunities	Yes	Currently there is no resources for ongoing database upgrades or maintenance; however, database management activities will continue.	The original database itself was an unfunded initiative agreed to by EAA; staff time can be committed, but building new modules or interfaces does not have funding at this time. Data is available to the public on request.

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		27	Modeling efforts should become more integral to consideration of future Applied Research projects; referring to providing data and informing operating, refining, and expanding models.		TBD	No	Yes; with the caveat that the Applied Research budget only extends until 2019	Yes	A public process will be followed for the implementation of both the hydro and eco models, through which any additional research needs may be identified (but are not anticipated).	Modeling has been supported via past Applied Research projects; may be looked at in the event the eco model is updated in the future. There is a placeholder in the 2018-2019 research program in case this would be needed, but is not anticipated.