Appendix 1:

Annotated Bibliography

Citation	Groundwater Require-ments	Agriculture-Riparian Interactions	Agricultural Mgmt	Water Budgets	Climate Change	Evapotran-spiration	Groundwater Pumping Effects	Key Components	Key Discussion Points	Geographic Location
Anderson 1982					X	X		Water use efficiency review for tamarix	Transpiration driven by tamarix density Higher temperatures do not necessarily mean more ET (stomatal resistance increases).	
Baird et al. 2007								Looked at revising spatial ET and water budget models to reflect DTW constraints	Groundwater models essential tool for conservation or riparian ecosystems ET components of models are essential but poorly simulated Grouped species into functional groups Good review of ET model components in MODFLOW RIP-ET package needs to be considered for our model runs	
Baker et al. 2013		X	X	X			X	Irrigation Efficiency Land Use Change Urban vs. Agricultural Water Use	40-65% of water in unlined canals and surface irrigation systems often seeps into aquifers Irrigation inefficiency is one of the largest sources of groundwater recharge in the West Increased efficiency can decrease groundwater levels Effects of water diversions much different than groundwater pumping	Idaho
Berkowitz and Evans 2014		X	X					Large-scale literature review Primarily focused on jurisdictional ramifications	Irrigation activities can create and support wetlands by seasonally increasing streamflow. Created wetlands can be agriculture-dependent. Created wetlands create jurisdictional challenges. These wetlands can provide diverse wildlife habitat They also create provide water quality improvements. Few papers directly address direct vegetation impacts	US-wide
Bredehoeft and Kendy 2008				X			X	Focused on groundwater pumping and stream effects	Groundwater pumping from connected aquifers depletes streamflow Magnitude, location, and timing of pumping determine extent of effects Strategic recharge can offset pumping effects	
Busch and Smith 2005	X							Review of drivers of woody species composition changes	Declining groundwater levels one key driver of saltcedar prevalence	
Caplan et al 2013	X							Looked at interaction of groundwater and soil moisture on coyote willow success	Example of restoration potential where groundwater is shallow Groundwater depth thresholds for coyote willow 1-1.5 m Soil moisture results from interaciton of groundwater depth and soil texture	
Carrillo-Guerrero et al. 2013		X	X	X		X	X	Assessed agricultural water use effects on riparian corridor	On the US side, ~40% of agricultural applied water returns to the river In the Mexicali valley, can be as low as 10% Canal seepage is higher in Mexico, suporting low-salinity aquifer Increasing irrigation efficiency by itself would not mean more water for the environment During high flow years, groundwater pumping is generally reduced	

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Cleverly et al. 1997	X					X		ET of willow and saltcedar, drought tolerance assessment	Willow more susceptible to groundwater depth increases	
									When more water is available, willow more likely to outcompete saltcedar	
Dahm et al. 2002				X		X		ET estimates for Middle Rio Grande	Provide ET estimates for variable species assemblages	
									Ranged from 74 cm/year for sparse saltcedar to ~120 cm/year for dense saltcedar or mature cottonwood stand.	
									Improved species mapping would allow for improved water budget calculations	
Dennison et al. 2009				X		X		Saltcedar beetle defoliation impacts over the first year of defoliation MODIS remote-sensing and ground-based ET estimates	Defoliation decreased NDVI and ET for some periods.	Utah
									Annual ET changes could not be quantified due to environmental variation.	
									Beetle defoliation was not entire for the site	
									Defoliation and ET reductions are more significant later in the season.	
Doody et al. 2011				X		X		Effects of saltcedar removal on water budgets	Large review of saltcedar ET	
									Lower Colorado River ET between 300 and 1400 mm/year depending on hydrology	
									Native species ET review also provided	
									Water salvage from phreatophyte removal is possible, but difficult to quantify.	
									Water salvage must account for replacement vegetation and evapotranspiration, bare soil evaporation, and open water evaporation	
Fernald et al. 2010		X	X	X			X	Quantified fate of water diverted for irrigation	Almost 60% of water diverted for agriculture returned to the river	Rio Grande, northern NM
									Surface water irrigation resulted in stored groundwater later released to the river	
									Less irrigation would result in higher spring runoff, reduced fall and winter flows	
Froend and Summer 2010	X				X		X	Looked at climate and groundwater pumping-induced groundwater decline effects on vegetation	As groundwater levels declined, vegetation trended toward drought-tolerance species	Australia
									They predict linear response to slow declines, threshold response to quick declines	
Geerts and Raes 2009			X	X				Review of practice of deficit irrigation	For this method, water applied only during "drought-sensitive growth stages"	
									Can be used to increase water use efficiency	
									Tolerable decreases in irrigation depend on crop.	
									Salinity can limit the potential for this irrigation strategy	
									*As this practice becomes more common, less agricultural return flow would result.	

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Glenn and Nagler 2005	X					X		Comparison of saltcedar and native species	Depth to groundwater thresholds for cottonwood-willow range from 2-4 m, saltcedar up to 6 m, mesquite 10 m or deeper Drying of riverbanks and decline of water tables a key mechanism for non-native species dominance Present annual ET as: 0.8-1.2 m/year for saltcedar, 1.0-1.2 for cottonwood, and 0.6-0.7 for mesquite	
Hartwell et al. 2010						X		Looked at irrigation requirements for cottonwood and Goodding's willow	Recommend crop coefficients of 0.83 for cottonwood, 1.02 for willow. Trees will use more if water isa vailble	
Hinojosa-Huerta et al. 2013		X		X	X			Looked at riparian corridor changes during drought	Lower flows reduced cottonwood-willow in 2002-2007 Saltcedar cover increased Ecosystems supported by agricultural returns Cottonwood-willow have a short half-life due to flow reduction, groundwater depth increase, and fire A gradual increase in depth to groundwater is projected based on out-of-basin water transfers, lining of canals, and climate change in the Southwest	
Horton et al. 2003	X					X		Looked at water use sources for cottonwood, willow, and saltcedar	Rooting depth of 0.1-5.1 m, 0.1-3.2 m, and greater than 2.2 m for cottonwood, willow, and saltcedar Willow most sensitive to groundwater depth Cottonwood most sensitive to vapor pressure deficit	
Horton et al. 2001	X							Depth to groundwater responses at two Arizona rivers	A threshold response was observed for cottonwood and willow at DTW of 3 m Saltcedar did not show a response to groundwater declines over 3 m	
Hultine et al. 2010a	X							Soil moisture sensitivity of Fremont cottonwood and coyote willow	Looked at extreme reductions in water availability for two growing seasons Both species recovered from the short-term "drought" Cottonwood more sensitive year-to-year, willow more sensitive to longer dry periods	
Hultine et al. 2010				X		X		Saltcedar beetle defoliation effects on ET	Saltcedar beetles decreased ET during defoliation period (6 to 8 weeks during the growing season) by 16% On an annual basis, this equals a water savings of 4 cm in SE Utah, a 15% reduction compared to no defoliation.	

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Kirschbaum 2004					X	X		Review on the effects of climate change on transpiration	Climate change ET effects are not easily predicted While higher temperatures can increase vapor pressure deficits, ET can actually decrease due to CO2 effects on stomatal control Survival and ET potential at higher temperatures driven by water availability.	
Lite and Stromberg 2005	X						X	Studies hydrology effect on cottonwood, willow, and saltcedar along San Pedro River	Key components: surface water, groundwater less than 2.6 m, annual grounwater fluctuations less than 0.5 m	
Merritt and Bateman 2012	X							Looked at the effects of groundwater and surface water on vegetation composition and habitat quality for birds	Lower depth to groundwater resulted in higher cottonwood, willow, and tamarix cover For cottonwood and willow, a 2 m depth to groundwater decreased likelihoood by approximately 90%	
Moore and Owens 2012				X		X		Compared transpiration between species assemblages	Saltcedar uses little water when an understory species If saltcedar removed from understory, canopy trees use more water (no water savings)	
Nagler et al. 2005								ET estimates from Modis	Saltcedar ET estimates of 300-1300 mm/year Arrowweed ET estimates of 300-700 mm/year Cottonwood-willow 1100-1300, but data not from lower Colorado	
Nagler et al. 2007				X		X		Ground and remote-sensing based estimates of cottonwood transpiration	Cottonwood on the lower Colorado River uses an estimated 1.2 m of water per year	
Nagler et al. 2008				X		X		Estimates of saltcedar ET on lower Colorado	Estimate wide-scale annual ET of 1.1 m for saltcedar	
Nagler et al. 2008b		X	X	X X		X X		Looked at riparian vegetation and ET in the Delta	Wide-area estimate of 1.1 m per year for the riparian corridor ET was four times incoming flow, indicating reliance on groundwater and agricultural returns	
Nagler et al. 2012				X		X		Remote sensing analysis of beetle effects on ET	Mean ET reduction estimated as 14-15%. Defoliation not constant-ET reductions highest in mid-summer	
Nagler et al. 2014				X		X		Remote sensing of ET changes due to Beetles on Virgin River	Defoliation estimated to reduce ET by 54% for these study sites. Reductions primarily occur during peak defoliation	

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Perry et al. 2012				X	X			Review on the susceptibility of western US riparian ecosystems due to climate change	Temperatures increasing, drought more frequent Compared to upland ecosystems, riparian areas more vulnerable due to streamflow dependence Human water demands likely to further increase stress Likely that changes will favor drought-tolerant woody and herbaceous species instead of early successional trees Reservoir and flow management might become an important tool for conservation.	
Scanlon et al. 2007		X	X	X				Global review of agricultural impacts to water resources	Non-irrigated agriculture decreases ET, increases recharge and streamflow Irrigation based agriculture reduces streamflow, increases groundwater levels Irrigated agriculture also increases salinity Impact of land-use change has not been fully realized	
Scott et al. 1999	X							Assessed impacts of groundwater decline on cottonwoods	1 m declines in groundwater resulted in 88% mortality of cottonwood Declining crown volumes were a good indicator of future mortality 0.5 m declines in groundwater did not increase mortality Document the effects of channel incision on groundwater declines	
Stromberg 2013	X							Summary of rooting depths for native and non-native species	2.1 m rooting depth for Goodding's willow 2.1 m+ for cottonwood 4.9 m+ for saltcedar	
Zhao et al. 2013		X	X	X				Looked at changes due to drip irrigation adoption	0.5 m decline in groundwater due to large-scale adoption of drip irrigation Groundwater shifted to more normal phasing (lower during summer)	