Bird Species Composition in Riparian Habitat Invaded by Russian Olive





Peter J. Motyka

Sean M. Mahoney, Anna N.B. Smith, Erick Lundgren, Matthew J. Johnson, Raemy R. Winton, Bo Stevens

Photos by: Peter J. Motyka

Riparian habitat is important for breeding and migrating birds

Lucy's Warbler

Gray hawk

Common Blackhawk

TIL

Southwestern willow flycatcher

Photos by: Peter J. Motyka

Indigo bunting Anthropogenic changes to riparian habitats have promoted establishment and recruitment of non-native plants

Photo by: Peter J. Motyka

Much research has focused on birds in Tamarisk.

But we don't know much about Russian olive

Restoration Ecology

Tamarix as Habitat for Birds: Implications for Riparian Restoration in the Southwestern United States

Mark K. Sogge,^{1,3} Susan J. Sferra,² and Eben H. Paxton¹

Monitoring Southwestern willow flycatcher nests in Tamarisk on the Gila River

Photo by: Peter J. Motyka

We know that birds are integral to the system, mainly through dispersal of Russian olive seeds





Squirrel munching on Russian olives

Photo by: Peter J. Motyka

Ecohydrology

RESEARCH ARTICLE

The role of a non-native tree in riparian vegetation expansion and channel narrowing along a dryland river

Michael L. Scott 🗙, Lindsay V. Reynolds, Patrick B. Shafroth, John R. Spence

First published: 17 May 2018 | https://doi.org/10.1002/eco.1988

Russian olive has established in many riparian areas and is predicted to increase its dominance, which will be facilitated by climate change.



So what do these changes mean for the birds?



We wanted to know <u>about:</u>

Species richness

Functional groups

Species/functional group composition

Photo by: Peter J. Motyka

Bird richness in Russian olive

Other studies found mixed results:

- 1. Intermediate bird richness to native and upland sites (Knopf and Olson 1984)
- 2. Lower overall richness in Russian olive (Brown 1990)
- 3. Marginally lower warbler richness during migration (Kelly et al. 2000)
- 4. Overall vegetation (not Russian cover) most important predictor of bird richness (Fischer et al. 2012)

Foraging guilds/functional groups that use Russian olive

- 1. Hypothesized to benefit frugivores (Borell 1976, Knopf and Olson 1984)
- 2. Insectivores may forage on insects attracted to RO flowers during spring migration and breeding periods (Mahoney, unpublished data)
- 3. Russian olive trunks may be too small for drillers (Smith and Finch 2014)
- 4. Russian olive branches may not be robust enough to support bird of prey nests (Sadoti 2008)

Bird species composition studies show mixed responses to Russian olive

- 1. Black-chinned hummingbirds may or may not nest in Russian olive (Stoleson and Finch 2001, Smith et al. 2009, Mahoney, unpublished)
- 2. Only 11 out of 29 bird species nested in Russian olive when native habitat was available. At some sites, Yellow-breasted chats and Mourning doves preferentially nest in Russian olive (Stoleson and Finch 2001).
- 3. Other bird species may avoid nesting in Russian olive (Blue grosbeak, Stoleson and Finch 2001)
- 4. Willow flycatchers may experience increased brood parasitism from cowbirds in Russian olive (Stoleson and Finch 2001)
- 5. Studies have found higher densities of some nest predators (Knight and Fitzner 1985, Gazada et al. 2002)

We certainly know about the effects of Russian olive thorns on our feet,

But as far as interactions with birds, major gaps in knowledge remain.



Nell helping Sean remove Russian olive thorns from his sandal

So we hit the river to look for birds







Overstory				Understory					
Site name	Elaeagnus	Populus fremontii	Elaeagnus	Populus fremontii	Salix exigua	Tamarix	Rhaponticum	Ericameria nauseosa	Artimesia tridentata
3-Below	70	30	30	15	30	20	5	0	0
Big Stick	60	40	60	20	10	10	0	0	0
Butler Island	60	40	75	0	25	0	0	o Photos	s by: Peter J. N

Sites and Surveys

0 0

0 0

Bluff

Presence/Absence survey Each site surveyed 2 times if a species was never observed, we declared it absent

Montezuma Creek

Photo by: Peter J. Motyka

1	Site Name	UTM E	UTM N	Area	Transect length	PC1 score ^a	Richness	Functional groups
	3 Below	645939	4125655	19.6	1.5	-2.44	9	4
	Big Stick	614067	4119092	14.4	2	-2.85	16	5
	Butler Island	618367	4121828	1.61	0.4	1.79	6	3
	Chinle Island	613862	4117818	2.21	0.4	0.06	5	3
	Comb Wash	615528	4119909	8.75	1.6	-1.87	7	4
	First Cliff	637172	4126722	8.9	0.7	-1.07	7	2
	Foot Bridge	629137	4126374	19.5	1.4	0.19	12	4
	Heron Island	633509	4126961	26.6	2.3	-1.41	13	4
	Lime Creek	644248	4125851	5.89	1.8	-2.76	8	4
1	Lower Bluff	603770	4115532	2.6	0.4	3.34	5	1
	Lower Butler Wash	624622	4125022	55.8	4.2	3.29	14	5

Mexican Hat

50

Russian olive-dominated

Mixed vegetation

100 150 200 km

Higher bird species richness in mixed sites than in sites dominated by Russian olive



And we still have 6-14 bird species in sites with the most Russian olive

More functional groups of birds were found in mixed sites



<u>Functional groups</u> Generalist Insectivore Nectarivore Frugivore Carnivore Granivore Bird species composition is different between stands dominated with Russian olive vs mixed stands Bird functional group composition is barely different



Our results suggest that as Russian olive becomes more dominant in riparian habitats, bird communities will likely change.



Diversity in plants will support diversity in birds

Fischer et el. 2012 suggested that <u>structural architecture</u> is the most important thing driving bird richness and diversity

Bird Community Response to Vegetation Cover and Composition in Riparian Habitats Dominated by Russian Olive (*Elaeagnus angustifolia*)

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Northwest Science, Vol. 86, No. 1, 2012

Birds using non-native vegetation is not a novel phenomenon, and it is becoming increasingly common



Maui Alauahio nesting in a Monterrey cypress in Maui, Hawaii



Southwestern willow flycatcher nesting in Tamarisk on the Gila River, AZ

Bird Conservation International (2015) 25:280–293. © BirdLife International, 2014 doi:10.1017/S0959270914000306

Recent large-scale colonisation of southern pine plantations by Swainson's Warbler *Limnothlypis swainsonii*

GARY R. GRAVES

Photos by: Peter J. Motyka

Structure and function can be more important than native or non-native origins

A middle ground in the argument between a species' origin and its role in the ecosystem could facilitate conservation Shackelford et al. 2013 – Biological Conservation

"While origin may be a useful piece of information for predicting ecosystem function and impact of species introductions, it cannot necessarily be used as a simple shortcut for informed and nuanced decision making." Buckley and Catford 2016 – Journal of Ecology

Birds likely prefer Russian olive over dead or defoliated tamarisk

Photos by: Peter J. Motyka

Parasitism by Brown-headed cowbirds is a major concern that needs to be better understood.

TABLE 2. Number of passerine nests located and percent of nests exhibiting brood parasitism by Brown-headed Cowbirds along the Colorado River in Grand Canyon, Arizona, 1982 to 1987.

Species	# nests located	% parasitized
Black Phoebe	2	0
Say's Phoebe	4	0
Willow Flycatcher	8	50.0
Blue-gray Gnatcatcher	28	32.1
Phainopepla	3	0
Bell's Vireo	57	7.0
Lucy's Warbler	13	23.1
Yellow Warbler	22	22.7
Common Yellowthroat	9	55.6
Yellow-breasted Chat	37	10.8
Black-headed Grosbeak	1	0
Blue Grosbeak	5	60.0
Indigo Bunting	2	0
Northern Oriole	1	0
House Finch	7	0
Lesser Goldfinch	8	0
Total	207	17.9

RATES OF BROOD PARASITISM BY BROWN-HEADED COWBIRDS ON RIPARIAN PASSERINES IN ARIZONA

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Photos by: Peter J. Motyka

The ecology in riparian systems are complex. Cause and effect dynamics are often confounded.

Experiments! Photos by: Peter J. Motyka

We need to take an ecosystem approach that is driven by research-oriented restoration



Review Article | Published: 01 July 2006

A framework for community and ecosystem genetics: from genes to ecosystems

Thomas G. Whitham , Joseph K. Bailey, Jennifer A. Schweitzer, Stephen M. Shuster, Randy K. Bangert, Carri J. LeRoy, Eric V. Lonsdorf, Gery J. Allan, Stephen P. DiFazio, Brad M. Potts, Dylan G. Fischer, Catherine A. Gehring, Richard L. Lindroth, Jane C. Marks, Stephen C. Hart, Gina M. Wimp & Stuart C. Wooley

Nature Reviews Genetics 7, 510–523 (2006) | Download Citation 🛓













Illustration by: Jackie Parker Photos by: Peter J. Motyka

Questions?