Capture Success Rates of the Western Yellow-breasted Chat in the South Okanagan Valley, British Columbia, from 2005 through 2007

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ABSTRACT

Since 2001 Environment Canada has color-banded the endangered population of the Yellow-breasted Chat (*Icteria virens auricollis*) in the south Okanagan valley, British Columbia, as part of a study of habitat selection and reproduction. During 2005 to 2007, we kept detailed records of chats banded in the breeding territories in the south Okanagan valley and determined capture success rates between 19.4 and 52.9 chats per 100 net-hours for the three years. These high capture rates can most likely be attributed to consistency in banding personnel, knowledge of study sites, territories, behavior of the species and, in some instances, location of the nest. We had mixed results with active mist netting. During 2005 and 2007, no chats were caught with active mist netting and males did not react to the male chat playback call. However, during 2006, 175 chats per 100 net-hours were captured with active mist netting. Males had a higher capture rate before a nest was located, while females were more often caught after a nest was located and while chicks were in the nest.

INTRODUCTION

Capturing of birds can be challenging. Black-billed Magpies (*Pica pica*) are wary birds that avoid unusual objects, making them extremely difficult to catch (Alsager et al. 1972, Scharf 1985). Mist netting is used frequently to capture and recapture birds in bird studies (Karr 1981, Poulsen 1994). Mist netting success can be influenced by net avoidance, behavioral differences between species and individuals of the same species, escapes from the net, species density, activity of birds, habitat structure and weather conditions (Karr 1981, Jenni et al. 1996).

When they are not singing, Yellow-breasted Chats (*Icteria virens auricollis*) are elusive, are often overlooked, and have a skulking and secretive nature (Thompson and Nolan 1973, Eckerle and Thompson 2001). Their behavior and preference for using dense shrubs (Eckerle and Thompson 2001) make it challenging to mist-net chats.

METHODS

The study area was within the riparian zone of the Okanagan River in the south Okanagan valley in British Columbia, south from the city of Penticton (49° 27' N and 119° 36' W) to Osoyoos (49° 1' N 119° 26' W) located on the US-Canada border, a dis-tance of 66 km. The elevation of the study area ranged from 297 m to 344 m above sea level.

Once a chat territory was detected by the presence of a singing male, the territory was visited about every three days to determine whether a female was present, whether the adults were banded, and to do nest searching and monitoring. When an unbanded bird was detected, the behavior of the bird was observed by quiet observations for from 10 min to one hr to identify common flight paths and to get familiar with the territory.

A combination of active and passive mist netting was then used between 0500 and 1400 after males arrived in mid-May until the end of the breeding season at the end of July. During active netting, a tape of a male chat call was played for a maximum

of 10 min. If there was no reaction to the tape, the tape recorder was switched off and the mist nets were left open for 30 min. We did not have access to a parabolic mike to record the call of each male to use as a playback, and during 2005 and 2006, we had to rely on a chat call taped from a compact disk recorded in the south Okanagan. The call was, therefore, recorded from a male chat within our study sites. During 2007, we had access to a Sony ICD P520 digital recorder and recorded individual male calls to use as playbacks. If no tape of a male chat call was played, it was considered passive mist netting.

The nets were checked every 10 to 15 min. Once captured, the chats were banded with a US Geological Survey metal band and a unique combination of three color bands.

Mist nets were set up before or after a nest was located; and if a nest was located, nets were set up during different nesting stages, namely during incubation, while there were chicks in the nest, and after chicks fledged. If a nest was already located, the nets were set up in an opening where the chats were likely to move through to or from the nest. Caution was taken to set up nets at least 5 m away from the nest so as not to disturb the breeding female. No females were observed leaving the nest while setting up mist nets.

During 2005, two 9-m nets (38 mm, US-made Avinet, Inc.) were used. During 2006 and 2007, additional 9-m and 6-m mist nets (38 mm, US-made) were used; and depending on the size, structure and layout of the territory and the behavior of the birds, two to four mist nets were used. If the territory was not suitable for setting up a number of mist nets or the birds had a distinct flight path, only one mist net was used. If a chat was not caught in a territory the first time mist nets were set up, mist nets were often set again on one or two subsequent visit to the same territory. Net- hours for 6-m and 9-m nets were converted to net-hours for 12-m nets. One net-hr is considered one 12-m net open for one daylight hour. Net-hours reported here are only for unbanded chats. (Scientific permit to capture and band migratory birds # 10365 CY, Species at Risk Act permit # 59-05-0378, 59-06-0304 and 59-07-0279).

A t-test for dependent samples was used to compare differences between capture rates of active and passive mist netting, capture rates before a nest was located, and after a nest was located, as well as between different nesting stages. Statistical analysis was performed using the software Statistica 5.5 (StatSoft Inc.). Significant difference was $p<0.05$ (Zar 1996).

RESULTS

During 2005, 49 net-hours (nh) (active and passive mist netting combined) were spent and 12 unbanded chats (eight males and four females) were caught at a capture rate of 24.5 birds per 100 net-hours (b/100nh). During 2006, 34 nh (active and passive mist netting combined) were spent and 18 unbanded chats (10 males and eight females) were caught at a capture rate of 52.9 b/100nh. In 2007, 67 nh (active and passive mist netting combined) resulted in the capture of 13 unbanded chats (seven males and six females) at a capture rate of 19.4 b/100nh.

Breaking the net hours into active and passive net hours, during 2005, one net hour was spent with active netting and 48 net hours were passive mist netting. No chats were caught during active mist netting, while 12 chats were caught during passive mist netting (25 b/100nh). In 2006, active mist netting was very successful and seven chats were caught during four active nh (175 b/100nh), while 11 chats were caught during 30 passive nh (36.7 b/100nh). During 2007, no chats were caught during three active nh, while 13 chats were caught during 64 passive nh (20.3 b/100nh). There was no statistical difference between active and passive mist netting ($p=0.62$).

During 2005 and 2006, setting up mist nets before a nest was located proved to be more successful; while in 2007, a higher capture rate was achieved setting up mist nets after a nest was located (Tables 1A & 1B). More females were caught after a nest was located than before, while males were the opposite, with a higher capture rate when nets were set up before a nest was located (Table 1A & 1B). When mist-nets were set up when a nest was already located, more males and females were captured during the period while chicks were in the

Table 1A. Capture rates for Yellow-breasted Chats *(Icteria virens auricollis)* before a nest was located in the south Okanagan, British Columbia, during 2005 through 2007.

Year	# of nh	# of males caught	# of females caught	Total # of Chats	Capture Rate males (b/100 nh)	Capture Rate females (b/100nh)	Capture Rate males + females (b/100nh)
2005	15	4	1	5	26.7	6.7	33.4
2006	16	6	3	9	37.5	18.8	56.3
2007	34	4	1	5	11.8	2.9	14.7

Table 1B. Capture rates for Yellow-breasted Chats *(Icteria virens auricollis)* after a nest was located in the south Okanagan, British Columbia, during 2005 through 2007.

Year	# of nh	# of males caught	# of females caught	Total # of Chats	Capture Rate males (b/100 nh)	Capture Rate females (b/100nh)	Capture Rate males + females (b/100nh)
2005	34	4	3	7	11.8	8.8	20.6
2006	18	4	5	9	22.2	27.8	50
2007	33	3	5	8	9.1	15.2	24.3

Table 2A. Capture rates for Yellow-breasted Chats *(Icteria virens auricollis)* during the incubation period in the south Okanagan, British Columbia, during 2005 through 2007.

Year	# of nh	# of males caught	# females caught	Total # of Chats	Capture Rate males (b/100 nh)	Capture Rate females (b/100nh)	Capture Rate males + females (b/100nh)
2005	19	1	1	2	5,3	5,3	10.6
2006	8	1	1	2	12.5	12.5	25
2007	16	2	3	5	12.5	18.8	31.3

Table 2B. Capture rates for Yellow-breasted Chats *(Icteria virens auricollis)* while chicks were in the nest in the south Okanagan, British Columbia, during 2005 through 2007.

Year	# of nh	# of males caught	# females caught	Total # of Chats	Capture Rate males (b/100 nh)	Capture Rate females(b/10-0nh)	Capture Rate males + females (b/100nh)
2005	12	3	2	5	25	16.7	41.7
2006	10	3	4	7	30	40	70
2007	7	1	2	3	14.3	28.6	42.9

Table 2C. Capture rates for Yellow-breasted Chats *(Icteria virens auricollis)* chicks fledged in the south Okanagan, British Columbia, during 2005 through 2007.

Year	# of nh	# of males caught	# females caught	Total # of Chats	Capture Rate males (b/100 nh)	Capture Rate females (b/100nh)	Capture Rate males+ females (b/100nh)
2005	3	0	0	0	0	0	0
2006	0	0	0	0	n/a	n/a	n/a
2007	10	0	0	0	0	0	0

nest than during the incubation period or after the chicks fledged (Table 2A, 2B & 2C). There were no statistical differences between capture successes (males, females, and males and females combined) before or after a nest was located (p=0.12; p=0.12; p=0.68), or between the incubation period and the period when there were chicks in the nest (p=0.15; p=0.10; p=0.09).

DISCUSSION

These capture rates are higher than capture rates reported for chats in Indiana, where capture rates were between 1.40 and 3.48 b/100nh for adult males and 0.59 and 3.88 b/100nh for adult females during spring migration (Thompson and Nolan 1973). In Virginia, capture rates for adults (after converting 9-m nh to 12-m nh) were approximately 7.4 b/100nh in one study site and approximately 2.3 b/100nh in the second study site (Dennis 1958). Our high capture rates can most likely be attributed to bander experience, extensive observations, time spent in territories, the use of active and passive netting and, in some instances, knowledge of the location of the nest. Having studied the chats in the south Okanagan, BC, since 2002, the bander is familiar with the chat territories, their behavior and possible flying paths. Net placement is also crucial, so knowledge of the movements of specific individuals or pairs in their territories improves capture success, as illustrated by the fact that on three occasions a chat was caught while the bander was still in the process of opening the net.

When mist nets were set up after a nest was located, capture rates were higher during the nestling stage than during incubation or after chicks fledged. Only females incubate the eggs, while both males and females feed nestlings (Eckerle and Thompson 2001). The pair is, therefore, more active during the nestling stage, which enhances the chances of capture.

Banding in 2007 had the lowest capture rate, as it was windier than during 2005 and 2006 (Environment Canada 2005). During 2007, there were 27 days when the wind speed was between 30 and 60 km/h compared to 19 days in 2005 and 15 days in 2006, supporting the reports that wind can affect capture success negatively (Jenni et al. 1996, Huschle et al. 2002). During 2007, mist nets were also set up in a number of new territories with which the bander was less familiar and territories that were less suitable for setting up mist nets (e.g., steep slopes, very thick vegetation, no openings between rose patches that can be used as net lanes). This further emphasizes that familiarity with territories is important to achieving higher capture rates.

Mixed results were achieved with active mist netting. Males sometimes did not react to the tape recording; or when they reacted, they flew over the mist net, sometimes displaying but not low enough to be caught. Even when we used call playbacks during 2007 instead of a chat call from a compact disk, we did not achieve higher capture rates during active netting. When active mist netting was successful, males reacted immediately to the call and were caught within three to five min. The use of a decoy should be investigated. If males have a visual cue with the audible cue, they might come lower down to investigate instead of just displaying high above the nets. A combination of decoys and playbacks was successful in capturing Black-throated Blue Warbler (*Dendroica caerulescens*) and Veery (*Catharus fuscescens*; Kearns et al. 2006), Hermit Thrush (*Catharus guttatus*; Brown et al. 2000) and Least Flycatchers (*Empidonax minimus*; Tarof and Ratcliffe 2004).

In Willow Flycatchers (*Empidonax traillii*), active mist netting was effective for territorial males, while non-territorial males were caught only in passive mist netting (Koronkiewicz et al. 2006). Playbacks were effective in attracting a number of different forest species in New Brunswick and Quebec (Gunn et al. 2000). Territorial male Willow Flycatchers (Koronkiewicz et al. 2006), Black-breasted Wood-Quail (*Odontophorus leucolaemus*; Hale 2006) and male Cerulean Warblers (*Dendroica cerulea*; Barg et al. 2006) also responded to playbacks, while Montezuma Quail (*Cyrtonyx montezumae*) did not respond to playbacks (Hernandez et al. 2006). Playbacks were effective in detecting relatively silent species, including leaftossers (*Sclerurus caudacutus* and *S. mexicanus*), Chestnut-belted Gnateater (*Conopophaga aurita*) and Spotted Antpitta (*Hylopezus macularius*; Stouffer 2007).

In our study, passive mist netting and mist netting during the nestling stage produced more consistent results. The variation in success with different techniques and among different passerine species likely with different levels of experience among banders makes specific recommendations for passerines difficult. It is, therefore, important to try multiple methods to ensure maximum results. Our very high capture rate, however, suggests long-term studies with consistency in banding personnel and knowledge of the study sites, territories, behavior of the species, timing of setting up nets, and their annual nesting locations are probably very valuable and contribute to higher capture rates.

ACKNOWLEDGMENTS

We thank the Osoyoos Indian Band, Penticton Indian Band, Audra Moir, Marta Sutherland, and Jim Heel for access to their land. Thanks to Owain McKibbin, Tawna Morgan, Jason Emery, Richard Armstrong, Ron Hall, Rosemary Bryan, Alicia Newbury, Lukus Bent, Ingrid Pollet, Mario Hall, Trent Manassa, and Bowe McGinnis for their assistance during mist netting. Thank you to the reviewers for their valuable comments. The study was funded by Environment Canada, the Osoyoos Indian Band and The Endangered Species Recovery Fund.

LITERATURE CITED

Alsager, D.E., J.B. Stenrue, and R.L. Boyles. 1972. Capturing Black-billed Magpies with circular live traps. *J. Wildl. Manage.* 36:981–983.

Barg, J.J., J. Jones, M.K. Girvan, and R.J. Robertson. 2006. Within-pair interactions and parental behavior of Cerulean Warblers breeding in eastern Ontario. *Wilson J. Ornithol.* 118:316–325.

Brown, D.R., P.C. Stouffer, and C.M. Strong. 2000. Movement and territoriality of wintering Hermit Thrushes in southeastern Louisiana. *Wilson Bull.* 112:347–353.

Dennis, J.V. 1958. Some aspects of the breeding ecology of the Yellow-breasted Chat (*Icteria virens*). *Bird-Banding* 29:169-183.

Environment Canada Climate data. 2005. http://www.climate.weatheroffice.ec.gc.ca

Eckerle, K.P. and C.F. Thompson. 2001. Yellow-breasted Chat (*Icteria virens*). *In* The birds of North America, No. 575. (A. Poole and F. Gill, eds.). The Acad. Nat. Sci., Philadelphia, PA and The American Ornithologists' Union, Washington, DC.

Gunn, J.S., A. Desrochers, M.A. Villard, J. Bourque and J. Ibarzabal. 2000. Playbacks of mobbing calls of Black-capped Chickadees as a method to estimate reproductive activity of forest birds. *J. Field Ornithol.* 71:472–483.

Hale, A.M. 2006. Group living in the Black-breasted Wood-Quail and the use of playbacks as survey technique. *Condor* 108:107–119.

Hernandez, F., L.A. Harveston, and C.E. Brewer. 2006. A comparison of trapping techniques for Montezuma Quail. *Wildl. Soc. Bull.* 34:1212–1215.

Huschle, G., J.E. Toepfer, W.L. Brininger Jr., and D.A. Azure. 2002. Capturing adult American Bitterns. *Waterbirds* 25:505-508.

Jenni, L., M. Leuenberger, and F. Rampazzi. 1996. Capture efficiency of mist nets with comments on their role in the assessment of passerine habitat use. *J. Field Ornithol.* 67: 263–274.

Karr, J.R. 1981. Surveying birds with mist nets. *In* Estimating numbers of terrestrial birds. (C.J. Ralphs and J.M. Scotts, eds.) *Stud. Avian Biol.* 6:62–67.

Kearns, L.J., E.D. Silverman, and K.R. Hall. 2006. Black-throated Blue Warbler and Veery abundance in relation to understory composition in northern Michigan forests. *Wilson J. Ornithol.* 118:461–470.

Koronkiewicz, T.J., M.K. Sogge, C. Van Riper III, and E.H. Paxton. 2006. Territoriality, site

fidelity, and survivorship of Willow Flycatchers wintering in Costa Rica. *Condor* 108:558–570.

Poulsen, B.O. 1994. Mist-netting as a census method for determining richness and abundances in an Andean cloud forest bird community. *Gerfaut* 84:39-49.

Scharf, C. 1985. A technique for trapping territorial magpies. *N. Am. Bird Bander* 10:34-36.

Stouffer, P.C. 2007. Density, territory size, and long-term spatial dynamics of a guild of terrestrial insectivorous birds near Manaus, Brazil. *Auk* 124:291–306.

Tarof, S.A., and L.M. Ratcliffe. 2004. Habitat characteristics and nest predation do not explain clustered breeding in Least Flycatchers (*Empidonax minimus*). *Auk* 21:877–893.

Thompson, C.F. and V. Nolan, Jr. 1973. Population biology of the Yellow-breasted Chat (*Icteria virens L.*) in southern Indiana. *Ecol. Monogr.* 43:145–171.

Zar, J.H. 1996. Biostatistical analysis, 3rd edition. Prentice-Hall, Inc. Upper Saddle River, NJ.

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