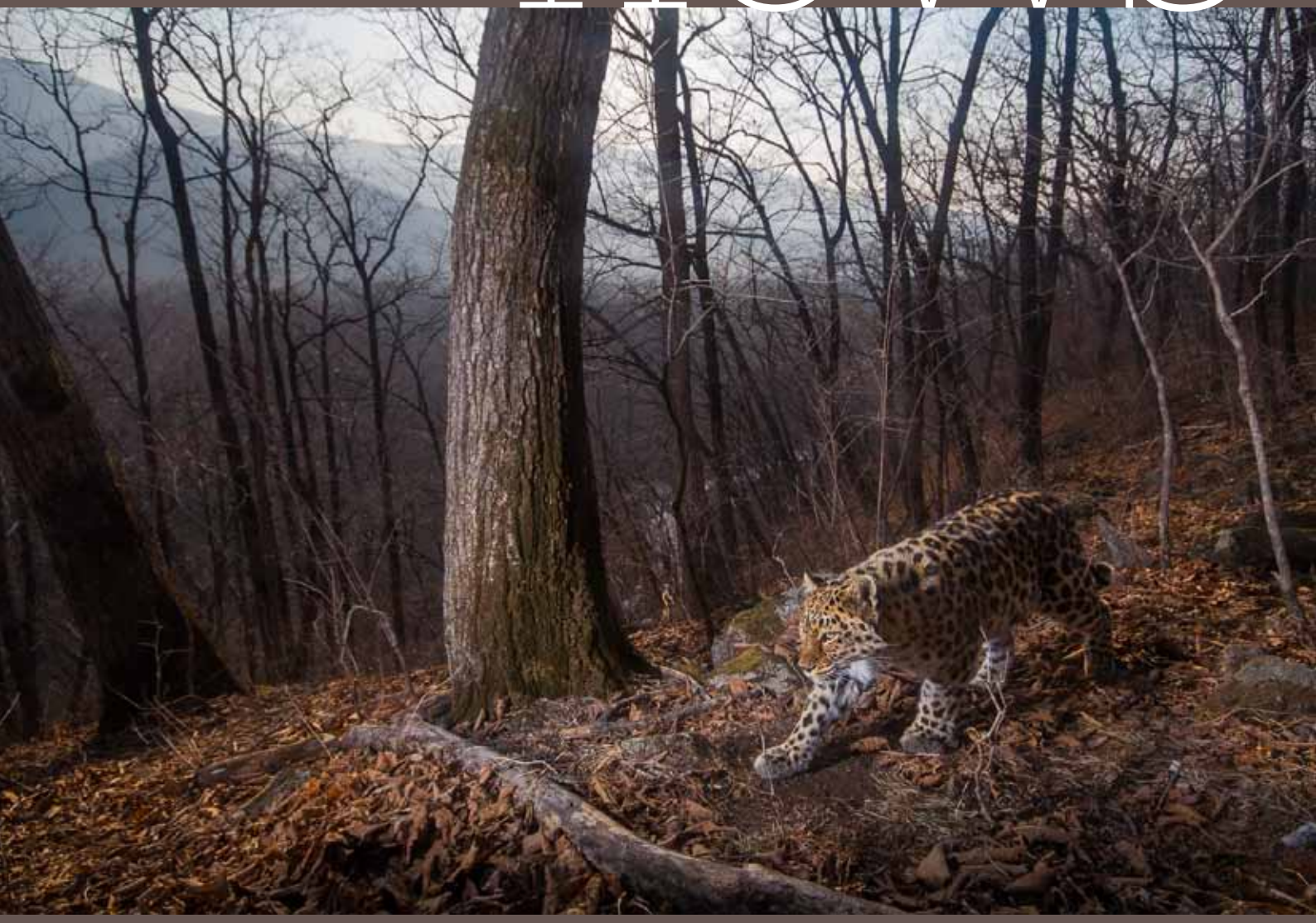
ISSN 1027-2992

CAT news

N° 67 | Spring 2018



SPECIES SURVIVAL COMMISSION

CAT SPECIALIST GROUP

CATnews is the newsletter of the Cat Specialist Group, a component of the Species Survival Commission SSC of the International Union for Conservation of Nature (IUCN). It is published twice a year, and is available to members and the Friends of the Cat Group.

For joining the Friends of the Cat Group please contact Christine Breitenmoser at ch.breitenmoser@kora.ch

Original contributions and short notes about wild cats are welcome
Send contributions and observations to ch.breitenmoser@kora.ch.

Guidelines for authors are available at www.catsg.org/catnews

CATnews is produced with financial assistance from the Friends of the Cat Group.

Design: barbara surber, werk'sdesign gmbh
Layout: Christine Breitenmoser and Tabea Lanz
Print: Stämpfli Publikationen AG, Bern, Switzerland

ISSN 1027-2992

Editors: Christine & Urs Breitenmoser
Co-chairs IUCN/SSC
Cat Specialist Group
KORA, Thunstrasse 31, 3074 Muri,
Switzerland
Tel ++41(31) 951 90 20
Fax ++41(31) 951 90 40
<urs.breitenmoser@vetsuisse.unibe.ch>
<ch.breitenmoser@kora.ch>

Associate Editors: Keith Richmond
Brian Bertram
Sultana Bashir
Juan Reppucci

Cover Photo: Amur leopard
Photo Emmanuel Rondeau

LUIS G. FONSECA[1], STEPHANNY ARROYO-ARCE[2*], IAN THOMSON[2], WILBERT N. VILLACHICA[1] & ROLDÁN A. VALVERDE[3]

Records of pumas scavenging at jaguar kills in Santa Rosa National Park, Costa Rica

This study describes records of scavenging behaviour of pumas *Puma concolor* at jaguar *Panthera onca* kills in Costa Rica. We set camera traps at fresh carcasses predated by jaguars on Nancite beach between March 2010 and July 2017. Pumas were recorded at four out of 70 monitored kills. Jaguars interacted with the carcasses mainly at night while pumas were more active during the day. Since little is known about pumas using jaguar kills as food resource it is important to continue our monitoring efforts to better understand this interaction.

Although jaguars and pumas are known to be opportunistic predators (Sunquist & Sunquist 2002), they can also act as scavengers. For jaguars, this behaviour has been documented in Mexico (González & Piña 2002), Honduras (Castañeda et al. 2013), Costa Rica (Guilder et al. 2015, Escobar et al. 2016a) and Brazil (Cavalcanti & Gese 2010). For pumas, most scavenging records have been reported in North America (Hibben 1937, Linsdale & Tomich 1953, McBride 1976, Ackerman et al. 1984, Ross & Jalkotzy 1996, Logan & Sweanor 2001, Bauer et al. 2005, Bacon & Boyce 2010, Knopff et al. 2010, Elbroch et al. 2014, Elbroch & Quigley 2017), but also in Costa Rica (Escobar et al. 2016b) and Chile (Elbroch & Wittmer 2013). To date, and to our knowledge, there is only one documented record of pumas using jaguar kills as food resource (Escobar-Lasso et al. 2016b). In this study, we aim to expand our current knowledge by describing the scavenging behaviour of pumas at jaguar kills at Nancite beach, Santa Rosa National Park, Costa Rica.

Nancite beach is located on the Northwest Pacific coast of Costa Rica (10°48' N / 85°39' W) within the Santa Rosa National Park, Guanacaste Conservation Area. The beach has an extension of approximately 1,050 m surrounded by rocky mountain systems, estuaries and patches of dry forest (Janzen 1988, Fonseca et al. 2009). Since jaguars are known to prey on sea turtles that nest on the beach (Escobar et al. 2016a, 2016c, 2016d), a camera trap monitoring programme of sea turtle carcasses has been conducted since 2009 to assess this predator-prey interaction.

The monitoring programme consisted of surveying the beach looking for sea turtles (but also other large animals) predated by jaguars (<24 h since kill; hereafter known as kills). When a carcass was found it was examined for evidence of jaguar predation (e.g. bite marks on the neck, drag marks, jaguar tracks). If it was determined to be the result of jaguar predation, one or two camera traps capable to take photos and videos (models Bushnell and Moultrie) were installed around the kill and checked daily for a period of one to four days.

Activity patterns of jaguars and pumas were estimated in accordance with the methodology of Monroy-Vilchis et al. (2011). For each species, records were grouped in two hours intervals, and the activity patterns were classified as diurnal (8:00-18:00 h), nocturnal (20:00-6:00 h) and crepuscular (6:00-8:00 h and 18:00-20:00 h).

A total of 70 kills (69 olive ridley sea turtle *Lepidochelys olicavea* and one American crocodile *Crocodylus acutus*) were monitored with camera traps from March 2010 to July 2017. During the study period, pumas (at least one male) scavenged at four kills, including three olive ridley sea turtles and one American crocodile (Fig. 1; Supporting Online Material SOM Table T1). At these kills, also three adult jaguars (one male and two females) were recorded. Due to methodological limitations, it was not possible to determine which jaguar was responsible for the kill and which ones were acting as scavengers. On the first and the fourth kill, pumas spent more time feeding on the carcass (Kill 01: 57 min, Kill 04: 161 min) than the jaguars (Kill 01: 24 min, Kill 04: 89 min). The opposite occurred at the second kill, where jaguars spent more time feeding on the kill (192 min) than pumas (161 min). At the third kill, jaguars fed during 175 min while a puma only passed by the carcass. Overall, pumas scavenged on the kills mainly during the day (from the records 69% were diurnal, 19% nocturnal and 12% crepuscular), while jaguars were more nocturnal (58%), although they also showed some activity

Fig. 1. Camera trap photos of jaguars and pumas scavenging from jaguar kills in Nancite beach, Santa Rosa National Park, Costa Rica. First column corresponds to Kill 01 and the second column to Kill 02 (Photo L. G. Fonseca).

during the day (17% records) and at twilight hours (25% records). It is important to highlight that all visits from jaguars and pumas were from single individuals. At the end of the sampling period, all carcasses had extensively been consumed by the felids and no other mammal species were detected scavenging from the remains.

Our results suggest that jaguars exhibit certain degree of tolerance to other coexisting predators (e.g. jaguars and pumas) occasionally scavenging their kills (Escobar-Lasso et al. 2016a, Escobar-Lasso et al. 2016b). Although sea turtles nest throughout the year on Nancite beach, and despite that jaguar predation has been recorded since 1980 (Cornelius & Robinson 1985), it is not until recently that pumas have been documented using turtles as a food resource (Escobar-Lasso et al. 2016b). Therefore, there are still important questions to answer: are these scavenging records isolated events? Alternatively, are pumas learning how to use jaguar kills as a strategy to optimise foraging? What factors are triggering the scavenging behaviour of this felid? Could jaguar kills affect the population dynamics of pumas? Will pumas learn to hunt sea turtles themselves? Thus, it is important to continue with our monitoring efforts to better understand the foraging behaviour of both jaguar and pumas, and how it will evolve in the future.

Acknowledgements

We would like to thank the Área de Conservación Guanacaste for giving us permission to conduct this work and for their logistical support. We would also like to thank Dr. Mark Elbroch and the anonymous reviewers for their comments on the manuscript.

References

Ackerman B. B., Lindzey F. G. & Hemker T. P. 1984. Cougar food habits in southern Utah. Journal of Wildlife Management 48, 147-155.

Bauer J., Logan K., Sweanor L. & Boyce W. 2005. Scavenging behavior in puma. The Southwestern Naturalist 50, 466-471.

Bacon M. M. & Boyce M. S. 2010. Scavenging of an Elk, *Cervus elaphus*, carcass by multiple Cougars, *Puma concolor*, in southeastern Alberta. The Canadian Field-Naturalist 124, 242-245.

Castañeda F. E., Herrera L. & Pereira S. 2013. Behaviour of two male jaguars scavenging on a marine dolphin in Honduras. Cat News 58, 11-12.

Cavalcanti S. & Gese E. 2010. Kill rates and predation patterns of jaguars (*Panthera onca*) in the southern Pantanal, Brazil. Journal of Mammalogy 91, 722-736.

Cornelius S. E. & Robinson D. C. 1985. Abundance, distribution and movements of Olive Ridley sea turtles in Costa Rica. U. S. Fish and Wildlife Service Report, Washington, D. C. 134 pp.

Elbroch L. M., Allen M. L., Lowrey B. H. & Wittmer H. 2014. The difference between killing and eating: ecological shortcomings of puma energetic models. Ecosphere 5, 5-16.

Elbroch L. M. & Quigley H. 2017. Social interactions in a solitary carnivore. Current Zoology 63, 357-362.

Elbroch L. M. & Wittmer H. 2013. The effects of puma prey selection and specialization on less abundant prey in Patagonia. Journal of Mammalogy 94, 259-268.

Escobar-Lasso S., Gil-Fernandez M., Herrera H., Fonseca L. G., Carrillo-Jiménez E., Sáenz J. & Wong G. 2016a. Scavenging on sea turtle carcasses by multiple jaguars in Northwestern Costa Rica. Therya 7, 231-239.

Escobar-Lasso S., Fonseca L., Gil-Fernández M., Villachica, W. N., Arroyo-Arce S., Thomson I. & Sáenz J. 2016b. First record of consumption of olive ridley sea turtle by a cougar. Cat News 64, 4-5.

Escobar-Lasso S., Fonseca L. G., Villachica W. N., Herrera H., Valverde R. A., Quiros-Pereira W., Pesquero M. & Plotkin P. T. 2016c. First field observation of the predation by jaguar (*Panthera onca*) on olive ridley sea turtle (*Lepidochelys olivacea*) at Nancite Beach, Santa Rosa National Park, Costa Rica. Mammalogy Notes 3, 20-23.

Escobar-Lasso S., Gil-Fernandez M., Sáenz J., Carrillo-Jiménez E., Wong G. & Fonseca L. G. 2016d. Inter-trophic food provisioning between sea and land: the jaguar (*Panthera onca*) as provider of sea turtle carcasses to terrestrial scavengers. International Journal of Conservation Science 7, 1081-1094.

Fonseca L. G., Murillo G. A., Guadamuz L., Spínola R. M. & Valverde R. A. 2009. Downward but stable trend in the abundance of arribada olive ridley sea turtles (*Lepidochelys olivacea*) at Nancite beach, Costa Rica (1971-2007). Chelonia Conservation and Biology 8, 19-27.

González C. A. L. & Piña G. L. 2002. Carrion use by jaguars (*Panthera onca*) in Sonora, Mexico. Mammalia 66, 603-605.

Guilder J., Barca B., Arroyo-Arce S., Gramajo R. & Salom-Pérez R. 2015. Jaguars (*Panthera onca*) increase kill utilization rates and share prey in response to seasonal fluctuations in nesting green turtle (*Chelonia mydas mydas*) abundance in Tortuguero National Park, Costa Rica. Mammalian Biology 80, 65-72.

Hibben F. C. 1937. A preliminary study of the mountain lion (*Felis oregonensis* ssp). University of New Mexico Bulletin, Biological Series 5, 1-59.

Janzen D. H. 1988. Guanacaste National Park: Tropical Ecological and Biocultural Restauration. *In* Rehabilitating damaged ecosystems. Cairns J. (Ed.). CRC Press, Boca Raton, Florida, pp. 143-192.

Knopff K. H., Knopff A. A. & Boyce M. S. 2010. Scavenging makes cougars susceptible to snaring at wolf bait stations. Journal of Wild Life Management 74, 644-653.

Linsdale J. M. & Tomich P. Q. 1953. A herd of mule deer: a record of observations made on the Hastings Natural History Reservation. University of California Press, Berkeley. 567 pp.

Logan K. L. & Sweanor L. L. 2001. Desert puma: evolutionary ecology and conservation of an enduring carnivore. Island Press, Washington D. C. 463 pp.

Mcbride R. T. 1976. The status and ecology of the mountain lion (*Felis concolor stanleyana*) of the Texas-Mexico border. MSc thesis, Sul Ross State University, Alpine, Texas. 320 pp.

Monroy-Vilchis O., Zarco-González M., Rodríguez-Soto C., Soria-Díaz L. & Urios V. 2011. Fototrampeo de mamíferos en la Sierra Nanchititla, México: abundancia relativa y patrón de actividad. Revista de Biología Tropical 59, 373-383.

Sunquist M. & Sunquist F. 2002. Wild Cats of the World. The University of Chicago Press, Chicago. 452 pp.

Ross P. I. & Jalkotzy M. G. 1996. Cougar predation on moose in southwestern Alberta. Alces 32, 108.

Supporting Online Material SOM Table T1 is available at www.catsg.org.

[1] Biocenosis Marina, Trinidad de Moravia, San José, Costa Rica

[2] Coastal Jaguar Conservation, 126-3100 Santo Domingo, Heredia, Costa Rica
*<sturnina@gmail.com>

[3] Sea Turtle Conservancy, 246-2050 San José, Costa Rica; and Department of Biological Sciences, Southeastern Louisiana University, Hammond, Louisiana 70402

Fonseca L. G., Arroyo- Arce S., Thomson I., Villachica W. N. & Valverde R. A. 2018. Records of pumas scavenging at jaguar kills in Santa Rosa National Park, Costa Rica. Cat News 67, 4-5. Supporting Online Material

Table 1. Date and time individual jaguars and pumas were feeding from jaguar kills on Nancite beach, Santa Rosa National Park, Costa Rica. Period: 2017.

Date	Time	Species	ID[1]	Sex[2]	Min[3]
Kill 01: Olive ridley sea turle					
03 February	15:12	Puma	P04	M	41
03 February	17:04	Puma	P04	M	16
03 February	20:36	Jaguar	C01	F	22
03 February	21:31	Jaguar	C01	F	2
03 February	23:18	Puma[4]	NI	NI	0
Kill 02: American crocodile					
04 March	18:36	Jaguar	C01	F	65
05 March	2:26	Jaguar	C01	F	68
05 March	9:25	Puma	P04	M	67
05 March	11:51	Puma	P04	M	38
05 March	14:13	Puma[4]	P04	M	1
05 March	18:37	Puma	NI	M	25
05 March	21:01	Puma	NI	M	30
06 March	2:22	Jaguar	J16	M	59
Kill 03: Olive ridley sea turle					
13 March	18:32	Jaguar	C01	F	52
14 March	2:07	Jaguar	J03	F	50
14 March	3:04	Jaguar	C01	F	73
15 March	20:55	Jaguar[4]	C01	F	0
16 March	7:22	Puma[4]	P04	M	0
Kill 04: Olive ridley sea turle					
10 July	12:55	Jaguar	C01	F	28
10 July	14:26	Puma	P04	M	64
10 July	17:16	Puma	P04	M	33
10 July	19:39	Jaguar	C01	F	44
10 July	20:32	Puma[4]	P04	M	0
11 July	9:01	Puma	P04	M	33
11 July	14:48	Puma	P04	M	11
11 July	15:06	Puma	P04	M	19
11 July	17:29	Jaguar	C01	F	17
12 July	10:34	Puma	P04	M	01

[1]Individual identification
[2]M:male, F:female
[3]Total time an individual spent at the kill
[4]Individuals were not recorded feeding from the kill (passing by)