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The European otter (*Lutra lutra*) in Vjosa River and its main tributaries

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We assessed otter distribution and marking intensity along the main water course of Vjosa River and its major tributaries (Drino, Lengarica and Bença). Marking intensity was assessed in two seasons, spring and early autumn 2016 and 2017, corresponding to the highest and lowest river discharge levels, respectively. Otter signs (spraints, jellies and footprints) were searched in 16 sampling stations consisting of river stretches each 200 m long each. All surveyed sites represent permanent river courses. Vegetation coverage, hydraulic pattern and human disturbance were assessed visually for the whole length of each sampling station. Both the mean number of sprainting sites and spraints per 200m of watercourse were higher in spring (2.18 and 3.94, respectively) than in early autumn (1.37 and 1.68). In spring otter signs were recorded in all sampling stations (100 %), while in early autumn, 12 sampling stations were positive for otters (75 %). The number of sprainting sites and marking intensity was correlated to both hydraulic pattern and the vegetation coverage, while human disturbance did not significantly influenced the marking intensity of the otters. Construction of hydropower dams along the Lengarica river shows some impacts on river biota and consequently on the otter distribution pattern and foraging behavior. Therefore, it is suggested that a long-term monitoring program on the Vjosa River and its main tributaries is implemented in the coming years as a baseline to assess the conservation status and possible human impacts.

Bego F. & Hysaj E., 2018: Der europäische Fischotter (*Lutra lutra*) in der Vjosa und den wichtigen Zuflüssen.
Wir bewerteten die Fischotterverteilung und -markierung entlang des Hauptwasserlaufs der Vjosa und einigen wichtigen Zuflüssen (Drino, Lengarica und Bença). Die Markierungsintensität wurde in zwei Saisonen, Frühjahr und Frühherbst 2016 und 2017 gemessen, die dem höchsten bzw. niedrigsten Flussabfluss entsprechen. Otterzeichen (Losungen und Fußspuren) wurden in 16 Probenahmestationen gesucht, die aus jeweils 200m langen Flussabschnitten bestanden. Alle untersuchten Standorte stellen permanente Flussläufe dar. Die Vegetation, das hydraulische Muster und die menschlichen Störungen wurden visuell für die gesamte Länge jeder Probenahmestation beurteilt. Sowohl die durchschnittliche Anzahl der Losungen als auch die pro 200 m Wasserlauf waren im Frühjahr höher (2,18 bzw. 3,94) als im Frühherbst (1,37 und 1,68). Im Frühjahr wurden in allen Probenahmestellen (100 %) Otterzeichen registriert, während im Frühherbst 12 Probenahmestellen für Otter positiv waren (75 %). Die Anzahl der Losungen und die Markierungsintensität wurden sowohl mit dem Habitattypus als auch mit der Vegetationsbedeckung korreliert, während menschliche Störungen die Markierungsintensität der Otter nicht signifikant beeinflussten. Der Bau von Kraftwerken entlang des Lengarica-Flusses zeigt Auswirkungen auf Flussbiota und auf das Verteilungsmuster der Otter und ihres Nahrungssuchverhaltens. Daher wird vorgeschlagen, dass in den kommenden Jahren ein langfristiges Überwachungsprogramm für die Vjosa und ihre Hauptnebenflüsse als Grundlage für die Bewertung des Erhaltungszustands und möglicher Auswirkungen auf den Menschen durchgeführt wird.

Keywords: otter, distribution, spraints, hydraulic pattern, vegetation cover, HydroPowers, Vjosa river.

Introduction

The otter (*Lutra lutra* Linnaeus, 1758) is a carnivore very well adapted to aquatic life. It is always associated with rivers, streams, ponds, reservoirs, estuaries, or coastal habitats. Historically its distribution extended over Europe and Asia, but after the 1950s, the spe-

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cies declined substantially in Western Europe becoming absent from large areas of its former range (Mason & Macdonald 1986). Hence, in the second half of the 20th century, Eurasian otter populations decreased in most European areas, becoming rare or extinct in much of central Europe (Foster-Turley et al. 1990, Macdonald & Mason 1994). Starting from the last decade of that century, otter populations have gradually recovered in several countries (Conroy & Chanin 2001, Prigioni et al. 2007) where persistent organic pollutants (POP) have been banned or controlled by regulations (Ruiz-Olmo et al. 2000). Currently, in continental Europe the otter range consists of three disconnected portions, the largest one including most Eastern Europe (Cianfrani et al. 2011). Vegetation cover on river banks, water quality, food availability and human disturbance are the major factors determining otter distribution and behavior (Macdonald & Mason 1983, Bas et al. 1984, Delibes et al. 1991, Mason 1995, Durbin 1998, Kruuk et al. 1998). Accordingly, sprainting sites have been reported to signal the active use of food resources in both coastal (Kruuk 1992) and riparian habitats (Remonti et al. 2011), whilst cover may be not an accurate predictor of marking intensity, as a positive correlation between these two parameters has not been observed in all studied areas (Prenda & Granado-Lorencio 1996). Although many authors have discussed the reliability of marking intensity as a tool for pointing out the habitat preferences of otters since the 1980s (Kruuk et al. 1986, Kruuk & Conroy 1987, Mason & Macdonald 1987), variation in sprainting activity is believed to reflect changes in otter distribution (Chanin 2003) and the use of signs to outline patterns of habitat selection has recently been confirmed to be effective for otters (Clavero et al. 2006).

Few studies on otters in Albania have been published up to date. Prigioni et al. (1986) made a first attempt to assess the distribution of otters in the country, while, more recently, the status and distribution of the species were investigated in the valley of Drino River (Hysaj & Bego 2008, Hysaj & Bego 2010, Hysaj et al. 2013, Bego & Hysaj 2013),in the watershed of Semani River (Bego et al. 2011) and the Albanian part of Prespa lakes (Bego & Malltezi 2012). Although otters appear to be widespread throughout the country (Bego, *unpublished data*), a reduction in marking intensity suggests a possible decline in otter numbers. Distribution of the otter in Albania has been influenced by land use and human density, suggesting man-induced habitat changes since the fall of communism may have affected the quality and fragmentation of otter habitats (Balestrieri et al. 2016). River pollution, uncontrolled fishing by dynamites and poisons and river-bed excavation for the extraction of inert materials are still considered major threats to the otter, which has been included in the Red Data Book of Albanian fauna as "Vulnerable" (Misja et al. 2006, Moe 2013). In all the Mediterranean area, drought each year causes periods of low river flow in summer-early autumn. Drought generally results in most streams and small rivers becoming dry or breaking up into a series of pools embedded in dry waterbeds, while large rivers suffer marked variation in their flow (Magalhães et al. 2002). Seasonal variation in river discharge has been reported to affect food availability for the otter (Clavero et al. 2003). The aim of this study was to provide information on otter distribution and ecology along the main water course of River Vjosa and some of its tributaries (Drino, Lengarica, Bença) prior the construction of the Hydropower dams, based on the assessment of sprainting site distribution and marking intensity. We hypothesized that, in our study area, variation in river flow and, consequently, water speed and hydraulic patterns (Hauer & Lambert 1996), was likely to affect the overall suitability of river stretches for the otter (Ruiz-Olmo & Gosálbez 1997, Prenda et al. 2001). To test for this hypothesis, ot-

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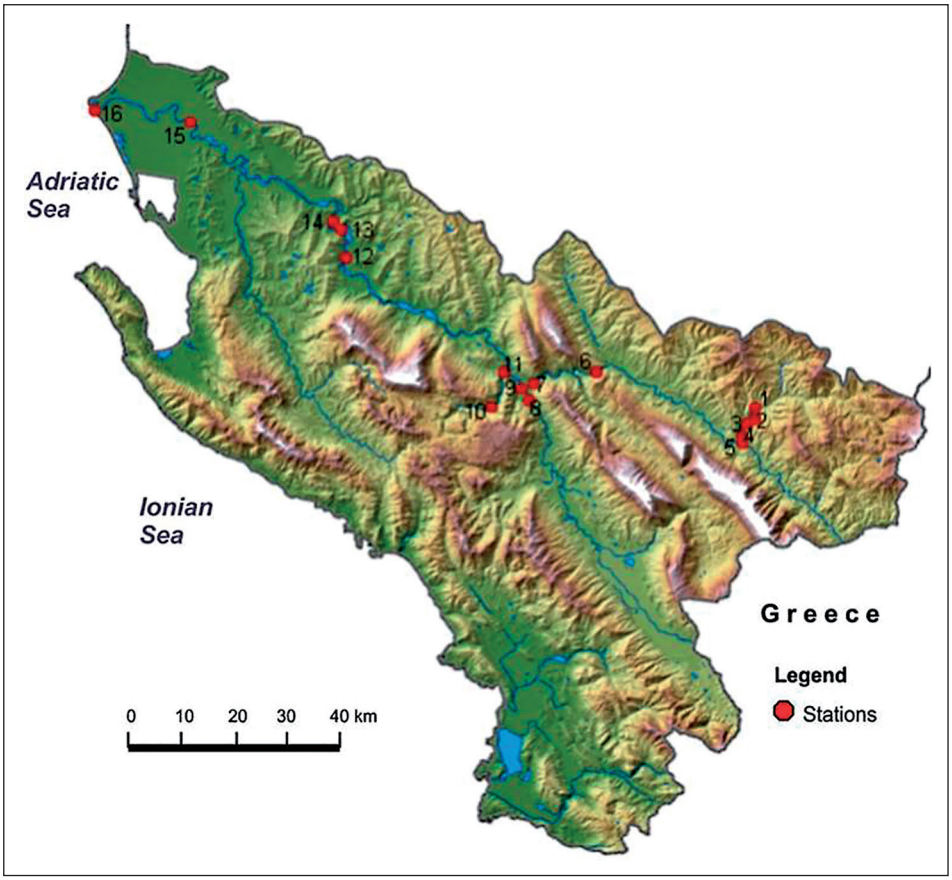

Fig. 1: Topographic map of Vjosa river basin and the location of the visited sites: 1, Lengarica-1; 2, Lengarica-2; 3, Lengarica-3; 4, Lengarica-4; 5, Petrani (Vjosa); 6, Uji Ftohte (Kelcyra); 7, Dragoti (Vjosa); 8, Lekli (Drino-1); 9, Drino-2; 10, Bença-1 (Village); 11, Bença-2 (Tepelena); 12, Kuta (Vjosa); 13, Poçemi-1; 14, Poçemi-2; 15, Mifoli (Vjosa); 16, Vjosa delta. – Abb. 1: Topografische Karte des Vjosa-Einzugsgebiets und Ort der besuchten Gebiete: 1, Lengarica-1; 2, Lengarica-2; 3, Lengarica-3; 4, Lengarica-4; 5, Petrani (Vjosa); 6, Uji Ftohte (Kelcyra); 7, Dragoti (Vjosa); 8, Lekli (Drino-1); 9, Drino-2; 10, Bença-1 (Dorf); 11, Bença-2 (Tepelena); 12, Kuta (Vjosa); 13, Poçemi-1; 14, Poçemi-2; 15, Mifoli (Vjosa); 16, Vjosa Delta.

ter distribution was assessed in two survey periods, corresponding to the lower and upper limits of the Vjosa River flow range. The obtained data would serve as baseline to measure the future cumulative impact of hydropower dams under construction or planned for construction on the otter distribution and ecology inside the Vjosa river basin.

Methods

Study area: Includes the main water course of Vjosa River from its entering from Greece to its river delta (Fig. 1). Vjosa is one of Europe's last living wild rivers. Along its entire course of over 270 kilometers it is untamed and free flowing and characterized by beau-

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Tab. 1: Surveyed sites in Vjosa river basin and their geographical location in spring (S) and Early autumn (EA). – Tab. 1: Festgestellte Standorte im Vjosa-Einzugsgebiet und ihre geographische Lage im Frühjahr (S) und Frühherbst (EA).

Station no.	Name of the Sampling Station	Longitude N	Latitude E	Altitude (in m asl)	Habitat grade	Presence note	
						Spring	Early Autumn
1	Lengarica-1	40°14′ 77″	20° 26′9.27″	404	3	P	A
2	Lengarica-2	40°14′ 27.42″	20° 25′51.83″	364	2	P	A
3	Lengarica-3	40°13′ 55.38″	20° 25′23.53″	339	2	P	A
4	Lengarica-4	40°12′33.83″	20° 24′55.16″	284	2	P	P
5	Petran (Vjosë)	40°12′26.96″	20°24′55.35″	282	2	P	P
6	„Uji i Ftohtë″ Këlcyrë	40°17′47.65″	20°9′43.27″	192	2	P	P
7	Ura e Dragotit	40°17′31.04″	20°4′45.01″	158	2	P	P
8	Drino-1 (Ura e Leklit)	40°15′33.47″	20°3′19.72″	153	2	P	P
9	Drino-2	40°16′38.69″	20°2′41.28″	142	2	P	P
10	Bënçë-1	40°15′49.06″	20°0′22.15″	225	2	P	P
11	Bënçë-2	40°18′20.54″	20°1′4.57″	141	2	P	P
12	Kute	40°27′31.85″	19°44′52.42″	57	2	P	P
13	Poçem-1	40°29′33.29″	19°43′33.83″	49	2	P	P
14	Poçem-2	40°30′1.50″	19°43′3.56″	43	2	P	P
15	Ura e Mifolit	40°38′3.51″	19°27′42.96″	4	2	P	P
16	Vjosa delta	40°38′44.50″	19°19′6.15″	0	1	P	A
Note: A-Otter is Absent; P- Otter is Present; Habitat grade: 1= Good; 2= Medium; 3= Poor							

tiful canyons, braided river sections, islands, oxbows and meandering stretches. In some areas the riverbed expands over more than 2 km in width. Together with its tributaries, Vjosa provides a dynamic, near-natural ecosystem. It is without par on this continent – a true, though unknown European natural heritage. On its first 80 kilometers the river flows through Greece and is named Aoos. In Albania it turns into Vjosa. The meandering lower part opens up into a valley with extensive wetlands, providing habitats for spawning fish, migratory birds and others. Finally, it drains into the sea just north of the Narta lagoon (Kabo 1990). For a detailed description see Schiemer et al. (2018 this volume).

Surveyed sites were situated along the main water course of Vjosa River (river delta, Mifoli, Poçemi, Kuta, Kelcyra Gorge, Petrani), as well as along the main tributaries (Drino, Bença, Lengarica) (Fig. 1). Lengarica river as being under operation scheme of small scale Hydro Powers, has been more systematically investigated during the last two years (2016–2017), respectively in March, April, June and September, just to understand how the changes in the water regime is influencing the otter activity along the river. Table 1 shows the list of the surveyed sites and their geographical position and altitude. Sites were chosen to be representative of all habitat features of the Vjosa River basin (Fig. 1). Habitats were classified in three categories: 1, good; 2, medium and 3, poor. Grade 1 comprises sites with good lying-up zones in form of dense reed beds, dense thickets of willows, plane and oak, caves or rocks; grade 2 contains some scrub and reed offering limited shelter, and grade 3 has no suitable lying-up places and does not offer any shelter for otter.

Visited sites along the Vjosa River and its main tributaries (Lengarica, Drino, Bença) were selected taking into consideration the National Monitoring Program and the location of

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Fig. 2: Picture 1: A new born baby otter from Bença River, October 2017 (Photo courtesy of G. Shehu, Tepelena); Pictures 2 and 3: otter spraints on stones (Bença) and debris (Kuta); 4: otter footprints (2–4, Photos © F. Bego). – Abb. 2: Bild 1: Ein neugeborener Fischotter aus dem Fluss Bença, Oktober 2017 (Foto mit freundlicher Genehmigung von G. Shehu, Tepelena); Bilder 2 und 3: Otter-Losung (Bença, Kuta); 4: Otter-Trittsiegel (2–4, Fotos © F. Bego).

the reference sites. At each site a minimum distance of 200 m was searched for otter signs, namely feces (spraints or scat) (Fig. 2), jelly excrements, footprints and other marking and feeding sings; we walked on both riversides and around small islands along the river as to investigate all shoreline areas. In most of the cases, sites were chosen for ease of access, e.g. at bridges, or where a river runs close to a road. Otter is presumed absent from a site or station when, after a search of 600 m to 1 km of river bank, no presence signs was found.

Surveys were carried out in two seasons: Spring and Autumn 2016 and 2017, respectively, corresponding to the maximum and minimum river discharge. For each site there were recorded, the number of: *i*, sprainting site, and *ii*, spraints. A sprainting site was defined as a place with spraints lying at least 1 m from other spraints (Kruuk et al. 1986). Sprainting sites were georeferenced by a GPS device and overlaid on geographical maps as to assess otter distribution in the study area. Three environmental variables of potential importance to otters were assessed visually for the whole length of each site:

1. Vegetation cover, in a 20 m large belt on both river banks (four categories: 1, 0–25 %; 2, 26–50 %; 3, 51–75 %; 4, 76–100 %).

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2. Hydraulic pattern, classified according to hydro-morphologic units (Parasiewicz, 2007), which broadly reflect the progressive increase in water speed and surface turbulence: 0, dried riverbed; 1, stagnant (backwaters and large isolated pools caused by summer drought); 2, low (runs and pools); 3, medium (fast runs and ruffles); 4; swift (cascades, rapids and riffles).

3. Human disturbance: 0, negligible (no roads or urban areas within 1 km from the river banks); 1, low (distance between the river and a main road < 1 km); 2, moderate (presence of small villages on the riverside); 3, high (presence of towns with 10000–25000 inhabitants). The significance of seasonal variation in otter sprainting activity was tested with one-way ANOVA, using PASW Statistics 18. The correlation analyses (Spearman's test, r_s) was carried out to evaluate the strength and direction of the relationship between the habitat variables recorded and marking intensity.

Results

Most of the visited sites (12 out of 16) belong to habitat grade 2, with a medium state, contains some scrub and reed offering limited shelter, one station (Lengarica-1) to habitat grade 3 (no suitable lying-up places, not offering any shelter for otter), and one station (Vjosa delta) to habitat grade 1, with good lying-up zones in form of dense reed beds, dense thickets of willows, plane and oak, caves or rocks. Nine sites have scarce vegetation cover (0–25 %), six others have less than 50 % vegetation cover and only one site (Vjosa river delta) has a thick and dense vegetation cover (76–100 %).

In Spring season all the 16 stations were found positive for otter presence. Habitat quality, especially the combined effect of water regime and vegetation coverage seems to significantly influence otter activity during the low water flow season (late Summer/early Autumn), when both positive stations for otter presence and the sprainting activity are reduced (Tab. 1 and 2). ANOVA statistics show high significant changes in sprainting activity between Spring and Early Autumn (F=5.248, 1d.f., P=0.029 for the number of sprainting sites and F= 15.116, 1d.f., P=0.00052 for the number of spraints). It is similar with previous otter surveys conducted along Drino river (main tributary of Vjosa), where both the number of sprainting sites and spraints were the highest in spring, with the number of otter signs found being more than twice that of the late Summer/early Autumn survey (Hysaj et al. 2013). However, in the case of Vjosa, percentage of favorable sites for otter is higher in both seasons (respectively 100 % in Spring and 75 % in early Autumn) in comparison with those observed along Drino River. It is primarily explained with permanent water flow in all 16 surveyed sites and the abundant fish along Vjosa (Shumka et al. 2010, Shumka, *unpublished data*) as the main prey for otter (Hysaj et al. 2014).

During early autumn, with the reduction of the river flow, the otter territorial marking activity is lower almost in all sites, and in some of them it is missing, as it was confirmed in the upper part of Lengarica (sites Lengarica-1, Lengarica-2 and Lengarica-3). Construction and operation of the HPPs have reduced the water flow downstream of Lengarica River, and this might be one of the reasons why otter activity is not observed in the three upstream sites during early autumn (September). Furthermore, the number of sprainting sites and the number of spraints were higher with increased water speed and turbulence and on river banks offering vegetation cover. This correlation is stronger for number of

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Tab. 2: Data on otter sprainting activity in surveyed sites along Vjosa River and its main tributaries during Spring (S) and Early Autumn (EA); HD, Human disturbance; VC, Vegetation cover. – Tab. 2: Daten über Otterlosung in den untersuchten Gebieten entlang der Vjosa und ihrer Hauptnebenflüsse während des Frühjahrs (S) und Frühherbsts (EA); HD, menschliche Störung; VC, Vegetationsdecke.

Station no.	Name of the Sampling Station	Number of Sprainting sites/200m river stretch		Number of Spraints/200m river stretch		Environmental Variables			
						Vegetation coverage	Hydraulic Pattern		Human disturbance
		Spring	Early Autumn	Spring	Early Autumn		Spring	Early Autumn	
1	Lengarica-1	0*	0	0	0	1	3	2	0–1
2	Lengarica-2	2	0	3	0	1	3	2	1–2
3	Lengarica -3	2	0	5	0	1	3	2	1
4	Lengarica-4	2	2	4	2	1	3	2	2
5	Petran (Vjosë)	3	3	7	4	2	3	2	2
6	"Uji i Ftohtë" Këlcyrë	2	1	3	1	2	2	2	2
7	Ura e Dragotit	2	1	3	1	2	2	2	2
8	Drino-1 (Ura e Leklit)	3	3	6	3	1	3	2	2
9	Drino-2	2	2	4	3	1	3	2	2
10	Bënçë-1	1	1	3	2	1	4	3	1
11	Bënçë-2	4	3	7	4	1	3	3	2
12	Kutë	3	2	5	2	2	3	2	0–1
13	Poçem-1	2	1	3	1	1	3	2	2
14	Poçem-2	2	1	2	1	2	3	2	1
15	Ura e Mifolit	3	2	5	3	2	3	2	2
16	Vjosa delta	2	0	3	0	4	2	2	0–1
Total Nb of sprainting sites and spraints		**35**	**22**	**63**	**27**				
Nb of stations		**16**	**16**	**16**	**16**				
Mean		**2.18**	**1.37**	**3.94**	**1.68**				
Mean ± SD		**2.18± 0.91**	**1.37± 1.08**	**3.94± 1.84**	**1.68± 1.40**				
One way ANOVA		**F=5.248, 1d.f., P=0.029**		**F= 15.116; 1d.f., P=0.00052**					
Spearman's test, (rs)		**0.64**		**0.72**					
P		**0.0013**		**0.00053**					

(*)-No otter spraints found but footprints and tracks observed

spraints than number of sprainting sites (respectively, r_s = 0.64, P = 0.0013 for sprainting sites and r_s= 0.72, P= 0.00053 for spraints).

Human disturbance was negligible or low in 7 out of 16 visited sites (43.7 %), and moderate in the remaining 9 sites (56.3 %). During summer and early Autumn, human disturbance was slightly increased in some sites (Lengarica-1, Lengarica-2, Kuta and Vjosa delta) due to increased recreational activity, however, our results showed that the otter activity was not significantly influenced by low and moderate human disturbance in all surveyed stations (Tab. 2).

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Discussion

Average marking intensity on the Vjosa River (sprainting sites/200 m = 1.78 and spraints/200 m = 2.8) was almost equal to the average one assessed for central and northern Albania 30 years earlier (sprainting sites/200 m = 1.7; spraints/200 m = 3.6; Prigioni et al. 1986). With respect to other Mediterranean countries, it was similar to that reported for peripheral areas of the otter range in Italy (Prigioni et al. 2006, Balestrieri et al. 2008), while it was rather lower than that found for healthy or expanding populations (Prenda & Granado-Lorencio 1996, Ruiz-Olmo & Gosálbez 1997, Prigioni et al. 2005).

Fluctuation in water availability, reducing both environmental quality and food availability, is regarded as one of the most important factors affecting the use by otters of stretches of watercourses (Prenda et al. 2001, Ruiz-Olmo et al. 2001). Rain and increasing water level have been reported to affect spraint persistence and thus otter detectability (Ruiz-Olmo & Gosálbez 1997); accordingly, Fusillo et al. (2007) suggested carrying out otter surveys in summer, when the reliability of otter standard survey methods would be the highest. Our results are consistent with those of Balestrieri et al. (2011), who reported that in Southern Italy, neither bank cover, nor water discharge affected otter detectability. In both flow regimes, marking intensity was the highest on river stretches covered by thick riparian vegetation, according to previous results reported for large Mediterranean study areas (Macdonald & Mason 1985, Delibes et al. 1991).

Vegetation cover provides shelter and suitable sites for holts, and a relationship between bank cover and the use of river stretches by otters has often been pointed out (reviewed by Mason & Macdonald, 1987). Seasonal variation in marking intensity may depend on reproductive activity, as Hysaj & Bego (2010) and Kean et al. (2011) have recently suggested. Both the large distances usually covered by otters (up to 39 km; *see* Green et al. 1984, Prigioni et al. 2006) and mean number of spraints/200 m found suggest that the otter population occurring along the Vjosa River is in good conditions, and its main tributaries, such as Drino, Bença, Lengarica, are frequently used by otters as foraging sites (Fig. 2). Several tributaries (Lengarica, Bença, Drino, Shushica and springs (Picari-Gurra, Viroi, Uji Ftohte -Tepelena, Uji Ftohte -Kelcyra, Poçemi) (Fig. 1) provide well oxygenated waters and suitable sites during the floods of the main Vjosa river (Jimėnez & Lacomba 1991, Mason 1995, Kruuk et al. 1998). Particularly, Kardhiqi and Bença streams offer a consistent flow regime and fish-farms (mostly rainbow trout), which, in their owners' opinion, suffer damage by otters during high flood periods (Hysaj et al. 2013).

The results of otter presence and sprainting activity were somehow controversy for the site no. 16 (Vjosa delta). This site in terms of habitat suitability is considered good, with slow and permanent running waters, thick vegetation coverage, and abundant fish, and therefore we may anticipate a high otter sprainting activity there; surprisingly, during Spring we noticed a moderate sprainting activity in this site (2 sprainting sites and 3 spraints), while in early Autumn no otter presence signs were observed. However, we believe that otters in the coastal areas may find other places more suitable to hide and easy find food, such as big drainage canals and ditches. It is also an opportunistic foraging behavior of otters, especially in areas where they compete for territory with other mesopredators, such as badger (*Meles meles*), jackal (*Canis aureus*) and fox (*Vulpes vulpes*), as it is confirmed by previous studies (Macdonald & Mason 1983, Mason & Macdonald 1986, Bego & Hysaj 2013).

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During our early Autumn 2016 survey in the coastal area adjacent to Vjosa delta (site 16), we noticed high activity of badger, jackal and fox in the site. Our assumption is that otters, just to avoid competition with these bigger mesopredators, tend to visit other sites, such as big drainage canals and ditches of thick and dense reeds on bank sides and different preys available (fish, amphibians, water snakes, snails, crabs, etc.), as it is observed in other parts of Mediterranean basin (Jimėnez & Lacomba 1991, Prenda et al. 2001, Magalhães et al. 2002, Clavero et al.2006). Our assumption is also based on the results of a recent survey conducted in the coastal area between Semani and Vjosa rivers in the framework of wildlife survey program of the TransAdriatic Pipeline (TAP) project, implemented prior the pipeline construction. Hence, on August 12th, 2015, along the main drainage canal crossed by the 500 m wide pipeline corridor a quite high otter's territorial marking intensity was observed along a 200m long stretch of the canal: 3 sprainting sites and 17 spraints (Bego, *unpublished data*). The proximity of the drainage canal and ditches to wooded old sand dunes that are not inundated during flooding, the controlled water level in the drainage canal and ditches by the pumping stations installed close to the coast, and the abundance of food (especially fish and frogs), make the importance of this drainage network of canals and ditches to otters higher especially during dry season (late Summer-early Autumn).

The planned construction of a series of HPP dams threatens to alter the habitat structure and quality of Vjosa and its main tributaries and streams, with repercussions on otters, which need to be assessed and monitored. The first otter survey in Albania judged that the main river courses in the plains between Tirana and Vlora, i.e. the rivers Erzeni, Semani, Shkumbini and Vjosa, were unsuitable for otter, as a consequence of pollution, mainly mine drainage, and industrial activities (Prigioni et al. 1986). As more recent surveys have shown that the otter occurs, although probably in low numbers, at least in some of those watercourses; e.g. the River Semani and its main tributaries (Bego et al. 2011), Shkumbini and Erzeni rivers (Bego, *unpublished data*; Balestrieri et al. 2016), and Drino river (Hysaj et al.2013,2014); moreover, the present survey ascertained presence of otter along the main Vjosa River; it suggests that pollution control and habitat restoration can favor the population recovery of the species in Albania (Balestrieri et al. 2016). This study confirmed the importance of tributaries and smaller streams for otter during heavy rains and flood seasons (Winter/Spring, Autumn/Winter) along the main watercourse of Vjosa River, as safer sites and easier forage grounds for otters (Jimėnez & Lacomba 1991, Mason 1995, Kruuk et al. 1998, Bego & Hysaj 2013).

The otter population in Vjosa catchment should be monitored in the coming years to measure cumulative impact of the operational HPPs, and those under construction or planned, on the river biota, as well as their implications with otter's ecology and conservation along the Vjosa river and its main tributaries, such as Çarshova, Lengarica, Kardhiqi, Bença, Poçemi, and Shushica.

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