

Mountain lakes of Mont Avic Natural Park: ecological features and conservation issues

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Tab. S1. Visual Encounter Survey for common frog *Rana temporaria* and introduced fish. A, adult frogs; M, freshly metamorphosed froglets; T, tadpoles; E, egg masses; S, Salmonidae; C, Cyprinidae.

Lake	Date	Frogs	Fish
Muffet	18/07/2018	1 A; 0M; 100T; 0 E	0 S; 0 C
	02/09/2018	0 A; 0M; 4T; 0 E	1 S; 0 C
de Vernouille	18/07/2018	0 A; 0M; 0T; 0 E	0 S; >1000 C
	02/09/2018	0 A; 0M; 0T; 0 E	0 S; >1000 C
	29/06/2019	0 A; 0M; 0T; 0 E	0 S; >1000 C
	16/07/2019	0 A; 0M; 0T; 0 E	0 S; >1000 C
	04/08/2019	0 A; 0M; 0T; 0 E	0 S; >1000 C
	31/08/2019	0 A; 0M; 0T; 0 E	0 S; >1000 C
	29/09/2019	0 A; 0M; 0T; 0 E	0 S; >1000 C
Raté	18/07/2018	5 A; 0M; 80T; 0 E	0 S; 0 C
	01/09/2018	0 A; 0 M; 0 T; 0 E	0 S; 0 C
Nero	27/08/2017	0 A; 15 M; 85 T; 0 E	0 S; 0 C
	19/07/2018	3 A; 0 M; 100 T; 0 E	1 S; 0 C
Miserin	27/08/2017	0 A; 0 M; 0 T; 0 E	0 S; >1000 C
	19/07/2018	1 A; 0 M; 0 T; 0 E	0 S; >1000 C
Pontonnet	20/07/2018	0 A; 0 M; 0 T; 0 E	0 S; 0 C
	01/09/2018	0 A; 0 M; 0 T; 0 E	0 S; 0 C
Servaz	10/09/2018	6 A; 11 M; 500 T; 0 E	0 S; 0 C
Panaz	11/09/2018	1 A; 0 M; 0 T; 0 E	0 S; >1000 C
Leser	06/09/2018	1 A; 24 M; 400 T; 0E	1 S ^a ; 0 C
Blanc	29/08/2017	2 A; 0 M; 150 T; 0 E	0 S; 10-100 C
	10/09/2018	0 A; 3 M; 8 T; 0 E	2 S; 1-10 C
	28/08/2017	8 A; 3 M; 0 T; 0 E	0 S; 0 C
Noir	10/09/2018	0 A; 0 M; 0 T; 0 E	1 S; 0 C
	29/06/2019	10 A; 0 M; 0 T; 0 E	0 S; 10-100 C
	29/08/2017	0 A; 0 M; 0 T; 0 E	1 S; >1000 C
Cornù	10/09/2018	0 A; 0 M; 0 T; 0 E	2 S; > 1000 C
	29/06/2019	0 A; 0 M; 0 T; 0 E	0 S; > 1000 C
	28/08/2017	3 A; 15 M; 0 T; 0 E	0 S; 0 C
Vallet Gran Lac	30/08/2017	0 A; 0 M; 0 T; 0 E	0 S; 0 C
	06/09/2018	0 A; 0 M; 0 T; 0 E	0 S; 10-100 C
	17/07/2019	0 A; 0 M; 0 T; 0 E	0 S; 10-100 C
	04/08/2019	0 A; 0 M; 0 T; 0 E	0 S; 10-100 C
	29/08/2019	5 A; 0 M; 0 T; 0 E	0 S; > 1000 C
	28/09/2019	0 A; 0 M; 0 T; 0 E	0 S; 10-100 C
	31/08/2017	3 A; 0 M; 0 T; 0 E	0 S; > 1000 C
Leita	05/09/2018	0 A; 0 M; 0 T; 0 E	0 S; 10-100 C
	30/06/2019	2 A; 0 M; 0 T; 0 E	0 S; > 1000 C
	17/07/2019	2 A; 0 M; 0 T; 0 E	0 S; > 1000 C
	04/08/2019	0 A; 0 M; 0 T; 0 E	0 S; 100-1000 C
	29/08/2019	4 A; 0 M; 0 T; 0 E	0 S; > 1000 C
	28/09/2019	0 A; 0 M; 0 T; 0 E	0 S; 100-1000 C
	29/08/2017	0 A; 0 M; 0 T; 0 E	0 S; 10-100 C
Balena	07/09/2018	2 A; 0 M; 0 T; 0 E	0 S; 100-1000 C
	30/06/2019	0 A; 0 M; 0 T; 0 E	0 S; 100-1000 C
	16/07/2019	3 A; 0 M; 0 T; 3 E	0 S; > 1000 C
	04/08/2019	2 A; 0 M; 0 T; 0 E	0 S; > 1000 C
	29/08/2019	0 A; 0 M; 0 T; 0 E	0 S; > 1000 C
	29/09/2019	0 A; 0 M; 0 T; 0 E	0 S; > 1000 C
Balena 2	29/08/2017	0 A; 0 M; 0 T; 0 E	0 S; 0 C
	07/09/2018	0 A; 0 M; 0 T; 0 E	0 S; 1-10 C
	16/07/2019	0 A; 0 M; 0 T; 0 E	0 S; 0 C
	04/08/2019	0 A; 0 M; 0 T; 0 E	0 S; 10-100 C
	29/08/2019	0 A; 0 M; 0 T; 0 E	0 S; 0 C
Gelato	29/09/2019	0 A; 0 M; 0 T; 0 E	0 S; 0 C
	09/09/2018	0 A; 0 M; 0 T; 0 E	20 S ^b ; 0 C
Mont Glacier	08/09/2018	0 A; 0 N; 0 T; 0 E	0 S; 0 C

^a Recognized as brown trout *Salmo trutta*; ^b Recognized as arctic charr *Salvelinus alpinus*

Tab. S2. Fish sampling by gillnetting (GN) and fyke netting (FN) in the lakes of the Mont Avic Natural Park. N, number of gillnets or fyke nets employed.

Lake	Date	GN/FN	N	Setting time	Pulling time	Effort	Captures
Muffet	18/07/2018	GN	2	9:00	19:00	10 h 00 m	1 <i>Salmo trutta</i>
	18/07/2018	FN	2	9:30	19:00	9 h 30 m	-
de Vernouille	18/07/2018	GN	2	11:00	18:00	7 h 00 m	-
	18/07/2018	FN	4	10:45	17:15	7 h 30 m	3570 <i>Phoxinus</i> sp.
	29/06/2019	FN	2	12:00	13:30	1 h 30 m	1536 <i>Phoxinus</i> sp.
	16/07/2019	FN	1	09:45	10:45	1 h 00 m	575 <i>Phoxinus</i> sp.
	04/08/2019	FN	1	10:40	11:40	1 h 00 m	129 <i>Phoxinus</i> sp.
	31/08/2019	FN	1	12:30	13:30	1 h 00 m	176 <i>Phoxinus</i> sp.
Raté	01-02/09/2018	GN	1	18:00	18:00	24 h 00 m	-
Nero	27/08/2017	GN	1	14:15	16:30	2 h 15 m	1 <i>Salvelinus alpinus</i>
	19/07/2018	FN	2	10:30	10:00	23 h 30 m	-
Miserin	27/08/2017	GN	2	09:45	17:30	7 h 45 m	1 <i>Salvelinus alpinus</i>
	19-20/07/2018	GN	2	9:30	17:00	31 h 30 m	5 <i>Salvelinus alpinus</i> , 9 <i>Phoxinus</i> sp.
	27/08/2017	FN	4	09:00	16:30	31 h 30 m	39 <i>Phoxinus</i> sp.
Pontonnet	20/07/2018	GN	2	10:30	19:30	9 h 00 m	-
	20/07/2018	FN	2	11:00	17:00	6 h 00 m	-
Panaz	11/09/2018	GN	1	11:30	17:50	6 h 20 m	-
	11/09/2018	FN	3	12:00	19:00	6 h 00 m	14 <i>Telestes muticellus</i>
Leser	06/09/2018	GN	1	13:30	17:00	4 h 30 m	-
	06/09/2018	FN	3	14:00	17:00	3 h 00 m	-
Noir	28-29/08/2017	GN	2	16:00	10:00	18 h 00 m	4 <i>Salvelinus alpinus</i>
	08-09/09/2018	FN	2	11:00	10:30	23 h 30 m	-
Blanc	10-12/10/2018	GN	1	11:00	11:00	72 h 00 m	-
	08-09/09/2018	FN	2	11:15	10:45	23 h 30 m	1 <i>Salmo trutta</i>
Cornù	29/08/2017	GN	2	16:30	19:00	2 h 30 m	7 <i>Phoxinus</i> sp.
	06-09/09/2018	GN	2	10:00	10:00	72 h 00 m	-
	08-09/09/2018	FN	2	10:00	10:00	24 h 00 m	100 <i>Phoxinus</i> sp.
	30-31/08/2019	FN	3	19:30	08:30	13 h 00 m	80 <i>Phoxinus</i> sp.
Gran Lac	29-30/08/2017	GN	1	9:00	08:00	23 h 00 m	5 <i>Phoxinus</i> sp.
	05-06/09/2018	GN	2	17:30	08:30	15 h 00 m	3 <i>Phoxinus</i> sp.
	05-06/09/2018	FN	3	18:00	9:00	15 h 00 m	2 <i>Phoxinus</i> sp.
	18-19/07/2019	FN	3	19:30	08:30	13 h 00 m	1 <i>Phoxinus</i> sp.
	30/08/2019	FN	6	08:30	15:30	7 h 00 m	1 <i>Phoxinus</i> sp.
Leita	28-29/08/2019	FN	3	16:30	08:30	16 h 00 m	-
	30/08/2017	GN	1	14:30	19:00	4 h 30 m	-
	05/09/2018	FN	3	09:30	16:00	6 h 30 m	193 <i>Phoxinus</i> sp.
	29-30/06/2019	FN	3	20:45	9:30	12 h 45 m	9 <i>Phoxinus</i> sp.
	16-17/07/2019	FN	3	19:30	09:00	13 h 30 m	650 <i>Phoxinus</i> sp.
	04-05/08/2019	FN	3	18:30	08:30	14 h 00 m	61 <i>Phoxinus</i> sp., 1 <i>Salmo trutta</i>
	29-30/08/2019	GN	2	09:40	16:00	30 h 20 m	2 <i>Salmo trutta</i>
Balena	28-29/08/2019	FN	3	17:30	09:40	16 h 10 m	495 <i>Phoxinus</i> sp.
	28-29/09/2019	FN	3	17:30	09:40	16 h 00 m	15 <i>Phoxinus</i> sp.
	30/08/2017	GN	1	11:40	14:00	2 h 20 m	-
	07/09/2018	GN	1	9:30	16:00	6 h 30 m	-
	07/09/2018	FN	3	9:45	15:30	5 h 45 m	2 <i>Phoxinus</i> sp.
	29-30/06/2019	FN	3	21:30	8:45	9 h 15 m	1 <i>Phoxinus</i> sp.
	16-17/07/2019	FN	3	19:30	09:00	13 h 30 m	440 <i>Phoxinus</i> sp.
	04-05/08/2019	FN	2	18:15	08:15	14 h 00 m	250 <i>Phoxinus</i> sp.
	29-30/08/2019	GN	1	11:15	16:30	29 h 15 m	20 <i>Phoxinus</i> sp.
Balena 2	29-30/08/2019	FN	3	10:30	09:30	23 h 00 m	40 <i>Phoxinus</i> sp.
	07/09/2018	GN	1	16:00	19:30	3 h 30 m	-
Gelato	07/09/2018	FN	2	16:00	19:30	3 h 30 m	-
	30/08/2019	GN	2	10:30	12:00	1 h 30 m	14 <i>Salvelinus alpinus</i>

Tab. S3. Recent fish stocking history (2010-present) and fishery data (i.e., fish capture data divided by species from 2011 to 2017) in the lakes of the Mont Avic Natural Park. Data from MANP (2017) and Consorzio Regionale per la Tutela, l'Incremento e l'Esercizio della Pesca in Valle d'Aosta website: <http://www.pescavda.it/>. ST, *Salmo trutta*; OM, *Oncorhynchus mykiss*; SA, *Salvelinus* sp; NA, not available data; (-), no recorded stocking or fishing activities.

Lake		2000-2009	2010	2011	2012	2013	2014	2015	2016	2017
Muffet	Stocking	500 OM 500 SA	-	500 ST	-	-	-	-	-	-
	Fishing	NA	-	2 ST 7 SA	4 ST 2 SA	11 ST 2 OM	3 OM 4 SA	-	9 ST 5 SA	10 OM 12 SA
de Vernouille	Stocking	750 ST 500 OM	-	-	-	-	-	-	-	-
	Fishing	NA	-	6 ST 3 OM 3 SA	11 ST	2 ST 2 SA	-	5 OM	-	1 ST 1 OM 6 SA
Raté	Stocking	500 ST 1000 OM 500 SA	500 ST	-	-	-	-	-	-	-
	Fishing	NA	1 SA	36 ST 31 OM 6 SA	44 ST 5 OM 4 SA	10 ST 13 OM 1 SA	1 ST 15 OM	5 ST 8 OM	3 ST 18 OM 15 SA	11 ST 2 OM 4 SA
Miserin	Stocking	2500 ST 9000 OM 9000 SA	2500 ST	2000 ST	1000 ST	1500 ST	1500 ST	-	-	-
	Fishing	NA	1 ST 7 OM 59 SA	1 ST 10 OM 85 SA	3 ST 1 OM 105 SA	20 ST 38 OM 110 SA	14 ST 15 OM 65 SA	13 ST 18 OM 77 SA	12 ST 37 OM 84 SA	13 ST 25 OM 94 SA
Nero	Stocking	500 ST	500 ST	500 ST	500 ST	-	-	-	-	-
	Fishing	NA	4 ST 18 OM 10 SA	3 ST 1 OM 5 SA	14 ST 15 OM 26 SA	13 ST 7 SA	1 ST 10 SA	14 OM 2 SA	1 ST 6 12	2 OM 5 SA
Pontonnet	Stocking	-	-	-	-	-	-	-	-	-
	Fishing	NA	-	-	2 ST	-	-	-	-	3 OM
Servaz	Stocking	1000 ST	-	-	-	-	-	-	-	-
	Fishing	NA	9 ST	8 SA	-	3 OM	-	-	-	-
Panaz	Stocking	1500 ST	-	-	-	-	-	-	-	-
	Fishing	NA	8 ST	6 ST 22 OM 1 SA	14 ST 22 OM 3 SA	-	-	5 ST 1 OM	2 ST 2 OM	-
Leser	Stocking	-	-	-	-	-	-	-	-	-
	Fishing	NA	-	1 SA	2 ST	-	9 OM	4 ST	4 ST	8 ST
Blanc	Stocking	5250 ST	500 ST	500 ST	500 ST	1000 ST	1000 ST	-	-	-
	Fishing	NA	62 ST 1 OM 3 SA	63 ST 4 OM 1 SA	44 ST 10 SA	75 ST 9 OM 4 SA	71 ST 7 OM 26 SA	1 ST 83 OM 4 SA	70 ST 4 OM 2 SA	71 ST 1 OM 6 SA
Noir	Stocking	1750 ST	-	-	-	-	-	-	-	-
	Fishing	NA	15 OM 1 SA	14 ST 4 OM 5 SA	11 OM 11 SA	23 ST 10 OM 23 SA	7 ST	7 ST 10 OM 30 SA	7 ST 11 OM 28 SA	4 ST 3 OM 4 SA
Cornù	Stocking	7250 ST	1000 ST	500 ST	1000 ST	1000 ST	1000 ST	-	-	-
	Fishing	NA	52 ST 1 OM 10 SA	22 ST 11 OM 86 SA	32 ST 20 OM 102 SA	34 ST 15 OM 153 SA	33 ST 20 OM 128 SA	22 ST 9 OM 70 SA	16 ST 19 OM 27 SA	51 ST 3 OM 79 SA
Vallet	Stocking	-	-	-	-	-	-	-	-	-
	Fishing	NA	-	-	-	-	-	-	-	-
Gran Lac	Stocking	14250 ST	1500 ST	1000 ST	1000 ST	1500 ST	1000 ST	-	-	-
	Fishing	NA	32 ST 58 SA	12 ST 66 SA	17 ST 22 SA	3 ST 82 SA	10 ST 13 SA	49 ST 44 OM 24 SA	38 ST 16 OM 43 SA	18 ST 17 OM 42 SA
Leita	Stocking	2500 ST	-	-	-	-	-	-	-	-
	Fishing	NA	11 ST	1 ST	-	-	1 ST 5 OM 2 SA	-	6 OM	1 ST 1 OM
Balena	Stocking	-	-	-	-	-	-	-	-	-
	Fishing	NA	-	20 OM	124 OM 2 SA	1 ST 2 SA	8 ST 32 OM 8 SA	9 SR 159 OM 16 SA	33 OM 10 SA	-
Balena 2	Stocking	-	-	-	-	-	-	-	-	-
	Fishing	NA	-	5 ST 1 OM	1 OM	1 ST	16 ST 14 OM	4 OM	8 ST 26 OM	-
Gelato	Stocking	1500 ST	-	-	-	-	-	-	-	-
	Fishing	NA	8 OM	3 SA	-	1 ST 3 SA	8 ST 16 SA	3 ST 4 SA	1 ST 5 SA	7 ST 2 OM 5 SA
Mont Glacier	Stocking	-	-	-	-	-	-	-	-	-
	Fishing	NA	-	-	-	-	-	-	-	-