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The Prášilské Lake

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Abstract: The main aim was to establish the precise altitude of the Prášilské jezero Lake and to draw its ground plan and bathymetric map. Geographic position and morphometric characteristics of catchment area of this Šumava lake are described. Characterization of the hydrologic and thermal regime is also given.

Keywords: bathymetric map, the Prášilské Lake, the Šumava Mountains

1. Position and name of the lake

The Prášilské Lake is situated in a cirque deepened in the Prášily massif gneiss and granite in the eastern slope of.the northern projection of the Polední hora Mountain (1315 m a.s.l.). The surface of the lake is at 1 079 m a.s.l. according to the map 1 : 10 000, the detailed tourist map 1 : 50 000 of 1991 gives its altitude as 1 080.4 m.

Josefinský katastr (1786) and the original map of Stabilní katastr (1837) mention the lake only as "See". The Kreybich map (1831) displays the lake without any name. The name "Stubenbacher See" was used for the first time in literature by F. X. M. Zippe (in Sommer, J. G., 1840). J. Krejčí (1857) in his work mentions the lake as "See des Mittagsberges". Since the beginning of our century, the name "Prášilské" (Švambera, V., 1911) has been used in Czech simultaneously and with equal frequence with the name "jezero Stubenbašské" Lake (Wagner, P., 1897).

2. History of the research on the Prášilské Lake

The history of the research on the Prášilské Lake is not long. It was mentioned for the first time by Josefinský katastr. Lieutenant Pemler did the geometric survey of the lake in the Prášily domain on 16 August 1785. The measured area of the lake – 5526 and 1/2 square klafters (about 1 987 ha) is too small to be considered as correct. It is possible that before the regulation of the outflow in the 19th century the surface of the lake was lower than nowadays, but the area could not be half of the present one (Josefinský katastr, 1786). The Prášilské Lake appears in certain contours on the cadaster map made by the surveyor Karel Struska in 1837 (Stabilní katastr, 1837). The lake is drawn in a schematic way and without name under an unnamed mountain already on the map by Kreybich, F. J. H. (1831). On the well-known map by Müller from the beginning of the 17th century, there is still no trace of the lake (Švambera, V., 1911).

Certain information on the lake is brought by Sommer, J. G. (1841) indicating that the lake is situated in a rock kettle depression, its area being 9 morgen and its depth 9 klafters (4.02 ha, 17 m deep). Hochstetter, F. (1855) brings authentic information from his own visit. Exactly at this lake, he found an important limit between the occurrence of granite and gneiss. He communicated also the first measuring of the altitude of the lake – 3 352 feet (1062 m a.s.l.) as the average of two barometric observations. In June 1871, Frič, A. (1871) visited the lake and estimated the lake's depth as 15 feet (4.75 m). Follows a new mapping by the Military Geographical Institute in Vienna in 1878. The older special map 1:144 000 depicts the lake still only schematically, but already in a correct way with indicating its altitude (1079 m).

In August 1896, P. Wagner (1897) visited the Prášilské Lake and called attention to the „Alte Schwelle" supposing that a lake connected with the Prášilské one would have been located there. Wagner proceeded there also to the first physical geographical observations. He measured there not only the depth and the temperature, but also the transparency of the water. Another monitoring was done there by V. Švambera at the end of August and in the first half of September 1906. He proceeded to 258 deep measurements in ten profiles, to 90 observations of the water temperature of the lake and of its affluents, of the transparency and for the first time also of the colour of the water. Based on his own observations, V. Švambera drew a map of the lake on a scale of 1:1000 corresponding to the then water level being 1.5 m below the level of the dam. V. Švambera visited the Prášilské Lake again on 28 June, 15 August and 18 September 1907. He measured water in the vertical water column, as well as the colouring and the transparency of the water.

Since the research V. Švambera, no systematic measurement of depths or of the ground plan of the lake have been done there.

3. Catchment area of the lake

3.1. Geographic position and morphometric characteristics of the catchment area

The Prášilské Lake is situated in the upper left-side part of the Jezerní Brook catchment area that, together with the Prášilský Brook, forms the right-side affluent of the Křemelná River. It is a catchment elongated in the S-N direction. The western part of the watershed line is formed by the ridge between the Poledník Mountain (1315 m a.s.l.) and the Skalka Mountain (1238 m a.s.l.).which is at the same time the watershed line between the catchments of the Prášilský and the Jezerní Brooks. The whole catchment area is situated on the eastern slope of this ridge.

The shape characteristics of the catchment are documented by the following figures:

Catchment area	$P = 0.6474\ km^2$
Total length of the watershed line	$r = 3.72\ km$
Coefficient of the development of the watershed line...	$k = r/P = 5.746$
Length of the water course...	$d = 1.2\ km$
Mean width of the catchment......................................	$\check{s} = P/d = 0.539\ km$

Coefficient of the elongation of the catchment area....	š/d = 0.449
Characteristics of the catchment area..........................	$P/d^2 = 0.449$
Area of the lake.	$P_j = 0.042\ km^2$
Part of the lake on the catchment area.........................	$P_j/P = 0.064\ 9$
Mean altitude of the catchment area....	1 199.106 m *)
Mean inclination of the catchment area.......................	17° 20' **)

*) It is the arithmetical average calculated from three data established by different methods (in Zbořil, A., 1994).

**) Gradient of the relief in contour belts was calculated according to the formula by A. Penck (in Zbořil, A., 1994).

Table 1: Morphmetric characteristics of the Prášilské jezero Lake catchment area (measured on a map 1 : 10 000)

Contour. line m. a.s.l.	Length of contour lines (km)	Altit.span of the measured belt in altitudes (m)	Area of the measured belt (km^2)	Mean incl. of belt	Part catchment area (%)
1 063	0	1 063 – 1 079	0.042	8°52'	6.49
1 079	0.819	1 079 – 1 100	0.021	35°10'	3.24
1 100	0.59	1 100 – 1 125	0.028	26°58'	4.32
1 125	0.55	1 125 – 1 150	0.045	19°17'	6.95
1 150	0.71	1 150 – 1 175	0.067	16°19'	10.35
1 175	0.86	1 175 – 1 200	0.050	25°10'	7.72
1 200	1.02	1 200 – 1 225	0.079	19°11'	12.20
1 225	1.18	1 225 – 1 250	0.114	13°23'	17.60
1 250	0.99	1 250 – 1 275	0.122	9°15'	18.84
1 275	0.60	1 275 – 1 300	0.062	10°03'	9.57
1 300	0.28	1 300 – 1 315	0.017	7°02'	2.62

3. 2. Geologic structure and geomorphologic conditions

From the regional geological viewpoint, the studied territory is a part of the Šumava system, in a more detailed division a part of the Šumava Mountains. The studied territory is situated in a strongly tectonized region limited in the east by the significant zone of the Prášily fault of a NNW-SSE orientation. This fault forms the limit between the cordierite –biotite stronly migmatized paragneiss, the medium grained to coarsly grained porphyric biotite granite and the chlorite-muscovite slate gneiss. In the neighbourhood of the Prášilské Lake, there are also maintained glacigenous sediments. They form on one hand a moraine bouldery mound closing the lake at its outflow side, on the other hand the continue into the valley as degraded glacigenous stony-bouldery sediments, washed out and mixed with deluvial and alluvial clastic.

The Prášilské Lake cirque was deepened by a glacier probably in the period of Würm glaciation, and that in the territory disturbed by an N-E oriented fault line. At the western side of the lake, there is a 150 m high lake wall. According to the plotted profile A – A' (Fig. 1) surveyed in the terrain, there is seen a significant inclination of the lake wall (38° in average) which is steeper in its upper part (40 – 50°). From the altitude of 1140 m, the inclination decreases to 30 – 40°. Windbreaks and the ensuing bark beetle proliferation cause a progressive forest dieback especially in the upper part of the lake wall and repeated windbreaks fostering erosion activities in this region. In the upper parts of the lake wall, there is a higher occurrence of rock outcrops surrounded by block debris. The material is then from there transported by erosion and gravitational processes to the lower parts of the wall. The in this way formed thicker slope sediments cause lower vaues of inclinations measured in the lower part of the wall which is visible also in the profile A – A'. Forest stand elimination is thus followed by an intensification of erosion processes.

The Prášilské Lake is dammed by a more than 200 m large moraine of N-S orientation which is probably the most marked of all the Šumava lakes which is also given by the deforestation of the neighbourhood of the lake. The moraine mound composed of block debris of unsorted character shows deterioration in the whole length of the moraine arc due probably to water erosion by a former stream. The Jezerní Brook flows perpendicularly to the moraine depression. In the lower parts, erosion causes washing out and away of moraine accumulations, the lower limit of which cannot be precisely localized. Northwards from the lake, there are block deluvia passing in their lower part to stone seas.

4. Morphographic conditions of the lake

4.1. Ground plan measurements and methods of their processing

Josefinský katastr of 1785 indicates the area of the lake as 3 morgen and 726 square klafters (1.9877 ha). This value is very low even if we take into consideration a lower surface level than today due to the regulated outflow. The cadaster of 1837 indicates already 6 morgen and 1150 square klafters (3.8615 ha). Sommer, J. G. (1841) indicates 7 morgen (4.0282 ha) whereas Möchel (1878) gives an absurd figure of 15.6 ha. Wagner, P. (1897) calculated the area of the lake as 3.567 ha. V. Švambera (1914) determined with the help of the Coradi disc planimeter the area of the lake as 3.72 ha, for the highest water surface level then 3.91 ha, with using for the map construction the Schmalkald compass on a fixed stand.

Our field measurements were based on laying out a levelling order along the bank line of the lake. Angle measurements were done by a small theodolite THEO 080A. In total, 22 polygon points (n = 22) were selected and internal angles in the polygon were determined (see Fig. 2). According to the formula (n – 2) 200 (in grades), the resulting figure should be 4000 g, in degrees then 3600°. The measured internal angles of the polygon and a survey of lengths of the polygon sides are contained in the thesis paper by the co-author (Zbořil, A., 1994). For the total length of all polygon sides (815.1 m), there are 256 measured perpendiculars, that is one perpendicular for each 3.18 length metres.

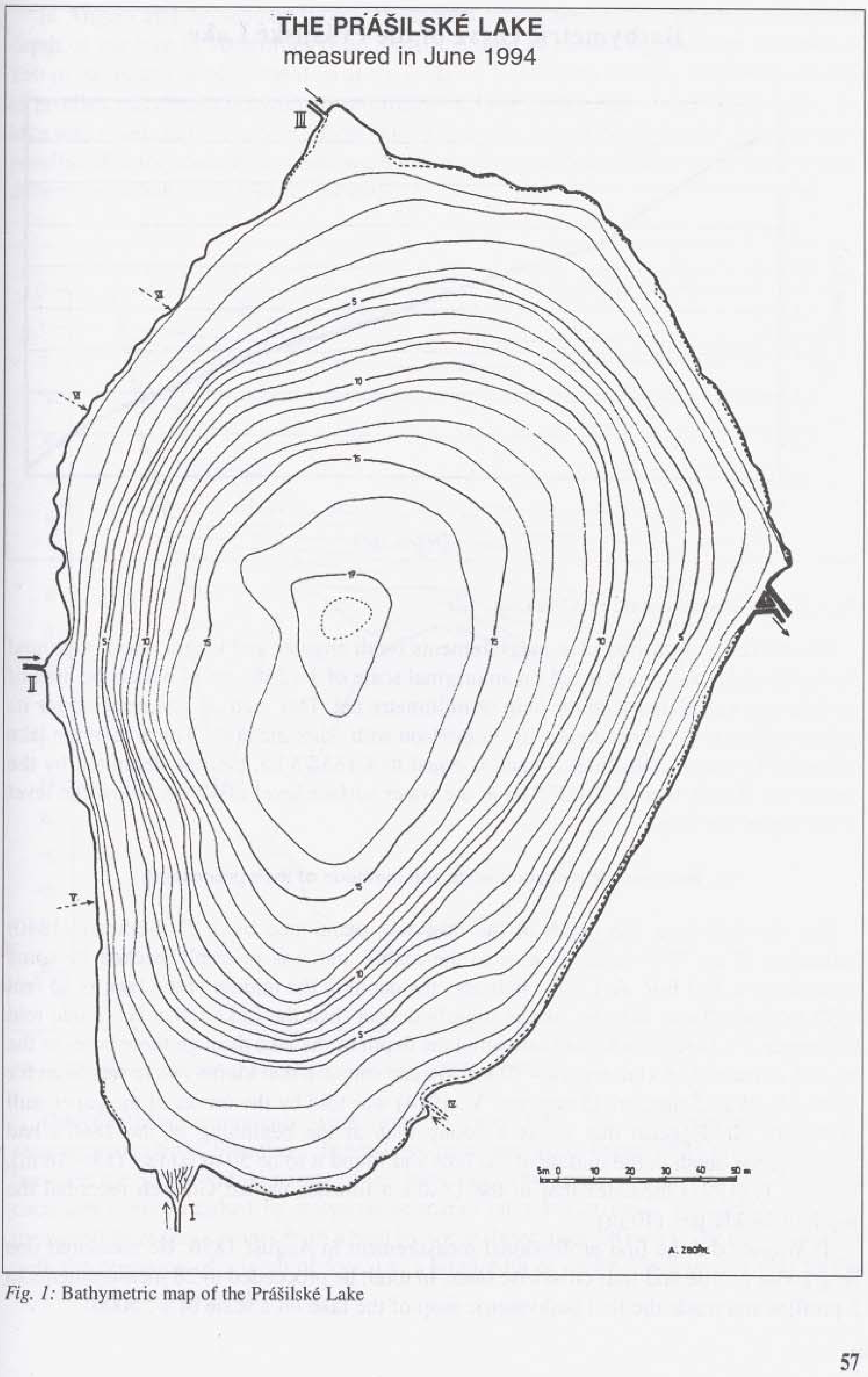

Fig. 1: Bathymetric map of the Prášilské Lake

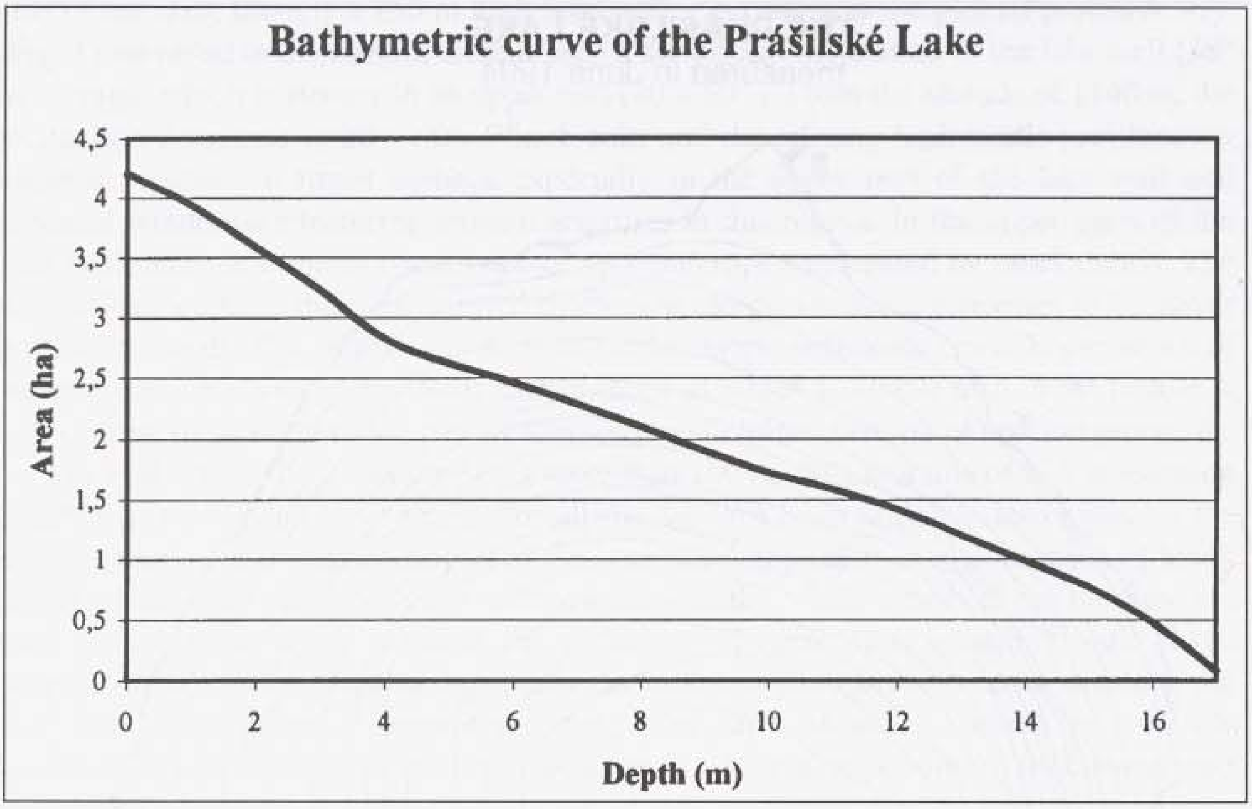

Fig. 2: Bathymetric curve of the Prášilské Lake

On the basis of ground-plan measurements (both angular and length ones), a ground plan of the lake was constructed on an original scale of 1 : 250, out of which the area of the lake was calculated with the help of millimetre net. This method was selected for its high precision and its expediency in comparison with other methods. The area of the lake delimited by the unconsolidated bank is equal to 4.183 75 ha, the one delimited by the consolidated bank then 4.204 375 ha at the water surface level of 47 cm below the level of the top of the dam.

4.2. Bathymetric measurements and methods of their processing

For the first time, the depth of the lake was mentioned by J. G. Sommer (1840) indicating 17 m. This datum is near to the reality and was probably backed by some measurement. But Frič, A. (1871) indicates the depth in the middle of the lake as 15 feet (4.75 m) and affirms that the lake is slightly deeper than the Laka Lake. His guide told Bayberger, F. (1886) that he had measured the depth of the lake through three holes in the ice and it reached 16 klafters (26 – 30 m). We can suppose that klafters were mistaken for metres. In 1910 Švambera (Švambera, V., 1914) was told by the owner of the paper-mill in Prášily Mr. Eggerth that he as a young man at the beginning of the 1860's had measured the depth in the middle of the lake and found it to be 50 to 60 feet (15 – 18 m). Wagner, P. (1897) indicates that in the 1840's a forester named Gulasch recorded the depth of 24 klafters (40 m).

P. Wagner did the first professional measurement in August 1896. He measured one lengthwise profile and four crosswise ones. In total, he proceeded to 28 measurements in 5 profiles and made the first bathymetric map of the lake on a scale of 1 : 5000.

In August and September 1906 V. Švambera proceeded to 258 measurements of the depth of the lake in 10 profiles (Fig. 3). At the time of measuring, the lake surface was 150 m below the level of the dam at the outflow. V. Švambera writes that his measuring of profiles was connected with great difficulties, because the wire stretched out across the lake was stolen and his only assistant helped him only during the first week. It is therefore possible that the measured values were incorrectly localized which would explain some differences when compared to our map.

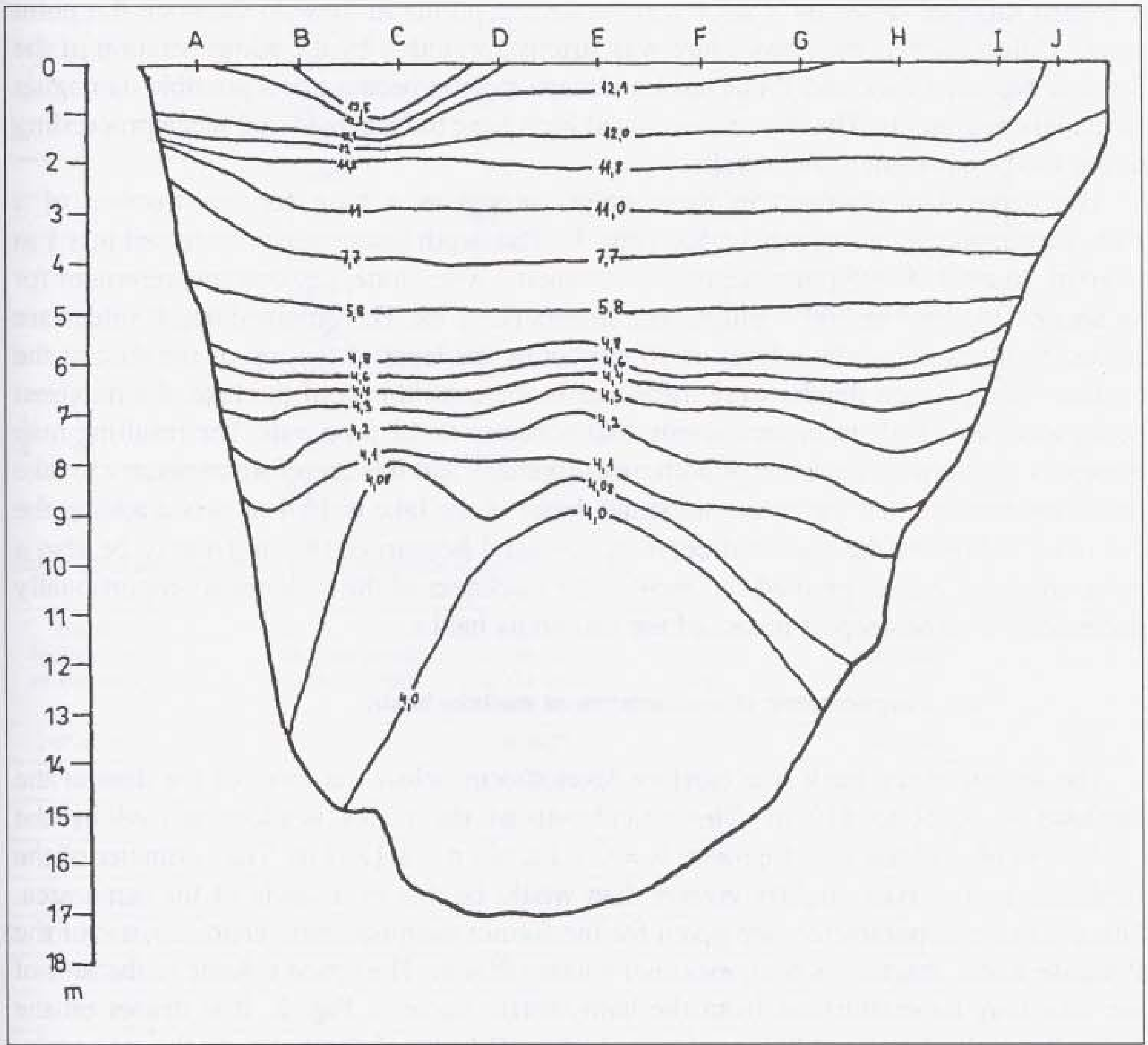

Fig. 3: Thermic profile during summer stratification – 11 June 1994

Our depth measurements were done in June 1994, i.e. 88 years after the last measurements by V. Švambera. In total, we measured 1095 values in 33 profiles, leading between the 35 individual points of the bank line. The points in a distance of 5 m from each other were marked by polystyrene marks on a kevlar cord. The depth was then measured from these points from a boat by sonar (Interphase DG – 1). The device worked with the precision of a tenth of foot, i.e. a hundredth of metre. Each profile was further measured by echo sounder.

To correctly evaluate the measured values, it is important to mention the quality of the used devices. We worked with two devices: a sonar, the advantage of which laid in a very precise point localization of the measured depth. The disadvantage of this apparatus was, in spite of its high precision, a problematic definition of the limit of reverberation, i.e. the emitted signal reverberated either from the solid bottom or penetrated into a certain depth of the sediment. The echo sounder, on the contrary, differentiated the sediment and the solid bottom, but we simply could not obtain a constant speed of the boat to be able to precisely localize the measured values. These facts could have been eliminated by using a burden dropped down on a steel wire in several points in view to calibrate the point sonar. Unfortunately, such procedure was strictly forbidden by the administration of the Šumava National Park and Protected Landscape Region because of a possible damaging of the lake sediments. The above-mentioned facts have to be considered when proceeding to the final evaluation of the results.

The depth data obtained in these points served as a base for construction of a bathymetric plan on a scale of 1 : 500 (Fig. 1). The depth lines were constructed in a 1 m interval. In total, 1 095 point depth measurements were done, i.e. one measurement for an area of 38. 4 m^2 or 260 depth measurements per 1 ha. The obtained depth values are related to the water surface level of 50 cm below the level of the top of the dam at the outflow. The greatest depths were measured in the central part of the lake, the maximal depth was found little more westwards, that is nearer to the lake wall. The resulting map of depths is drawn on the basis of both measurements and it is therefore necessary to take into consideration that the recent maximal depth of the lake is 16.4 m, when adding the 2.4 m of sediments the maximal depth of the solid bottom is 18.8 m (it may be also a more solid and coarse grained sediment). The thickness of the sediments proportionally decreases from the deepest places of the lake to its banks.

4.3. Morphometric characteristics of the lake basin

The length of the bank line (surface level 47 cm below the level of the dam at the outflow) is equal to 819 m. The articulation of the banks is characterized by the coefficient of the bank development: $R = O / 2 \pi . \sqrt{} / \pi = 1.1267$ m. The perimeter of the bank line is thus only slightly greater than would be that of a circle of the same area. Other horizontal parameters are given for the further morphometric characteristic of the Prášilské Lake: length – 306 m, maximal width – 204 m. The space volume (cubature) of the lake may be established from the bathymetric curve in Fig. 2. It is drawn on the following scale: 1 mm = 400 mm of area, 1 mm = 0.1 mm of depth; i.e. on the area scale: 1 mm^2 = 40 m^3 of volume. The volume (cubature) of the lake is thus equal to the number of square millimetres closed by the paratactic axes and the bathymetric curve: 349 920 m^3. If we divide this value by the area of the surface, we obtain the mean (volumetric) depth of the lake: 8.32 m. The percentage of the mean depth in the maximal depth is 48.37 %.

Table 2a: Morphometric characteristics of the lake basin

Depth (m)	Area (ha)	Area (%)	Length of the depth line	Perimeter of the depth line
0	4.2044	100	819	1.1267
1	3.9367	93.6	761	1.0819
2	3.5829	85.2.	719	1.0715
3	3.2242	76.7	673	1.0573
4	2.8229	67.1	625	1.0493
5	2.6223	62.4.	601	1.0469
6	2.4610	58.5	583	1.0483
7	2.2847	54.3	564	1.0526
8	2.1009	49.9	543	1.0568
9	1.8990	45.2	521	1.0665
10	1.7202	40.9	498	1.0711
11	1.5864	37.7	480	1.0750
12	1.4201	33.8	452	1.0699
13	1.2001	28.5	411	1.0583
14	0.9863	23.5	379	1.0765
15	0.7701	18.3	331	1.0640
16	0.4751	11.3	275	1.1255
17	0.0788	1.9	110	1.1054

Table 2b: Morphometric characteristics of the lake basin

mean inclination of the step	depth stepthe depth (m)step (ha)	area of of the step to the area of the surf.	% of the area the depth step	volume of the total volume	% of
16°26'30"	0 – 1	0.2677	6.37	40 560	11.59
11°48'48"	1 – 2	0.3538	8.41	37 400	10.69
10°58'51"	2 – 3	0.3587	8.53	33 960	9.70
9°11'11"	3 – 4	0.4013	9.54	30 040	8.58
16°59'32"	4 – 5	0.2006	4.77	27 080	7.74
20°09'14"	5 – 6	0.1613	3.84	25 200	7.20
18°01'10"	6 – 7	0.1763	4.19	23 480	6.71
16°45'33"	7 – 8	0.1838	4.37	21 480	6.14
14°45'42"	8 – 9	0.2019	4.80	19 840	5.67
15°54'18"	9 – 10	0.1788	4.25	17 800	5.09
20°04'33"	10 – 11	0.1338	3.18	16 440	4.69
15°39'13"	11 – 12	0.1663	3.95	15 080	4.31
11°05'48"	12 – 13	0.2200	5.23	13 040	3.73
10°28'03"	13 – 14	0.2138	5.08	10 960	3.13
9°19'29"	14 – 15	0.2162	5.14	8 680	2.48
5°51'52"	15 – 16	0.2950	7.02	6 120	1.75
2°46'51"	16 – 17	0.3963	9.43	2 680	0.76
7°56'48"	17 – 17.2	0.0788	1.87	80	0.02

5. Hydrological regime of the lake

The Prášilské Lake has three main whole-year affluents and one outflow that in the past was regulated by a sluice built in the reinforced dam of the lake. Discharging of the lake increased the flows of the lake brook when floating timber. Besides these three main affluents (I, II, III) the lake has several seasonal affluents (IV, V, VI, VII) localized on 29 April 1994.

In the lake wall, there occur during the whole year many tiny springs which gain in intensity in the period of the spring snow melting and after heavy rains. These headsprings are irregular and the majority of them do not mouth into the lake but soaks again into the delluvium. Their abundance cannot be thus measured and they cannot be precisely mapped out. For that reason, we can suppose, besides the three permanent affluents of the lake (affluents I, II and III), a higher quantity of occasional affluents.

The abundance of the affluent IV used to be comparable to that of the affluent I, but its major part has been regulated into the affluent I to prevent the water erosion caused by the affluent IV.

To establish the precise hydrological balance of the lake, it would have been necessary to build a water gauge at the dam of the lake and overfalls with water gauges at the affluents and at the outflow. Unfortunately this was not possible either for time reasons or for the impossibility of major interventions in the 1st zone of the Šumava National Park. For that reason, the indirect method of measuring the profile and the speed of the streaming water was used to measure the flow of the affluent I and of the outflow. At the affluent I, a pipe of a diameter of 51.5 cm and the length of 5 m was used in which the profile was always measured and the speed of the streaming was calculated out of 10 measurements. At the outflow from the lake, an artificial stone bed of a length of 7 m and a width of 65 cm was used. Again the surface of the flow profile was calculated and the flow velocity of water was established from 10 measurements. By lesser flows the calculated values were verified by direct measuring in a calibrated vessel. In the other affluents we used the direct method of measuring flows in a calibrated vessel. From the financial reasons, it was not possible to measure the flow more often than once a month.

Measured flows in the affluent I:

Date 1994	20 March	29 April	9 May	13 June	19 July	4 August
Flow Q (l/s)	12.00	35.92	11.42	6.26	0.96	2.48

Measured flows in the affluent II:

Date 1994	20 March	29 April	13 June	19 July	20 July	4 August
Flow Q (l/s)	3.096	4.25	0.55	0.97	0.78	0.38

Measured flows in the affluent III:

Date 1994	29 April	13 June	19 July	20 July	4 August
Flow Q (l/s)	1.10	0.79	0.49	0.54	0.37

Measured flows in the affluent IV:

Date 1994	29 April	19 July
Flow Q (l/s)	1.11	0.009

Measured flows – outflow from the Prášilské Lake:

Date 1994	lake water gauge (cm)	surface level below the level of the dam (cm)	flow Q (l/s)
9 February	2.0	50	-
20 March	6.0	46	66.86
29 April	10.0	42	102.39
9 May	4.5	47.5	46.29
10 May	5.0	47	47.92
11 May	4.3	47.7	43.26
11 June	2.0	50	23.08
12 June	2.5	49.5	26.74
19 July	1.8	50.2	18.70
20 July	1.5	50.5	13.43
4 August	0.5	51.5	4.00

These values were used for construction of a graph of dependence of the flow quantity of water of the Jezerní Brook /outflow/ on the surface level below the level of the top of the dam of the lake.

6. The thermal regime of the accumulated water

The thermal regime of the accumulated water is influenced by the character itself of the lake. It is a lake with surface inflow and outflow, that is a through-flow one. Because of the shape of the lake, it can be considered as a uniform thermal unit, i.e. that the temperature in a given depth is approximately the same in the whole lake. This thermal unit is nevertheless disturbed by the surface and subsurface affluents of the lake, especially in its southern and western part. In summer months, a certain cooling occurs in these places due to the affluents.

A small heat conductance and the anomaly of water (the density of water increases with its cooling to 3.98 °C and with further cooling the density decreases again) cause a typical distribution of temperatures in the lake during the year.

The first measurement of water temperature in the water column in the Prášilské Lake was done by P. Wagner on 16 August 1896. Wagner was stricken by a quick decrease of the water temperature due to the depth. When bathing he discovered two unusually cold places in the lake and concluded that under the water surface, there are hidden affluents constantly bringing new cold water inot the lake (Wagner, P., 1897).

The most extensive research was done by V. Švambera in the years 1906 – 1907 (Švambera, V.,1914) who measured the temperature by the Negretti – Zambra thermometer in the inclinable mechanism constructed by Prof. Ule. The first winter measuring of water temperature in the lake was done according to the instruction by V. Švambera and with the help of his instruments by M. Bronec, forester in Neubrunn, on 9 March 1913. Further measuring of water temperature in the water column in the Prášilské Lake was done as late as in the years 1991–2 (Hoffmannová, A., 1993). The measuring of temperature and pH was done by a digital pH-meter WTW On 9 February from 12 to 14 o'clock, we measured the water temperature in the water column of the lake by the GT – 1 thermometer. The temperature was measured with the precision of hundredth of degree Celsius. At the time of measuring (11.45 a.m. to 2.20 p.m.), there blew the south-eastern wind, it was sunny and the air temperature was – 1.5 ° C. The snow layer in the middle of the lake was 30 cm thick and the thickness of the multi-layer ice was 42 cm. On 20 March 1994, there was on the 56 cm thick multi-layer ice a 10.5 cm thick layer of snow, while during the week before the measuring the weather was rainy and the snow was melting. It was snowing in the night of 19 to 20 March. At the time of measuring (12 o'clock), the air temperature was + 1.5° C. We tried to measure the temperature in the period of spring circulation. For that reason, Zbořil A. visited the lake on 29 April 1994. Unfortunately, the lack of understanding of and a strict interdiction by the administration of the Šumava National Park and Protected Landscape Region did not allow him to do the measurements at the given date. He could only state that the southern half of the lake was covered by an approximately 0.5 cm thick ice. The water temperature was 4°C and the air temperature 14.2 °C at 10.30 a. m. The values measured on 11 May1994 manifest already the character of summer stratification. It can be thus concluded that the spring circulation of the lake water passed over very quickly in the period from 28 April to 10 May 1994. On 11 June1994, the temperature was measured in the whole length of the profile 12'- 4 (Fig. 3).

The up-to-now done measurements of the temperature in the Prášilské Lake allow affirming that the spring circulation, during which the water temperature is constant in the whole depth profile, occurs there regularly. Afterwards the temperature of the water column gets progressively diversified during the summer stagnation. By progressive heating and by the impact of wind, the thermocline (metalimnion) is progressively shifting to greater depths.

In spite of the uncomplete temperature order we can suppose that the spring, respectively the autumn thermal homogeneity of the lake occurs only for a very short period at the break of April-May, respectively of October-November. The period of the summer and winter thermal stratifications lasts approximately the same time. During the summer months the temperatures of the affluents are lower (affluent I – 12.2 °C, affluent.II – 10.3 °C, affluent III – 9 °C, – measured on 20 July 1994) than the temperature of the epilimnion of the lake – 19.1 °C. Consequently the water brought into the lake by its affluents dives into greater depths. The temperature of the outflow is equal to the temperature of the upper part of the epilimnion (19 and 20 July 1994 t = 19.6 °C resp. 19.1 °C) .

Temperature at the outflow:

Date 1994	20 March	29 April	9 May	11 May	19 July	20 July	4 August
Temperature °C	0.0	4.0	11.0	10.1	19.6	19.1	21.8

7. Colouring and transparency of water

At first it is necessary to stress that these two physical parameters are closely connected. A white metallic Secchi disc is generally used for their establishment. A circular disc of a diameter of 30 cm is in its middle attached to a wire with the help of which it is being immersed into the depth. The transparency is established by a slow immersion of the disc and by its consequent pulling up to the limit of its visibility. The value of transparency is the depth in which the disc appears for the first time when pulled up to the surface. Equally the colouring (colour) of the water was established by the Secchi method according to the colouring of the white disc in the middle depth of.transparency.

The first one to mention the colour of the Prášilské Lake was Hochstetter, F. (1855) who described it as dark, in another paper he writes about "the black surface of the lake, straight as glass". This was later confirmed by Krejčí, J. (1857) and Bayberger, F. (1886). Also Wagner, P. (1897) who had not the colour scale during his stay at the lake estimated the lake colour as Nos 13 to 14 of the Ule scale and added that the water surface seems to be darker than it really is. V. Švambera on 30 August 1906 (Švambera V., 1914) determined the colour as No. 16 of the Ule scale and confirmed this colour on 15 September 1907.

The transparency of the water was measured for the first time by Wagner on 16 August 1896 and established as 3.5 m. V. Švambera measured the transparency on a sunny day of 30 August1906 at noon and established the values of 4 to 4.2 m and at 3 p.m. then 5 m. He measured the transparency again by a sunny weather on 13 September1906 – 4 m and on 18 September 1907 at 4 p.m. – 5 m.

After a long time, the water transparency was measured again by Hoffmanová, A. (1993): 21 May 1991 – 3.8 m, 29 July 1991 – 2.5 m, 21 May 1992 – 3.3 m, 29 July 1992 – 7.0 m, 25 October 1991 – 7.0 m. Unfortunately, these data are not accompanied by the data on time and weather so as the measured values could be objectively evaluated.

The measuring of the colouring and transparency of the lake water could be done only in June when we had a boat and the necessary authorization. On 11 May 1994, we established the transparency of 3.6 m and on 12 June 1994 – 3.6 m, whereas the colour corresponded to the No. 15 of the Forel – Ule scale. The measuring was done at 2 p.m. by a cloudy weather.

The above survey shows clearly that all observations were done by several persons by the above-mentioned method, which is subjective. To draw some conclusions, there is not a sufficiently long and satisfactory series of measurements.

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PRÁŠILSKÉ JEZERO

Résumé

Poslední výraznou modelaci reliéfu prodělala Šumava ve čtvrtohorách v období zalednění. Ledovcové splazy lokálního zalednění zanechaly na Šumavě hluboké, ledovcovou erozí vyhloubené pánve (kary) se srázný-mi, vysokými stěnami nad nimi. Z nich je pouze 8 za čelními morénami zaplněno vodou v podobě ledovco-vých jezer: 5 je na naší straně Šumavy (Černé, Čertovo, Laka (Mlaka), Plešné a Prášilské) a 3 na straně bavorské (Velké a Malé Javorské a Roklanské), tři kary jsou bezjezerní nebo se zaniklými jezery.

Protože Prášilské jezero v minulosti spadalo do nepřístupné zóny, byla z velké části znemožněna vědecká činnost v této oblasti. Z tohoto důvodu nebyla 88 let vytvořena aktuální bathymetrická mapa jezera.

V roce 1994 bylo provedeno geomorfologické mapování glaciálních reliktů okolí jezera a základní limno-logický výzkum. Hlavním cílem bylo určení průběhu břehové linie, vymapování přesné plochy jezera a vytvoření nové bathymetrické mapy Prášilského jezera. Sonarem „Interphase DG-1" bylo naměřeno 1095 bodových hodnot s centimetrovou přesností ve 33 profilech. Dále byl každý profil změřen echolotem, který byl schopen rozlišit hranice: voda – sediment – pevné dno. Veškeré naměřené hodnoty a profily jsou uvedeny v diplomové práci autora (Zbořil, A., 1994). Také mapa vzniklá z půdorysných měření je první v historii, která byla vykreslena za maximálního stavu hladiny jezera.

Vzhledem k velkým administrativním překážkám Správy Národního parku Šumava, lze dosažené výsledky považovat za velmi uspokojivé. Přesto by budoucí podrobnější výzkum byl na místě, a to nejen na Prášilském jezeře, ale na všech ostatních šumavských jezerech, což je také cílem všech hydrologů. Při vstřícnějším posto-ji vedení NP a CHKO Šumava, s použitím modernějších měřicích přístrojů a nejnovějšího softwaru při zpra-cování naměřených dat, by tento úkol mohl být v nejbližší době splněn.

Photo 1: The Prášilské Lake. The view from the main affluent
Prášilské jezero ve směru od hlavního přítoku