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Title: The status of freshwater pearl mussel in the Czech Republic: several successfully rejuvenated populations but the absence of natural reproduction

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1 **The status of freshwater pearl mussel in the Czech Republic: several successfully**
2 **rejuvenated populations but the absence of natural reproduction**

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25
26 **Abstract**

27 The freshwater pearl mussel was historically abundant in many streams and rivers in the Elbe,
28 Oder and Danube Basins in the Czech Republic, Central Europe. By the 21st century, the mussels
29 had become extinct in the lower and middle altitudes, and current populations are only present
30 near the upper limit of their natural range. The current population of this mussel is estimated to
31 be only 1% of the historical abundance. The population decline was related to the negative
32 impacts of pollution from industry, intense agriculture, forestry and sewage water. The
33 freshwater pearl mussel habitat has also been impacted by watercourse regulations and has been
34 fragmented by dams and weirs. All of these impacts have resulted in failure of the reproductive
35 cycle; the last significant cohort of juveniles settled approximately 30–40 years ago. Therefore,
36 this species is considered critically endangered, and an action plan was developed to conserve the
37 populations in the Czech Republic. Special measures were conducted between 1984 and 2005 to
38 improve the age structure of elderly populations. Fish infected with millions of glochidia were
39 released in two locations, and over 50,000 captive-bred juveniles that were three to five years old
40 were released in 7 locations. Only the latter approach resulted in a small number of subadults that
41 gradually emerged from the substratum to the bottom surface, as confirmed by monitoring efforts.
42 Despite simultaneous efforts to restore mussel habitat over the last 25 years, natural reproduction
43 still does not occur in the Czech Republic. Therefore, complete restoration of oligotrophic
44 streams is the key to the future presence and natural reproduction of freshwater pearl mussels in
45 the Czech Republic.

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47 **1. Introduction**
48

49 Freshwater species, particularly bivalve molluscs, are greatly threatened with extinction
50 (Bauer and Wächtler, 2001; Strayer, 2006), and their protection requires a comprehensive
51 approach (Geist, 2011). The freshwater pearl mussel (*Margaritifera margaritifera*) was

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