# Beaver (*Castor fiber* L., Castoridae) management in Bavaria

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## Abstract

Beavers were exterminated in Bavaria in 1867. The reintroduction, conducted by the „Bund Naturschutz in Bayern e.V." between 1966 and the late seventies, was very successful: the present beaver population in Bavaria is estimated at more than 6.000 individuals, and it is still growing and expanding into its former range.

This success was paralleled by a growing number of conflicts between beavers and human land users in the densely settled and intensively used Bavarian landscape. Beavers fed on crops, beaver dams flooded forests, pastures and basements, beavers digged their burrows under roads, fields and high water dikes, and some of them felled apple trees in gardens. During the 1980s until the early 1990s, the beaver conflicts escalated, less because of the real world problems, but more because politicians and mass media abused this conflict between nature conservation and land owners for personal gain.

Taking a closer look at beaver-human-conflicts, we found, that almost all conflicts root in the overuse of landscape by man: beaver conflicts happen mainly in a narrow strip along the river banks. Where man has left some space to the rivers, there are only very few conflicts with beavers. Such unused areas are not only important for beavers and other plant and animal species, but more and mainly for man himself (e.g. for protection of water and prevention of floods).

**Key words:** beaver, *Castor fiber*, management, Bavaria

## Zusammenfassung

### Biber (*Castor fiber* L., Castoridae)-Management in Bayern

Biber wurden 1867 in Bayern ausgerottet. Die Wiederansiedlung unter der Führung des „Bund Naturschutz in Bayern e.V.", die zwischen 1966 und Ende der 1970er Jahre stattfand, war sehr erfolgreich. Die derzeitige Biberpopulation in Bayern wird auf über 6000 Individuen geschätzt, nimmt weiterhin zu und breitet sich auf das ursprüngliche Gebiet aus.

Zeitgleich mit diesem Erfolg stieg auch die Zahl der Konflikte zwischen Bibern und Landnutzern in der dicht besiedelten und intensiv genutzten bayerischen Landschaft.

Biber fressen Feldfrüchte, durch ihre Dämme werden Wälder, Viehweiden und Keller überstaut, sie bauen ihre Röhren unter Straßen und Felder, in Hochwasserdämmen und einige fällen Apfelbäume in Gärten.

In den 1980er Jahren bis zu Beginn der 1990er Jahre eskalierten die Konflikte, es waren keine weltbewegenden Probleme, aber Politiker und die überwiegende Mehrzahl der Medien missbrauchten diesen Streit zwischen Naturschutz und Landnutzern zur persönlichen Profilierung.

Betrachtet man diese Konflikte zwischen Biber und Landnutzern näher, kommt man zu der Erkenntnis, dass die Hauptursache in der Übernutzung der Landschaft liegt: Der Großteil der Probleme liegt in einem schmalen Uferstreifen. Ließe man diesen Streifen ungenutzt, wären die Konflikte auf ein Minimum reduziert. Solche ungenutzten Bereiche wären nicht nur für den Biber und andere Tier- und Pflanzenarten wichtig, sondern vor allem auch für den

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Menschen selbst, z. B. für den Wasserschutz und zur Verhinderung von Hochwässern.

## Introduction

Beginning in 1996, 30 years after beaver's reintroduction, a beaver management was developed with the goal to keep and promote the beaver in Bavaria by creating and improving acceptance for beavers and their activities. The development of the beaver management was funded by the European Community, program LEADER II, and local authorities; the implementation is funded by the "Bayerische Naturschutzfonds" (Bavarian State foundation for the protection of Nature), and the "Bund Naturschutz in Bayern e.V." (a NGO).

The key to the future of the beavers in Bavaria are the landowners, on whose properties the beavers are living. We consult these landowners in case of conflicts with beavers and assist them in applying for funding for protective measures; we also try to convince them to give up agriculture or forestry and to lease or sell the land to state agencies or private nature conservation organisations. We also do public relations work on a broader scale to inform the general public about beavers, its benefits for wildlife, conflicts and the solutions for the future of the beaver within the beaver management. Another important issue is the implementation of beavers and its habitats in long-term landscape planning, as this is one of the best ways to reserve areas for beavers and riverside forests from an early stage.

Beavers (*Castor fiber* L.) are very capable of modelling the land they live in (e.g. DJOSHKIN & SAFONOV 1972, NOVAK 1987): beaver dams flood and wet large areas, their burrows and dens increase the structure of river banks, and the cutting of trees creates openings in the riverside forests. As positive as these activities are from a nature conservation point of view, as problem causing they are, when beaver express them in a cultivated landscape used by man: beaver dams flood corn fields, machinery and people may fall into beaver burrows, beaver burrows threaten functionality of dikes, the last trees disappear from the rivers.

In Bavaria, where a successful beaver reintroduction between 1966 and the late 1970s yielded an still expanding population of more than 6000 animals, these conflicts remained unsolved for many years and caused increasing disputes between nature conservation organisations and agencies and land users and their associations, the top demand being the complete re-removal of beavers from cultivated landscape.

In this paper we give a short overview of the history of beavers in Bavaria and the problems they are causing and present then the beaver management which was developed in the last years to solve the problems and – in the long run – to use the beaver as a flagship species for the restoration of riverside forests.

## The Beaver in Bavaria: a short history

### Historic distribution and extinction

Beavers were a common species in Bavaria up to the 16th century. Their distribution over almost all of Bavaria, with exception of the Alps and the higher areas in low mountain regions, is documented by about 300 names of villages, streams or landscapes (ZAHNER 1997). The decline of the beaver population began locally in the 17th century, expanded through the 18th century and ended with the killing of the last Bavarian beaver in 1867 (WEINZIERL 1973).

The reason for the extinction of the beaver in Bavaria was over-hunting. They were hunted for meat, for their valuable pelt and for castoreum, which was widely used as remedy. Habitat changes, esp. the regulation of the major rivers and large bog areas had only an indirect influence by allowing an easier access for hunters into the last remaining beaver territories (ZAHNER 1997).

### Reintroduction

Reintroduction of beavers in Bavaria began in 1966, 99 years after the last beaver was killed. Until the late 1970s, the "Bund Naturschutz in Bayern e.V.", the major nature conservation NGO in Bavaria released about 120 beavers in several different places (WEINZIERL & FROBEL 1998). The beavers

came from wild and captive source populations in Sweden, Finland, France, Poland and the Sovjet Union (WEINZIERL 1973). Reintroduction was permitted by the Bavarian Ministery for Forestry and Agriculture, as beavers were listed as game species at this time.

In the middle of the 1980s, some beavers were trapped in the central Danube area in Bavaria and relocated to the Inn and Isar river (SCHWAB et al. 1994). In northern Bavaria, beavers immigrated in the early 1990s from a reintroduced population of East German beavers in Hessia. (SCHWAB et al. 1994).

### Present status of the Bavarian beaver population

During the first decades after reintroduction, the Bavarian beaver population grew scientifically almost unattended. The first state wide population estimate based on a poll and field work was conducted from 1988 to 1992. At this time, the population was estimated at about 800 to 1200 animals (SCHWAB et al. 1994). In 2002, we estimate the beaver population in Bavaria to more than 6000 animals in 1500 colonies. The beavers have reoccupied a large part of their former range (Fig. 1, Regierung von Unterfranken 2001), although colony density is low at the borders of the present range.

The Bavarian beavers have also changed their legal status since reintroduction. They lost their status as game species and are now a strictly protected species by European and German laws (HIMMELSBACH 1994).

## Beavers in a cultivated landscape: conflicts and solutions

During the beaver-free century in Bavaria, man had heavily altered the Bavarian landscape: he had regulated rivers, he had changed riverine forests into corn fields, and he had meliorated bogs into spruce plantations. Beavers, however, did not care much about these changes in their habitats. They are a species with a very high adaptability and low habitat requirements: some water to swim and some plants for food. Beavers began to settle and build dams in small drainage ditches in extensive farm lands, they digged their burrows in the banks of sewage treatment ponds or under roads, and they used drainage pipes under airport runways as lodges. In these areas, where beavers and man used the same land, an increasing number of conflicts between beaver and man started in the 1980s.

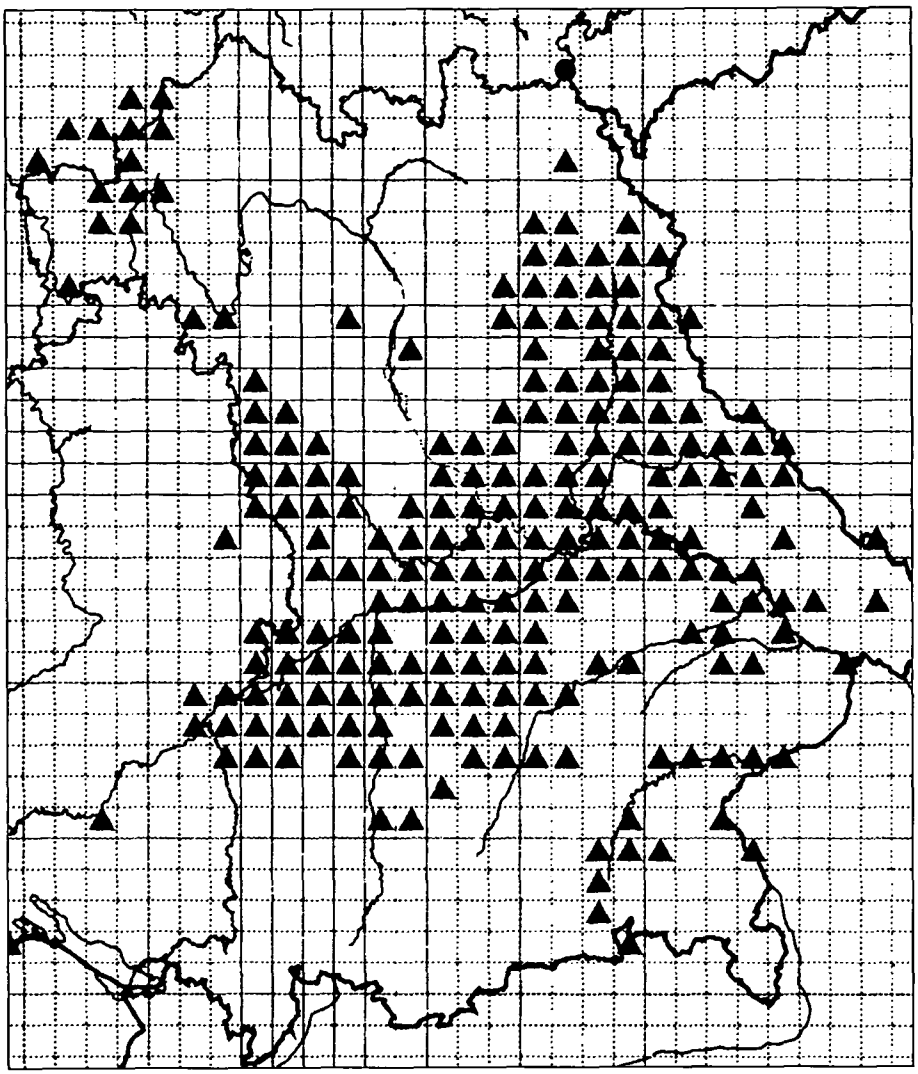

**Fig 1. Beaver distribution in Bavaria. (Regierung von Unterfranken 2001)**

### The "real world" problems

### Beavers feed on crops

Beavers have easily accepted crops, esp. corn, sugar beets, wheat and rape as food. The direct loss of crops is mostly low and accepted by farmers. More important than the damage to crops are damages to the creek banks by beaver slides, and thereby increased erosion, beaver dams and channels build by beavers for easier access into a field, and beaver burrows under fields.

### Beavers cut trees

By cutting trees for winter food or as building materials, beavers can cause a number of conflicts. Beavers cut not only "worthless" willow or aspen, but also economic valuable species (e.g. oak or acorn), they debark spruce and fir, feed on fruit-trees in villages and can clear cut expensively planted restoration areas.

The cutted trees can create further problems, especially if they lie in the water and impair the drainage of high water, impede access to fields and meadows, block streets or railroad tracks, damage power lines, or damage small hydroelectric power plants.

### Beavers build dams

Bavarian beavers build dams mainly in small creeks and drainage ditches with insufficient water depth. The backwater of beaver dams can flood forests and kill economic valuable trees (e.g. spruce), or flood agricultural fields, roads and basements of houses. Mill creeks, fish ponds and water treatment plants can overflow due to beaver build obstacles. The increased ground water level can clog up drainage pipes, increase erosion of soaked banks and destabilise railroad tracks.

### Beavers dig holes

The digging activity of the beavers represents the biggest problem in the cultivated landscape. The subterranean tunnels reach several meters into the ground. If there is any use of these areas (agriculture, roads, gardens), there is a permanent danger for vehicles or people falling into the beaver tunnels and being damaged. Beaver tunnels can also compromise the integrity of high water dikes and threaten the dams of mill creeks. Fishponds and water treatment pools can be drained as a result of beaver tunnels. In small drainage ditches and ponds, the increased sedimentation can be an additional problem.

### Beavers disturb fishes

Beavers disturbing fishes is a special seasonal problem in fish hatcheries. In ponds, where fishes are kept in high densities for wintering, beaver activities keep the fishes moving. This results in weight loss and higher oxygen consumption and may cause a complete loss of the fish stock (SCHMIDBAUER 1996, unpubl.).

## Solutions for beaver-man-conflicts

The activities of Bavarian beavers remain almost exclusively within 20 m of the banks of rivers or ponds (SCHWAB et al. 1994). Problems only arise when humans use this small strip of land as well. Therefore, the lasting solution of beaver-man-conflict lies in the removal of human land us in this range and the recreation of riverside habitats. These unused areas are not only important for the beaver and many other species, but mainly for man himself. They buffer fertilizer and pesticide drainage from the adjoining agriculture, and more important, they can be used as buffer areas to protect villages and towns from floods.

There are also a large number of technical measures to prevent or minimize beaver damages on local spots (e.g. HEIDECKE & KLENNER-FRINGES 1992, SCHWAB et al. 1994). Gratings, sheet-pile walls or gravel layers prevent undermining of dams and roads (DVWK 1997), electrical fences keep beavers out of areas, wire meshs and chemical repellents protect trees, culverts in beaver dam lower the impact of flooding, and a free running dog keeps beavers from eating roses in gardens.

If protective measures are to expensive, or take a long time to be implemented, beavers are trapped and relocated to other areas (SCHWAB & SCHMIDBAUER 2001).

Compensation for damage caused by beavers is not possible by state agencies, as there is no damage compensation for any free living wild animal in Bavaria (except some game species). There is, however, a privately based fund from the Bund Naturschutz in Bayern e.V, which allows compensations as a first step to make a landowner more willing to accept long term solutions (WEINZIERL & FROBEL 1998).

### The problem behind the problems

The solutions for conflicts between beaver an man were known in Bavaria since the early 1990s, but implementation of solutions was between slow and not at all. This

had several reasons. Personnel at the local nature conservation agencies was not trained on dealing with a strictly protected "problem" species and did not have the time to act quickly in case of a conflict; and if they found the time to act, there was almost no funding for damage compensation or for supporting preventive measures.

For farmers, under heavy economical pressure from politics and the international markets, the beaver was often used as scapegoat: if you can not do anything against the European Community, then hit at least the beaver. They felt, that everybody else was having the benefits of the beavers (from creating habitats to the pure pleasure that he his back in Bavaria), and that they themselves were the only ones who had to pay the bills. This exaggeration, on the other side, made nature conservation people underestimate the real problems and not taking the land users serious. So, even in severe cases, with damages of thousands of EUROs, no trapping permits for beavers were issued.

Last not least, mass media and politicians used pushed this „classic" conflict between nature conservation and farmers for their own advantages, turning every beaver burrow in a corn field into a deadly thread for farmers, just to make the headlines.

So, 30 years after the first reintroduction, Bavarian beavers had grown into a schizophrenic species: they were a holy cow for some nature conservationists, and the equivalent of the medieval rat plague for the farmers. Some farmers organisations even wanted the beaver completely removed from the cultivated landscapes in Bavaria, which means (as Bavaria is almost 100% cultivated landscape) nothing else as the re-eradication.

## Beaver management: the Bavarian way

The disparity between real beaver conflicts and their presentation in the media, and the disparity between possible solutions and the amount of implementations showed, that existing administrative and organisational structures were not suitable of solving the beaver conflicts. This was partly due to lack in manpower and money, but also because beaver conflicts were mainly seen as conflict between beaver biology and existing habitat structures, and less as a problems of the human dimensions associated with and behind it.

Therefore another way of dealing with beaver conflicts was established by building a beaver management in Aldo LEOPOLD's (1933) sense: manage the people not the beavers. Manage the people, from farmers who have the problems, to politicians who make the laws, to get the land to set aside for nature. The beavers, and all the other species, will then do the rest – as they did for million of years without being managed by humans.

### „Evolution" of the beaver management

The first steps towards this beaver management in Bavaria started in 1996. A biologist from the Munich Wildlife Society (Wildbiologische Gesellschaft München e.V), commissioned by the Government of Upper Bavaria (Oberbayern) consulted farmers and landowners in the county of Neuburg-Schrobenhausen in Central Bavaria to solve their beaver problems and helped them to find funding for compensation and protective measures. Although not all cases could be solved (SCHWAB 1996, unpubl.), landowners showed that they were willing to accept the beaver, if they got advice, help and financial support in case of problems. On the other hand, nature conservation organisations learned, that there are some cases, where beavers cause intolerable damages and had to be removed by trapping.

In northern Bavaria a similar approach was undertaken to solve the conflicts with beavers in fish hatcheries (SCHMIDBAUER 1996, unpubl.) in the district of Oberpfalz. In the same year, the Bavarian State Ministery for Environment Protection (Bayerisches Staatsministerium für Landesentwicklung und Umweltfragen) issued guidelines for nature conservation agencies on problem solutions and financial support programs (BSTMLU 1996, unpubl. (updated 1999)) .

The results of the first two projects in 1996 encouraged the agencies involved to establish a beaver management for all of Bavaria. This was done in two projects with

originally somewhat different main focuses. One project, running from 1998 to 2001 was funded by the European Community, LEADER II Program, and 5 counties in central Bavaria; it's main focus was to develop the organisation and structures for the beaver management (SCHWAB 2002, unpubl.). The other project, running from 1998 to present is funded by the "Bayerische Naturschutzfonds", a state guided grant, and the "Bund Naturschutz in Bayern e.V.", the major nature conservation NGO in Bavaria; it's focus is on the Bavarian wide implementation of the beaver management (SCHWAB & SCHMIDBAUER 2002, unpubl.).

## The job description for beaver management

The first activities in 1996 had mainly a fire fighter function: solve the problems which had been present for years. This is still a major part of the work, but for the future, the activities will shift more towards prevention of conflicts. All beaver management activities are conducted in close co-operation with nature conservation agencies, especially on the county level. Beaver management is not a replacement, but a consulting help for these agencies. The main activities of the beaver management are:

## Consulting in case of problems and helping in implementing solutions

The beavers are still expanding their range in Bavaria, and in spite of all preventive measures, there will always be individual conflicts. Here it is necessary, to consult the people involved as quick as possible to minimise and prevent negative attitudes against beavers. It is also necessary not only to consult, but also the help people in implementing solutions (e.g. protecting trees or crops).

## Introducing beavers in all habitat related planning systems

Preventing conflicts is better than solving conflicts. The best and least expensive way to prevent beaver conflicts is to take beavers and preventive measures against beaver damages into account in all planning systems working in potential beaver habitat. This will be done by training the personnel in agencies and companies responsible for this plannings.

## Training and organising "local beaver consultants"

Bavaria is just too big to be adequately covered by the two beaver managers working for the Bund Naturschutz in Bayern e.V. A network of individuals from the local public shall support the nature conservation agencies and the beaver managers in consulting, implementing solutions and monitoring the beaver population.

## Monitoring the beaver population

Data quality on beaver's area of distribution and population size is highly variable within Bavaria. A monitoring system would help to recognise potential conflicts earlier and to act better in advance. The monitoring system will be set up in the next years based on the local beaver consultants.

## Mediating between authorities, NGO's and individuals

One of the most important jobs is to be a mediator between the parties involved, as many "beaver" conflicts have their roots in completely different and much older quarrels between a farmer and a nature conservation agency.

## Public relations work

Many beaver conflicts arose from a lack of knowledge (e.g. fishermen believing that beavers eat fish, or farmers fear that beavers have the same reproductive rates as rats). Information on beaver biology, conflicts, solutions and management is therefore a vital part of beaver management.

## Develop a use for "surplus beavers"

So far, most of the beavers trapped in Bavaria could be used for reintroduction programs, mainly in the Danube countries in Eastern Europe (SCHWAB & LUTSCHINGER 2001). These programs will be finished within the next couple of years; so it necessary to develop a further use for these beavers, consistent with existing laws and within the acceptance of nature conservation organisations.

## Get money

Beaver management, and especially buying land costs money. One major task is

therefore to find the financing for the management and the restoration of riverside forests.

Summed up, the task of the beaver management is to bring the beaver back in the heads and hearts of the people, who simply forgot how to live with this fascinating creature and to bring forward what the beaver stands for: the recreation of riverside forests, not (only) for beavers and other species, but also for man himself.

### Organisation of the beaver management

Beaver management in Bavaria is a joint project between NGO-operated beaver managers and state agencies. Presently, there are two beaver managers in Bavaria, working for the "Bund Naturschutz in Bayern e.V." Funding is provided by the "Bayerische Naturschutzfonds". In an increasing number of counties, the beaver managers are supported by the so called "local beaver consultants". These are people form the local public (hunters, farmers, fishermen, nature conservationists, etc.) which are interested in supporting the beaver management.

Local beaver consultants are mainly working as volunteers, guided by and expenses paid by county authorities. Their training is organised by the Bayerische Akademie für Naturschutz und Landschaftspflege. Training includes all aspects of beaver management, from beaver biology to communication skills. Their main task is to be the first, because neighbourhood, address in case of a conflict. They consult in "standard" problems (e.g. protecting apple trees), help in implementing solutions, are informed about the beaver territories in their area and get into contact with the beaver manager in case of more complicated problems.

## The future?

Beaver management in Bavaria is still young, but the first years show, that we are heading in the right direction: many conflicts could be solved, many avoided.

But there is still a long way to go. Beaver population is still expanding it's range and sizes. There will be new problems in new areas, and new peoples will be involved. Therefore, beaver management as described above will also be extended in the foreseeable future.

It will take it's time, before beavers will be accepted by most people as what they are. Not a holy cow and not the reincarnation of medieval rats, but a fascinating species that creates and shapes landscapes for the benefits of many species, including man himself.

The urgent need for what's behind the beaver management was demonstrated in August 2002 (and earlier in May 1999). Floodings in Bavaria caused damages of hundreds of millions of EUROs. If only part of this money would have been available during the preceeding years to buy "beaver" land along the rivers, a lot of water could have flooded these lands, and a lot of houses along the Danube would have stayed dry. Not only in August 2002, but also in the future floodings to come.

## References

BStMLU (Bayerisches Staatsministerium für Landesentwicklung und Umweltfragen) (1996): Vollzugshinweise über Maßnahmen zur Verhinderung von Schäden durch Biber. — Unpublished, 1–12.

Djoshkin W.W. & W.G. Safonov (1972): Die Biber der Alten und Neuen Welt. — Wittenberg-Lutherstadt, 1–168.

DVWK (Deutscher Verband für Wasserwirtschaft und Kulturbau e.V.) (Eds.) (1997): Gestaltung und Sicherung der von Bisam, Biber und Nutria besiedelten Ufer, Deiche und Dämme. — Wirtschafts- und Verlagsgesellschaft Gas und Wasser mbH, Bonn, 1–83.

Heidecke D. & B. Klenner-Fringes (1992): Studie über die Habitatnutzung des Bibers in der Kulturlandschaft. — 2. Int. Symp. Semiaquatisch Säugetiere. Wiss. Beiträge der Martin-Luther-Universität Wittenberg-Halle, 215–266.

Himmelsbach V. (1994): Der Biber im Artenschutzrecht. — In: Bayerisches Landesamt für Umweltschutz (Ed.): Biber. Schriftenreihe des Bayerischen Landesamtes für Umweltschutz **128** (Beiträge zum Artenschutz 18), München, 67.

Leopold A. (1933) Game Management. — Charles Scribener's Sons, New York, 1– 481.

Novak M. (1987): Beaver. — In: Novak M., Baker J., Obbard M. & B. Mallock (Eds.), Wild furbearer management and conservation in North America, Ashton-Potter Ltd., Ontario, 283–312.

Regierung von Unterfranken. (Ed.). (2001): Biber in Unterfanken – Flussmeister der Natur. — Regierung von Unterfanken, Würzburg, 1–6.

SCHMIDBAUER M. (1996): Bestandsermittlung, Problemanalyse sowie Erarbeitung eines Maßnahmenkonzeptes und dessen Umsetzung zu Bibervorkommen in ausgewählten Oberpfälzer Teichgebieten. — Unpubl. report, 1–82.

SCHWAB G. (1996): Biberprobleme und -lösungen im Landkreis Neuburg-Schrobenhausen. — Unpubl. report, 1–47.

SCHWAB G. (2002): Modellhaftes Bibermanagement in der Region Ingolstadt mit Landkreis Kelheim. Schlussbericht 2001. — Unpubl. report, III + 46pp. + appenices.

SCHWAB G. & G. LUTSCHINGER (2001): The return of the Beaver to the Danube watershed. — In: CZECH A. & G. SCHWAB (Eds.), The European Beaver in a New Millenium. Proceedings of 2nd European Beaver Symposium, 27–30 September 2000, Bialowieza, Poland, Carpathian Heritage Society, Poland, 47–50.

SCHWAB G. & M. SCHMIDBAUER (2001): The Bavarian Beaver-Reextroductions. — In: CZECH A. & G. SCHWAB (Eds.): The European Beaver in a New Millenium. Proceedings of 2nd European Beaver Symposium, 27–30 September 2000, Bialowieza, Poland, Carpathian Heritage Society, Poland, 51–53.

SCHWAB G. & M. SCHMIDBAUER (2002): Jahresbericht 2001. Tätigkeit als Biberberater. — Unpublished annual report, 19 pp. + Appendix.

SCHWAB G., DIETZEN W. & G. v. LOSSOW (1994): Biber in Bayern. Entwicklung eines Gesamtkonzeptes zum Schutz des Bibers — In: Bayerisches Landesamt für Umweltschutz (Ed.), Biber. Schriftenreihe des Bayerischen Landesamtes für Umweltschutz **128** (Beiträge zum Artenschutz 18), München, 9–44.

WEINZIERL H. (1973): Projekt Biber. — Stuttgart, 1–63.

WEINZIERL H. & K. FROBEL (1998): Auf zu neuen Ufern! Die Wiedereinbürgerung des Bibers in Bayern. — Nationalpark **100**: 46–50.

ZAHNER V. (1997): Der Biber in Bayern. Eine Studie aus forstlicher Sicht. — Bayerische Landesanstalt für Wald und Forstwirtschaft, Freising, 1–63.

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