

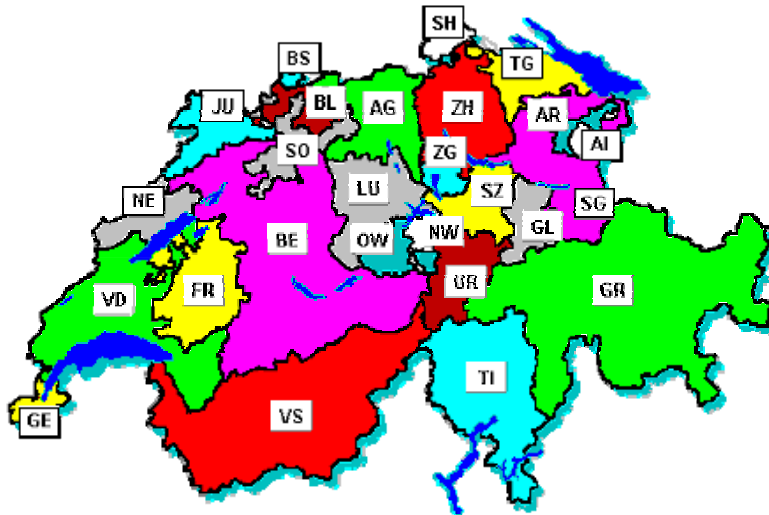
Swiss Water and Nature Protection Policies and Small Hydropower (SH)

- 1. Competent organisations and laws**
- 2. SH and the environment**
- 3. Environmental objectives**
- 4. Provisions and principles**
- 5. Measures to promote SH**
- 6. Instruments to assist implementation and control of objectives**
- 7. Results: environmental objectives achieved?**
- 8. Conclusions**



1. Competent organisations and laws

- The 26 cantons have sovereign responsibility for the watercourses on their territory and apply the Federal Laws on:



- Protection of Waters (LEaux)
- Fishing (LFSP)
- Protection of Nature and the Landscape (LPN)

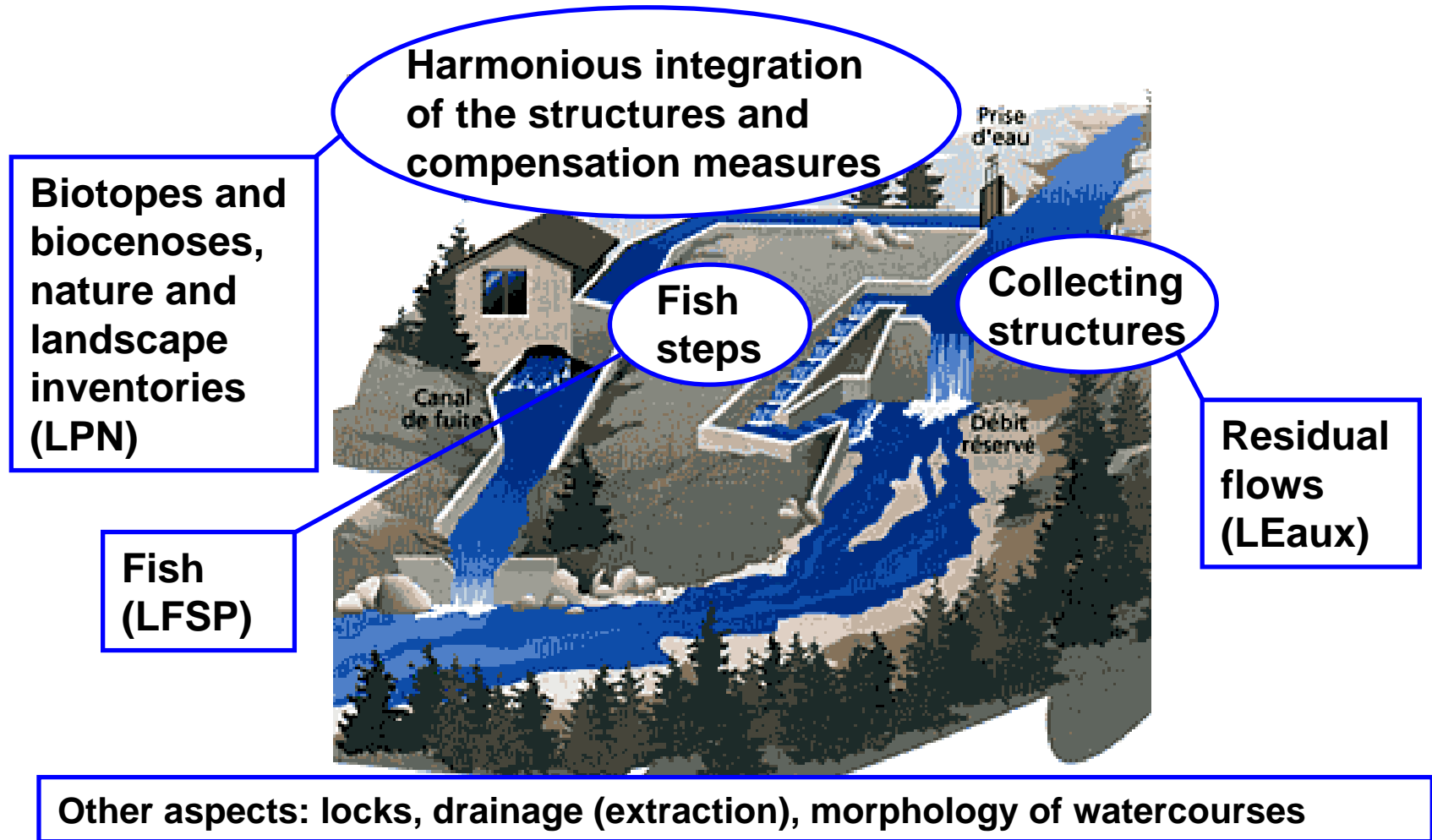
- The Swiss Confederation promulgates implementation provisions (ordinances, directives), supervises and coordinates homogeneous implementation of environmental legislation.

Competent Divisions of SAEFL:

- Water Protection
- Management of Species
- Nature and Landscape



2. SH and the environment



3. Environmental objectives

Protect water and nature against harmful effects
Maintain the health of persons, animals and plants



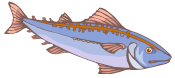
- **Safeguard the quality of surface waters**
- **Supply ground water resources (drinking water)**
- **Maintain water as an element of the landscape and for leisure purposes**



- **Maintain indigenous flora as well as biotopes (banks, reed beds, marshes, alluvial areas)**
- **Protect and maintain listed zones**



3. Environmental objectives



- **Maintain indigenous fauna**
- **Protect rare and endangered species (fish and crayfish) and their habitats (streams, banks, aquatic vegetation, and spawning grounds)**
- **Create favourable living conditions for aquatic fauna (water flow, morphology, temperature,...)**
- **Ensure free movement of fish**
- **Promote natural reproduction**
- **Prevent fish and crayfish losses and injuries due to construction and machinery**

Sources: LEaux: art 31; LFSP: art 5, art 7, art 9 (1); LPN: art 18 (1), art 18 1bis, art 18a-b





4. Provisions and principles

1. New concessions / installations:

- **LEaux (art 29-36):**
 1. Determination of the minimum residual water flow, calculated from rate of flow Q347 (art 31)
 2. Exceptions under conditions: e.g. water not suitable for fish reproduction, extraction above 1700 m.a.s.l. and rate of flow Q347 lower than 50 l/s (art 32)
 3. Weighing up public, economic and environmental interests (art 33)
- **LFSP (art 9):**

Measures in favour of aquatic fauna and habitats: e.g. fish steps





4. Provisions and principles

2. Current concessions / existing installations:

- **LEaux (art 80-83):**
 1. Redevelopment of water extraction without compensation (art 80 (1))
 2. More extensive redevelopment measures (listed zone) with compensation (art 80 (2))
- **LFSP (art 10):**

Measures in favour of aquatic fauna and habitats, economically acceptable



4. Provisions and principles

3. New and existing installations:

- **LPN (art 18 (1ter)): protection, reconstitution, replacement):**

To prevent, reduce and compensate impacts on biotopes

- **LPN (art 14 OPN):**

To create conditions necessary for the survival of indigenous wild fauna and flora



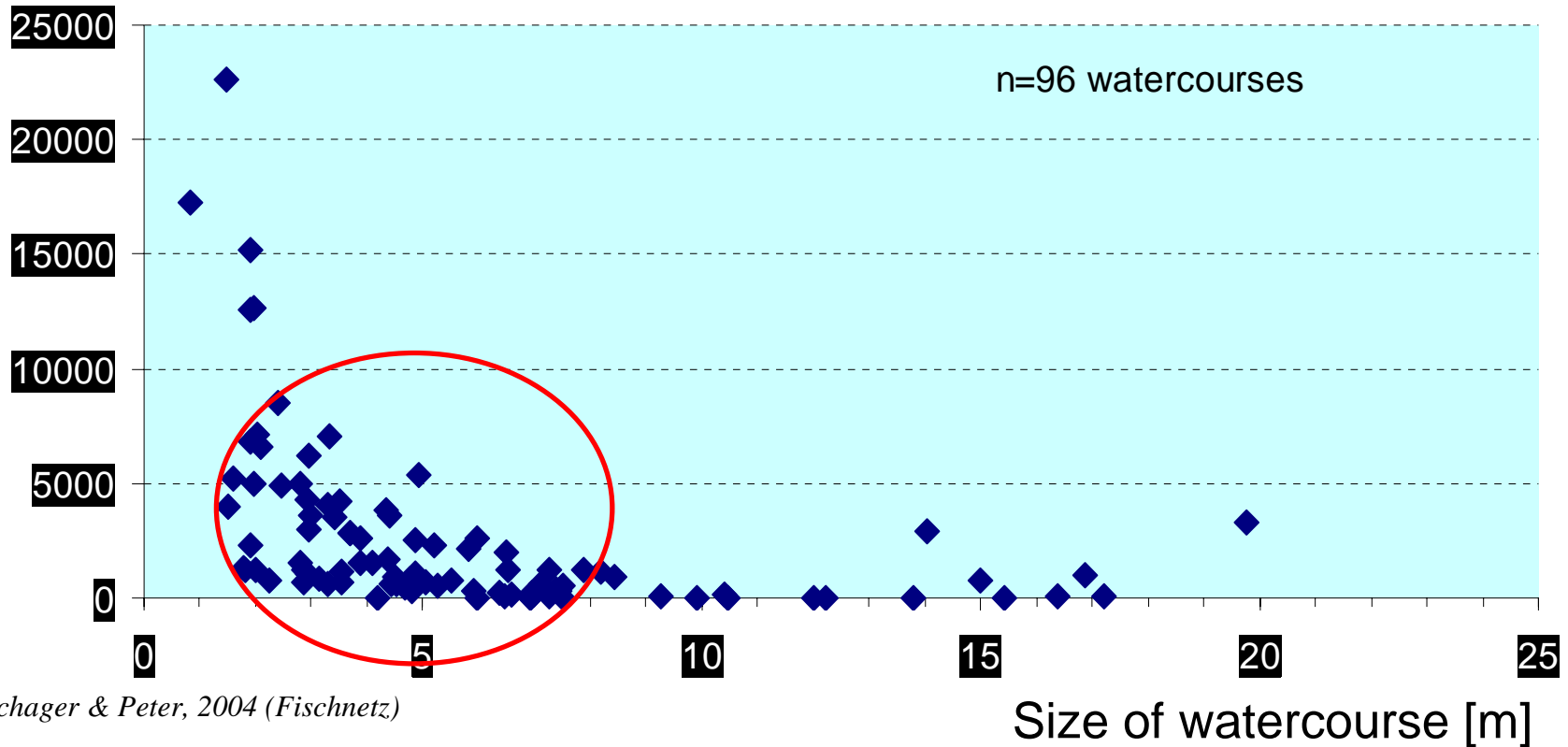
5. Measures to promote SH

- **Provisions on residual water flows do not apply to power stations:**
 - with no diversion of water,
 - using near-natural lateral watercourses,
 - using watercourses with non-permanent water flow,
 - whose concession is unlimited (only redevelopment)
- **No reduction in environmental requirements, but economic advantages, because small hydro-electric power stations ($P < 1$ MW) mainly affect small, ecologically important watercourses in the Central Plateau.**



Small ecologically important watercourses

Population density (yearling trout/ha)



Schager & Peter, 2004 (Fischnetz)



Swiss Agency for
the Environment,
Forests and
Landscape SAEFL

Swiss Water and Nature Policies and Small Hydropower



5. Measures to promote SH

Economic advantages ($P < 1$ MW) :

- Exemption from water charges (art 49 (4) LFH)
- Payment for generated power at suitable prices (art 7 (3-4) LEne)
- Subsidies: financial contributions to preliminary study for small power station projects
- Ecological labels

Possible combination: promotion-protection




6. Instruments to assist implementation and control of objectives:

- **Laws (LEaux, LFSP, LPN)**
- **Ordinances (OEaux, OLFP, OPN: Inventories)**
- **Directives (Environmental Impact Assessment, Adequate residual water flows, Redevelopment of water extraction, Sectorial Directives e.g. alluvial zones)**
- **Autorisations, consultations (e.g. art 35 (3) LEaux)**
- **Subsidies (redevelopment in listed zone,...)**

6. Instruments to assist implementation and control of objectives:

- **Monitoring of listed biotopes using biodiversity indicators; fish reproduction counting (hoop nets)**
- **Environmental databases (Invent, Ecogis,...), maps (Q347), measuring stations (SHN)**
- **Other: scientific studies, anglers, population**

7. Results: environmental objectives achieved?

 Residual water flows: what benefits for watercourses?
A scientific study of parameters (aquatic fauna, morphology, quantity and quality of water) for 8 watercourses



with adequate residual water flows proves the effectiveness of this measure.

Stretch of residual water flow compared with a similar natural section

	Watercourses	Canton
Watercourses below 1000 m.a.s.l.	Flembach	GR
	Vorderer Schächen	UR
Watercourses above 900 m.a.s.l.	Bockibach	UR
	Vièze	VS
	Aare, Interlaken	BE
	Aare, Bern	BE
	Schüss	BE
	Aabach	AG

Abiotic and biotic parameters in comparison with the reference						abiotic parameter in comp. with limit value		ecological functions of watercourse filled with existing resid. water flow?		
Qual. preservation fish fauna	Quant. preservation fish fauna	Flowdependent small animals	Morphology and structures	Qual./quant. preserv. small animals	Appearance	Min. depth for fish migration	phys./chem. water quality	largely ensured	partly ensured	not ensured
										(5)
(1)	(2)					(3)				
										(4)

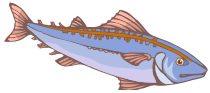
- No/small deviation
- Moderate deviation
- Marked deviation
- Impossible classification
- Parameter not studied

- (1) Strongly arranged watercourse
- (2) Feeding animal biomass not considered
- (3) Non fish water / lower residual flow
- (4) Harmful impact of a sewage plant
- (5) Infiltration in the stretch of residual flow

7. Results: environmental objectives achieved?



The listed zones are guarantors of biodiversity.



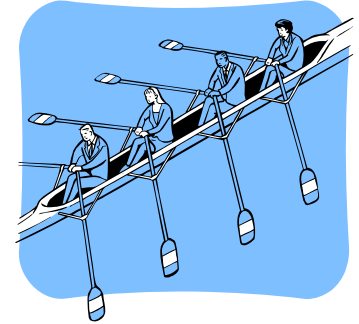
The Fischnetz project lists the multiple causes for the reduction in the quantity and quality of fish:

- strongly arranged watercourses**
- climate / temperature,**
- waste water, insufficient water flow,**
- lack of shelter (morphology),...**

But the LFSP is not called into question.



8. Conclusions



- **Legislation for waters and nature (LEaux 1991, LFSP 1991, LPN 1966-1998) is currently satisfactory**
- **Possible improvements in favour of watercourses: revitalisation, morphology, bedload regime, sluicing waters**
- **Adequate planning and consultation of responsible offices in order to prevent complications (prevention rather than cure)**
- **Objectives of the Confederation: promotion of hydropower (renewable) and respect for environmental requirements**

