

Salmon Monitoring on the upper Rhine – Return & Rivers colonisation -



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Since 1992 :

- Reintroduction of the atlantic salmon population in Alsace
- Restauration and Study of the migratory fishes in the French Rhine-Meuse basins



Financial and Technical Partner of the French Program :



Conseil Général
Haut-Rhin



20 Years on the Upper Rhine



From Iffezheim to Strasbourg and further...

Iffezheim 2000 –Gambsheim 2006



Exit



3 Entry

Video

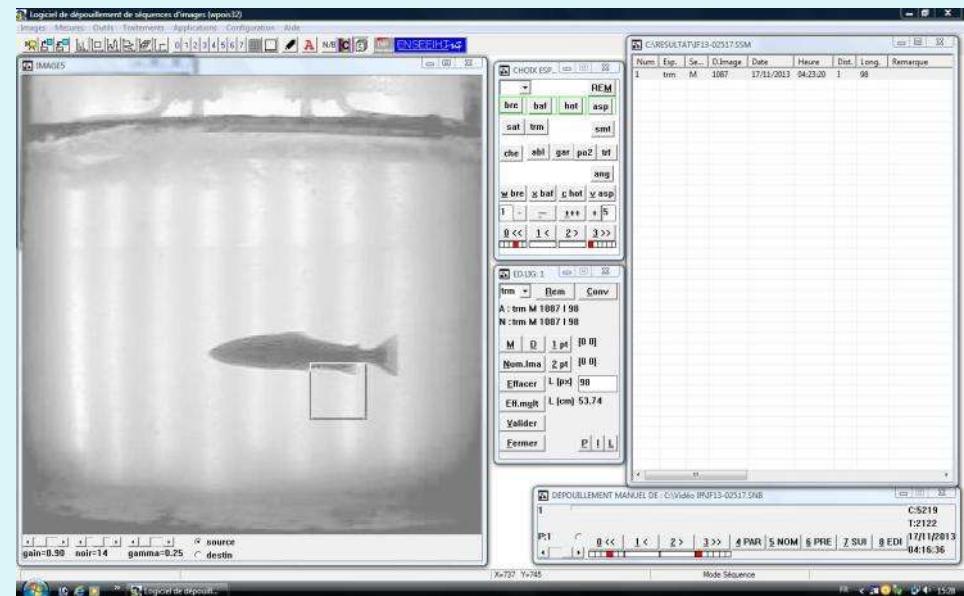
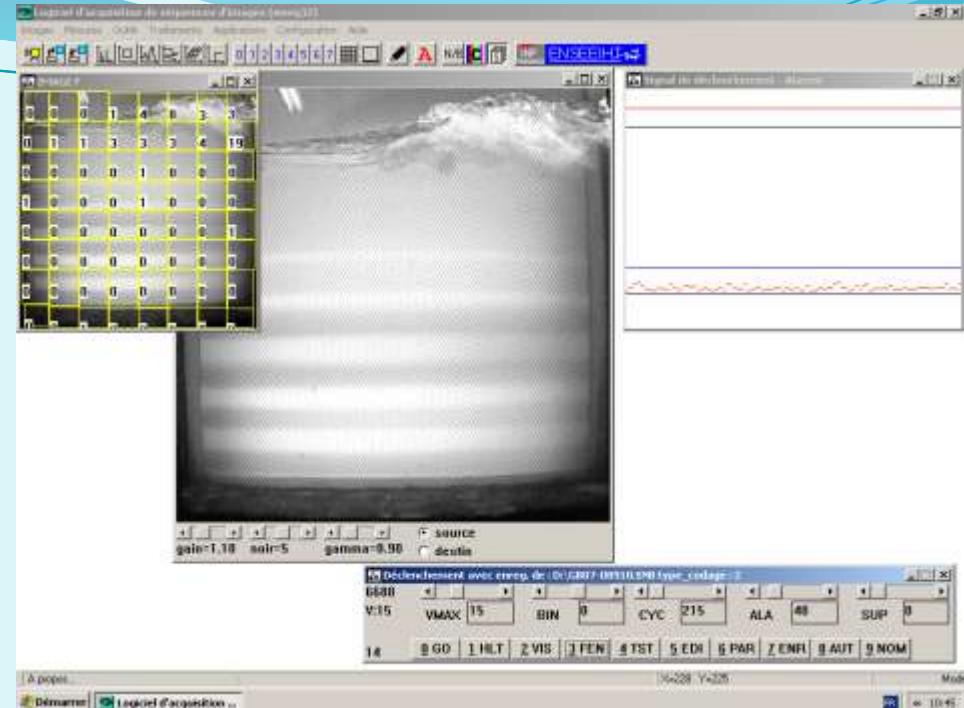


Catch system



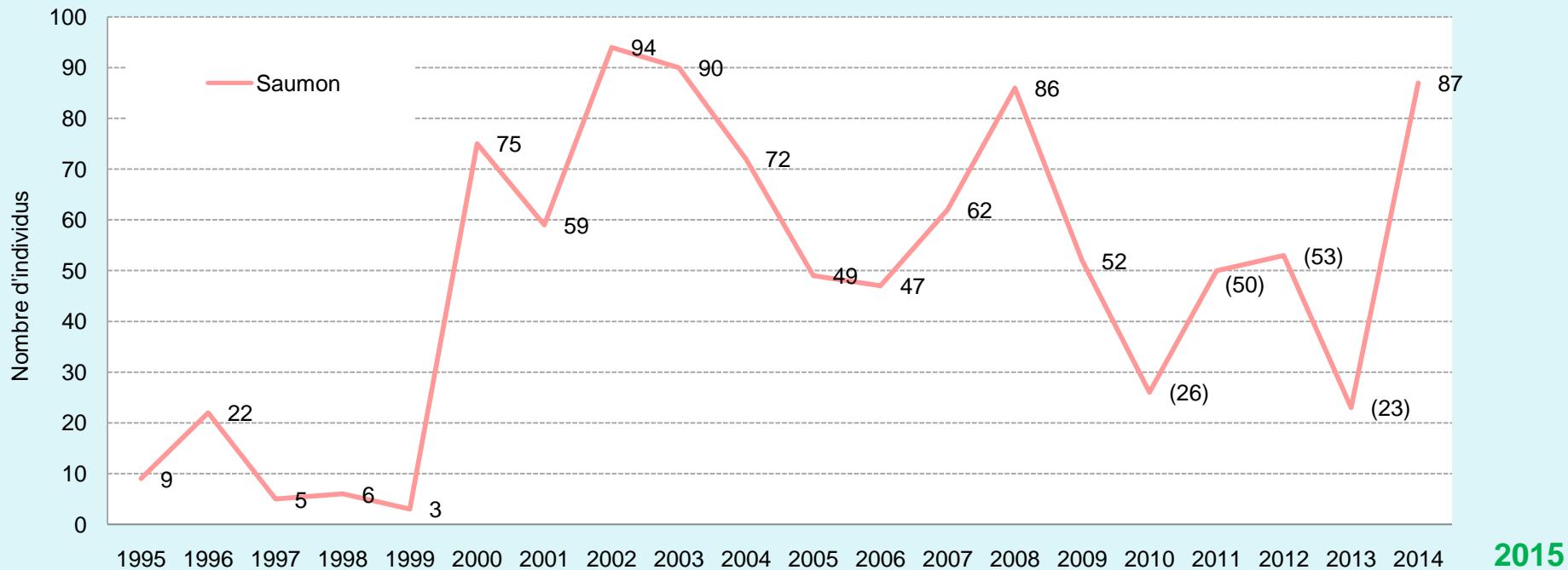
Video in operation

- 24h / 24h \approx 365 days / year
- Recording on detection
- Manual counting and species identification



Monitoring Results

198



- > Fluctuation depends on stocking strategy & environmental conditions (river and ocean)
- > 1995-2015, **more than 1000 salmon**s in the upper Rhine (French river, Rhine, other?)

Salmon's return : what happened in 2015 ?

> Record of the number of salmon observed to Iffezheim (198 end August)

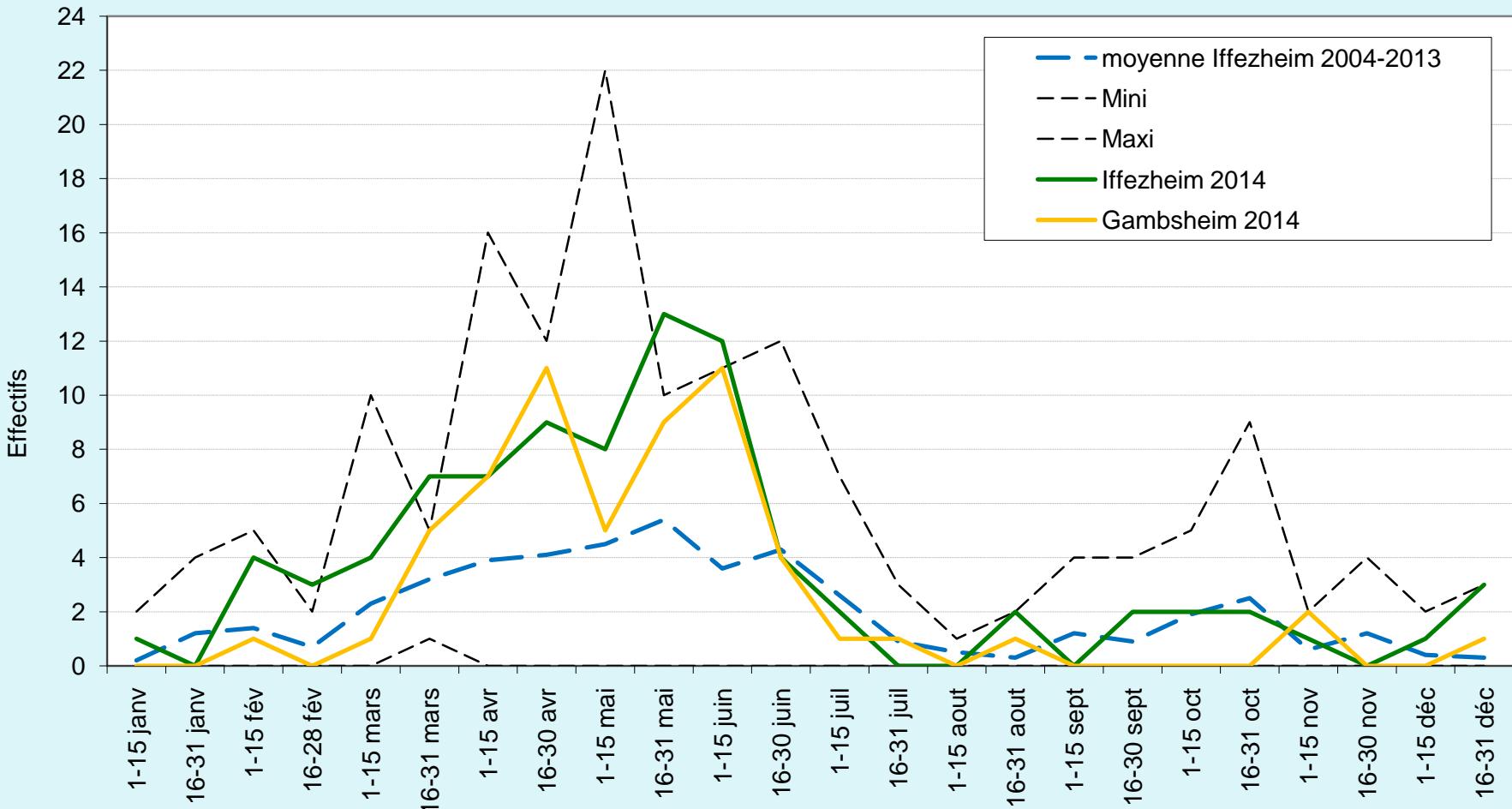
	Upper Rhine	Middle Rhine	Loire-Allier	Adour-Pyrénée	Bretagne
Mean value 5 Years	63		651	1460	
Maximum	94		1177	1788	
Year 2015	198		1238	2730	
Ratio Mean/2015	3,1	to soon	1,9	1,9	Stable

> Work, wait and see...



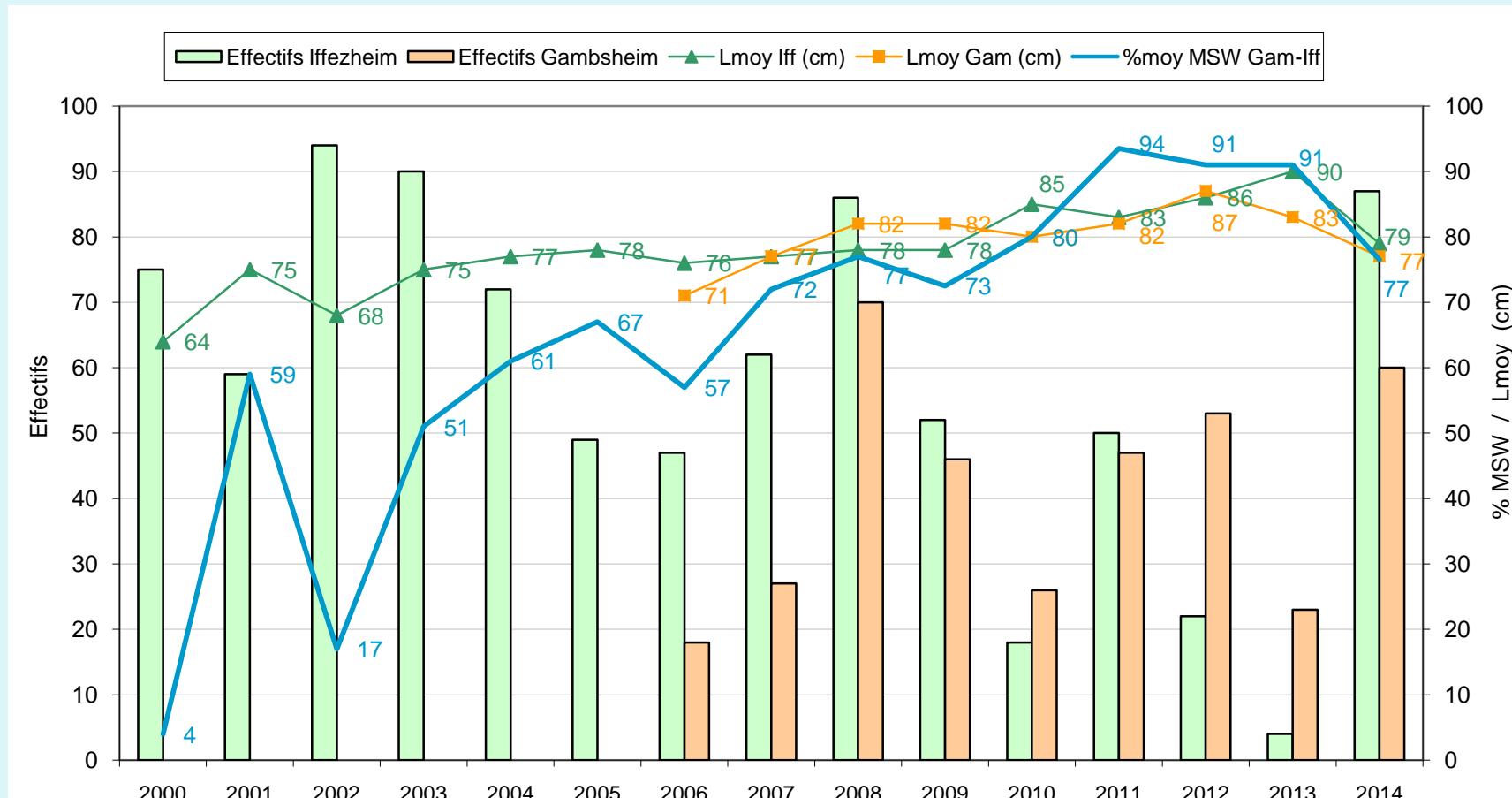
Some details about salmon results

Periodicity of Salmon Migration



More details about salmon results

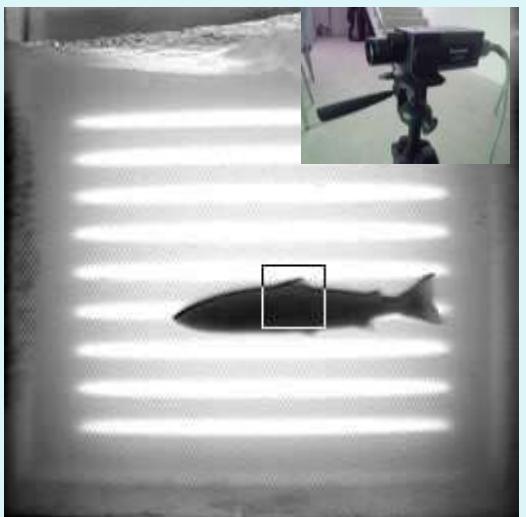
History and evolution of salmon's return



Gambsheim 2014 : 60 salmon

27% 1SW – Lmean = 70 cm ; 63% 2SW (73-87cm) – Lmean = 77 cm ; 10% 3SW – Lmean = 93 cm

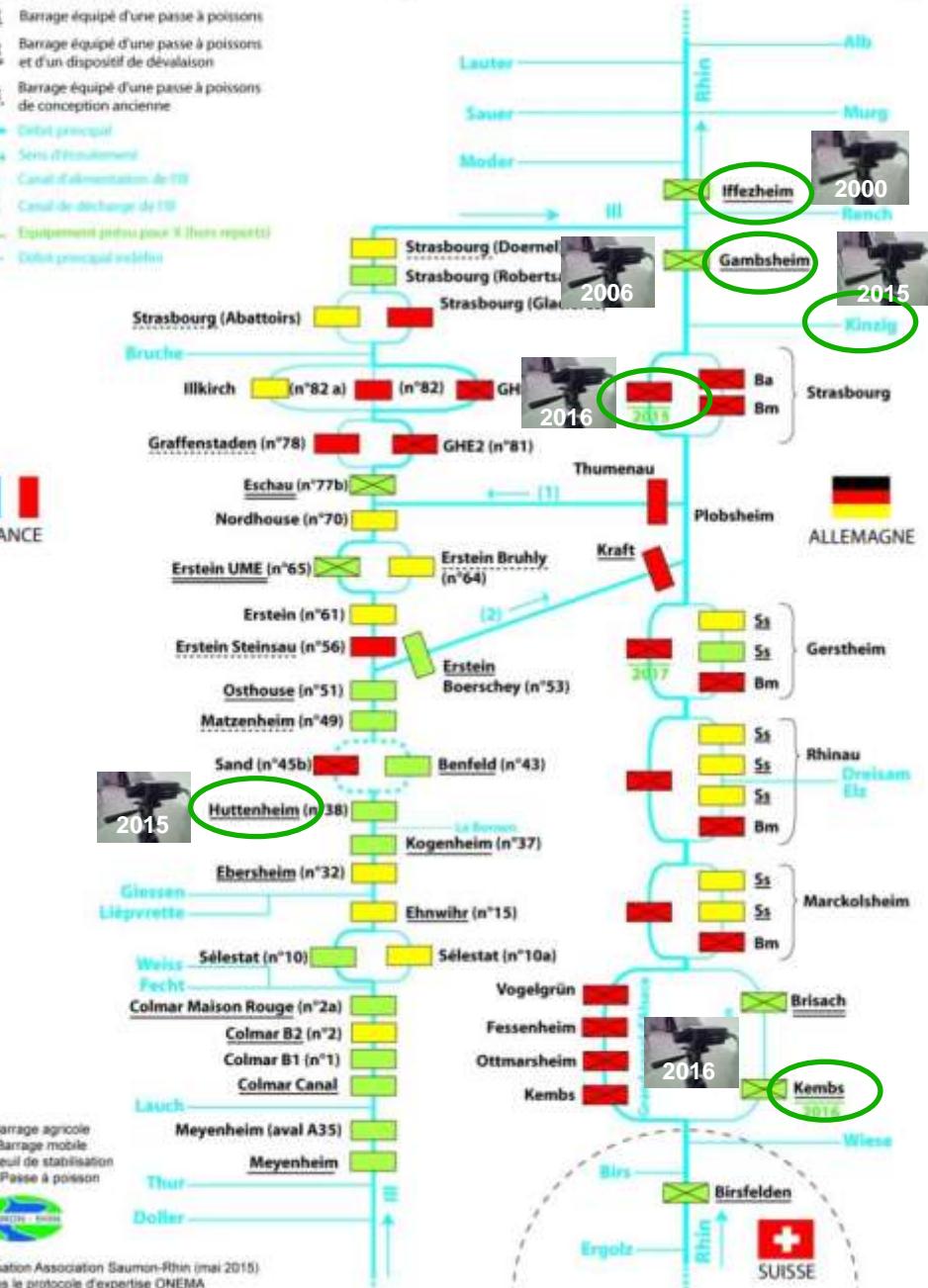
Upper Rhine Map and Video stations



- [Yellow box] Barrage franchisable
- [Yellow box] Barrage plus ou moins franchisable
- [Red box] Barrage infranchissable (hors conditions exceptionnelles)
- [Crossed-out box] Barrage hydroélectrique
- [Three crossed-out boxes] Barrage équipé d'une passe à poissons
- [Two crossed-out boxes] Barrage équipé d'une passe à poissons et d'un dispositif de dévalaison
- [One crossed-out box] Barrage équipé d'une passe à poissons de conception ancienne

- [Blue line] Débit principal
- [Blue arrow] Sens d'écoulement
- (1) Canal d'alimentation de l'Ill
- (2) Canal de décharge de l'Ill
- [Green line] Équipement prévue pour l'aller-retour
- [Dashed line] Débit principal avalin

Carte de franchissabilité des ouvrages hydrauliques transversaux pour les grands salmonidés migrateurs dans le sens de la montaison sur l'Ill et le Rhin
- Etat des lieux décembre 2013 -



Natural Reproduction : Monitoring methods

Prospecting Hot spot on foot almost daily
then realized by boat on all the accessible section



Electric fishing before stocking and genetic analyses

90 % of the **genetic analyses** show that salmons are related to the “Allier” origin



Natural Reproduction results

1995 & 1997 ponctual observations of natural reproduction in the river Bruche

Since 2000 reproduction every year on the Bruche

Improvement of the ecological continuity :

- Farther on the Bruche,
- Other river like Lauter, Moder, Ill...
- Fecht (since 2010)

In Germany too ... !



Others monitoring system – Fish Telemetry (ASR-EDF)

RFID/HDX transponder

Rhine - 3 Fishpass Iffezheim > Strasbourg

Rhine - Downstream Plan Breisach

III - Huttenheim (F)

Mosel – Fishpass Koblenz (D)

And more ... ?



Nedap technology (NL) :

8 stations Iffezheim > Kembs

≈ 30 Rhine Delta (NL)



RFID/HDX transponder



Small Tag (23 or 32 mm – 0,3 or 0,5 g – Ø3 mm) - Low cost > But short distance of detection

Different studies :

- Iffezheim to Gambsheim : Duration of the migration and choice of the fishpass entry (migratory salmonids)
- Gambsheim : Test fishpass entry attractivities and crossing (barbel, bream, eel...)
- Huttenheim : Comparison of the type of passes for eel
- Brisach : Salmon smolts and silver eel migration through downstream plan

Nedap station

(Big Tag : P : 26,5 g - L : 62 mm - Ø : 15 mm)

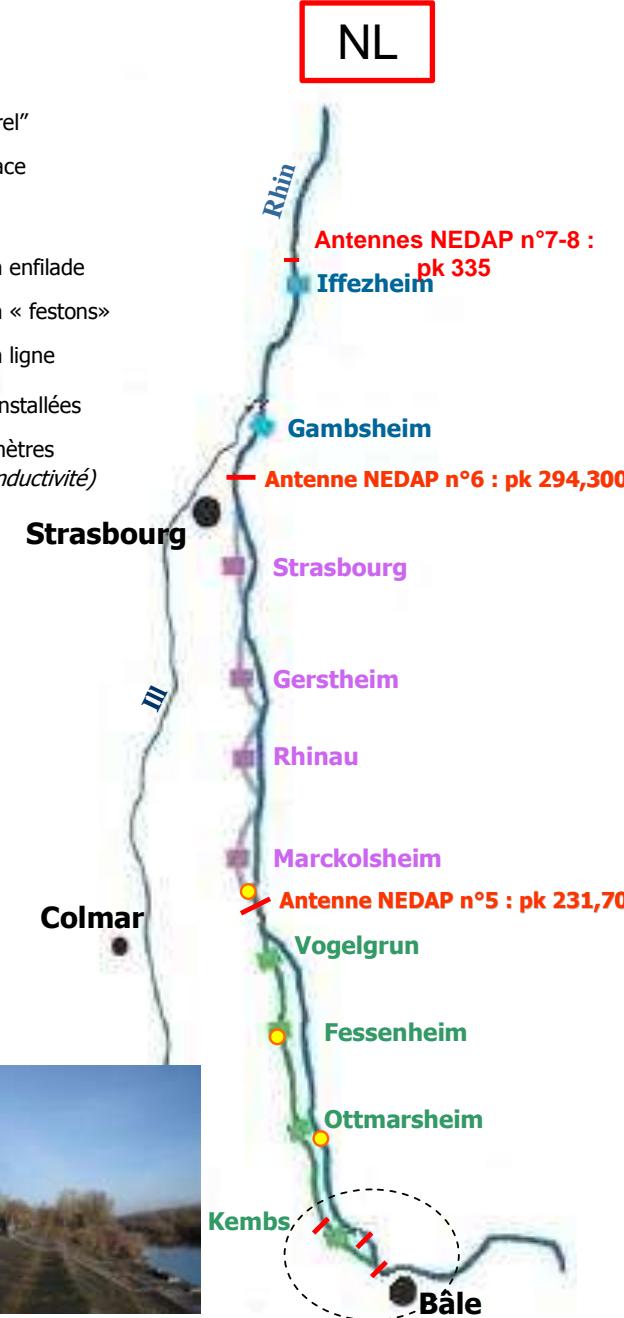
Aim : Study of the migratory rhythms of the silvery eel and the ways of crossing of the hydraulic arrangements

- 2010-2014 : ≈ 900 eel
- About 30 detected in NL > 3%
- Downstream migration duration between 13 days and more than 1 year

> Maybe use for salmon ?

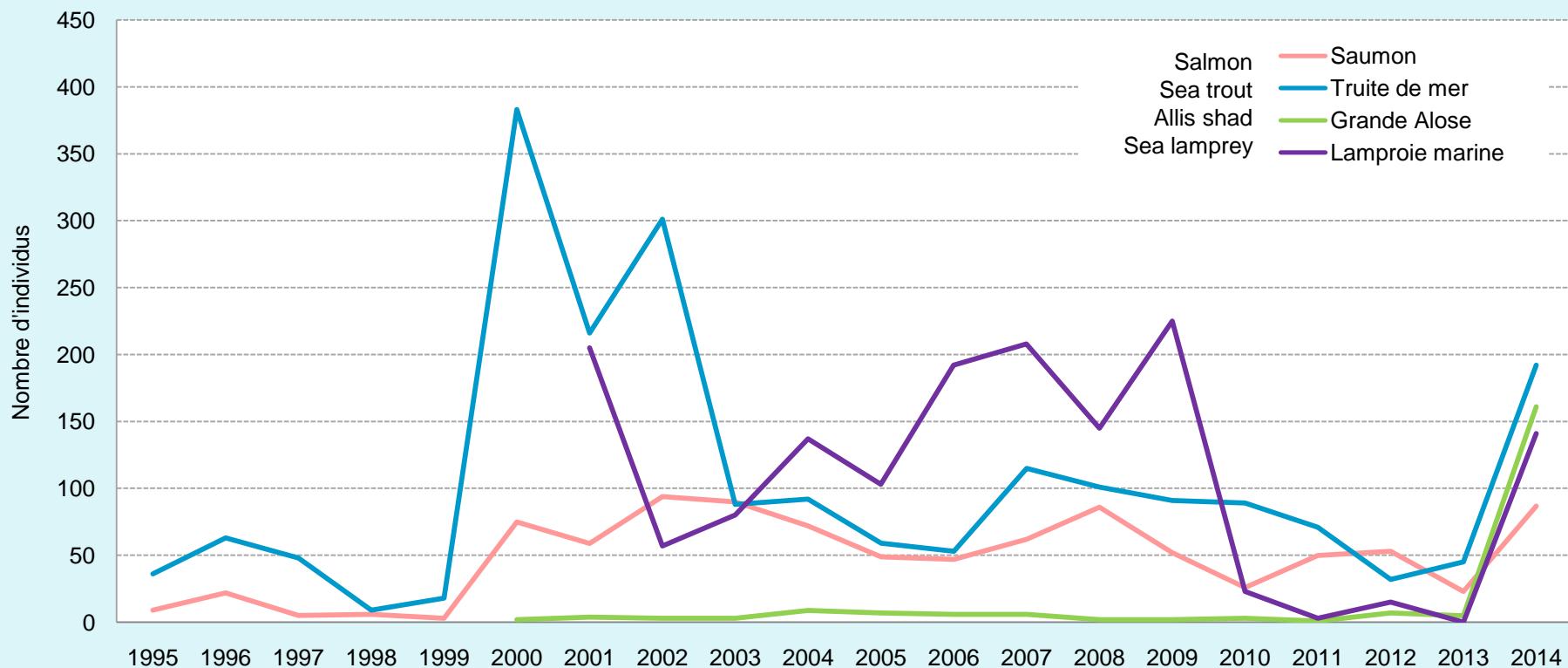


- Cours d'eau "naturel"
- Grand Canal d'Alsace
- Déviation du Rhin
- Aménagements en enfilade
- Aménagements en « festons »
- Aménagements en ligne
- Antennes NEDAP installées
- Sonde multi-paramètres ($T^\circ C$, turbidité, conductivité)



Conclusion : Salmon Symbol

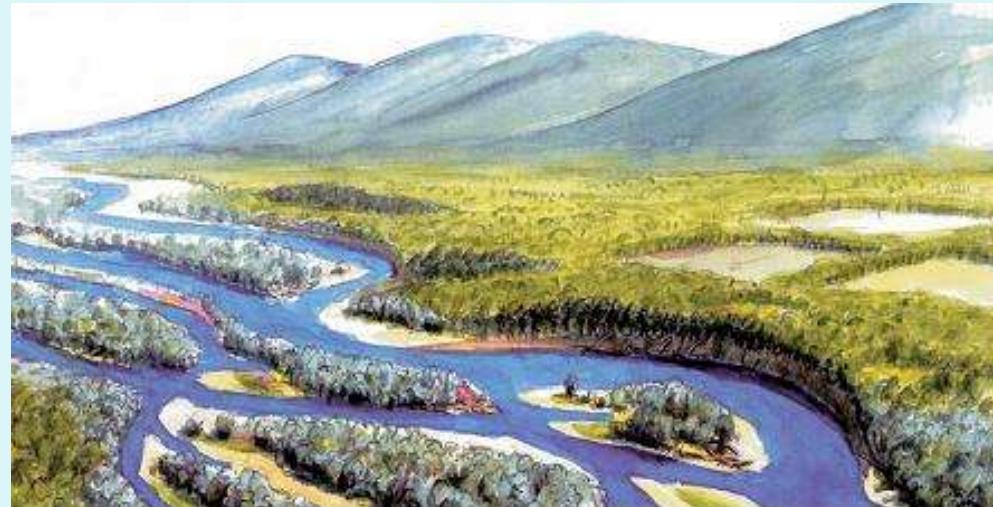
- Success of salmon's comeback on the upper Rhine
- Return of other migratory fishes



- More than 30 species observed through Rhine video station
- about 40 000 fishes / year

Conclusion : a success but not enough

- Ecological continuity improves (slowly) but the problem of downstream mortalities is not yet solved (eel number upper rhine 25 000 > 7 000 / year)
- Number of salmon returners is still not enough for the species sustainability



Salmon comeback & Migratory fish protection

Yes, together we can !



2015 : First salmon seen on
Video station Huttenheim - ILL