Interreg Sudoe

EUROPEAN UNION

SUDOANG

Example of the French approach for the dam and HP data base.

Karl KREUTZENBERGER, Laurent BEAULATON & Pierre SAGNES
French Agency for Biodiversity (AFB)

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE

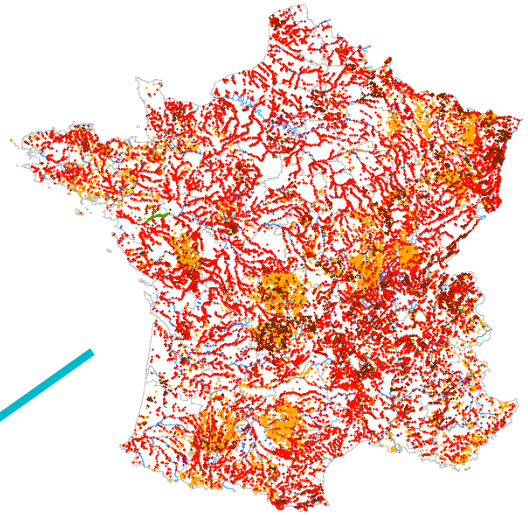
MINISTÈRE DE LA TRANSITION ÉCOLOGIQUE ET SOLIDAIRE

AGENCE FRANÇAISE POUR LA BIODIVERSITÉ
ÉTABLISSEMENT PUBLIC DE L'ÉTAT

Knowledge of instream barriers

Impact on temperature

Impact on river morphology and habitat quality



Impact on sediment transport

Impact on movements of the aquatic wildlife
Including eels

Impact on chemistry and pollutant storage

Impact on hydrology

AGENCE FRANÇAISE POUR LA BIODIVERSITÉ
ÉTABLISSEMENT PUBLIC DE L'ÉTAT

SUDOANG

Knowledge of instream barriers

- Many regulatory requirements
- Many involved actors
- Very different issues depending on the context

Need a common and shared data repository (reference dataset):

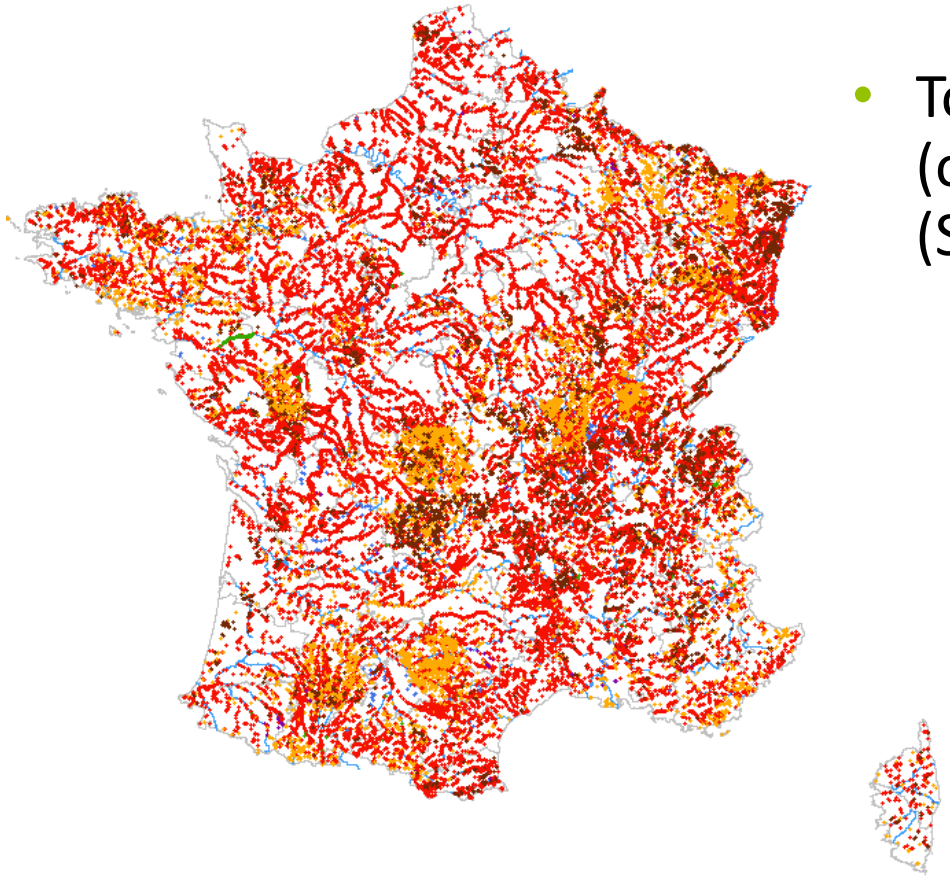
ROE (« Référentiel des Obstacles à l'Ecoulement »)

Need a harmonized evaluation method to assess the upstream passage of fish:

ICE (« Informations sur la Continuité Ecologique »)

SUDOANG

ROE: Why ?



- To have a national catalog on the instream barriers (obstacles) within the Water Information System (SIE) allowing to:
  - **Identify** obstacles
  - **Publish** a common information
  - Share this information to other informatic systems for a specific work: **interoperability**

AGENCE FRANÇAISE POUR LA BIODIVERSITÉ
ÉTABLISSEMENT PUBLIC DE L'ÉTAT

SUDOANG

ROE: Difficulties ?

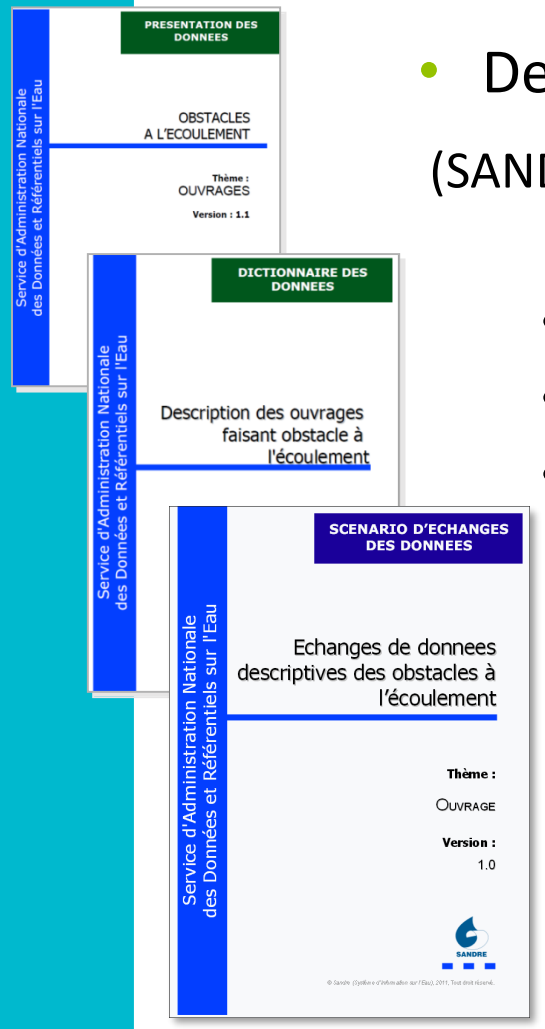
- However, many databases referencing instream barriers (obstacles)
  - Designed by operators **for their own and different needs** (ecology, hydroelectricity, navigation, *etc.*)
  - **Heterogeneity** (structure of database, codification, *etc.*)

→ **National standardized and centralized database : the « ROE »**

AGENCE FRANÇAISE POUR LA BIODIVERSITÉ
ÉTABLISSEMENT PUBLIC DE L'ÉTAT

SUDOANG

ROE: How ?



- Development of « SANDRE » reference documents for separate targets

(SANDRE : French National Service for Water Data and Reference Datasets Management)

- Presentation of the data: actors in the water field
- Data dictionary: actors implementing a system on this theme
- Scenarios of data exchanges: computer scientists

→ **Setting the dataset attributes**

Mandatory attributes

- Name of obstacle
- Location
- Type
- State

Optional attributes

- Sub-type
- Estimation of the height of the structure
- *Etc.*

AGENCE FRANÇAISE POUR LA BIODIVERSITÉ
ÉTABLISSEMENT PUBLIC DE L'ÉTAT

SUDOANG

ROE: How ?

- **Constitution of the initial plinth of data**
- Compilation of about **thirty databases of different origins**

➡ **Duplicates**

Obstacles that do not meet the dataset requirements

Etc.

Inventaires	Nombre d'ouvrages recensés
Agence de l'eau Adour Garonne	1461
Agence de l'eau Artois Picardie	1863
Agence de l'eau Loire Bretagne	11903
Agence de l'eau Seine Normandie	1651
Association Migado	532
Bardigues	448
Base AREA RMC	12106
Base AREA Seine Normandie	5370
Base CATER Seine Normandie	1589
Bd Carthage	5528
CG 67	230
DEAL Martinique	383
DEAL Réunion	134
EPTB-Charente	502
Hydratec Seine Normandie	189
Onema base Adour-Garonne	2336
Onema base Bretagne	1806
Onema base Loire	3719
Onema base Rhin-Meuse	3478
Onema DIR 9, affluents de l'Ouche	138
Onema DIR8 Obstacles Migrateurs RMC	186
Onema DR5 base Rhône-affluents	1375
Onema PGA du bassin Seine-Normandie, ouvrages sur ZAP	409
Potentiel hydroélectrique AE Loire Bretagne	893
Potentiel hydroélectrique Meuse	125
Potentiel hydroélectrique Rhin	416
PRN MORVAN, affluents du Cousin	56
SD 79	594
SDVP 67	823
SDVP 71	1612
SIOUH	4552
VNF	1674

ROE Descriptif de contenu v3 Onema, mai 2012

AGENCE FRANÇAISE POUR LA BIODIVERSITÉ
ÉTABLISSEMENT PUBLIC DE L'ÉTAT

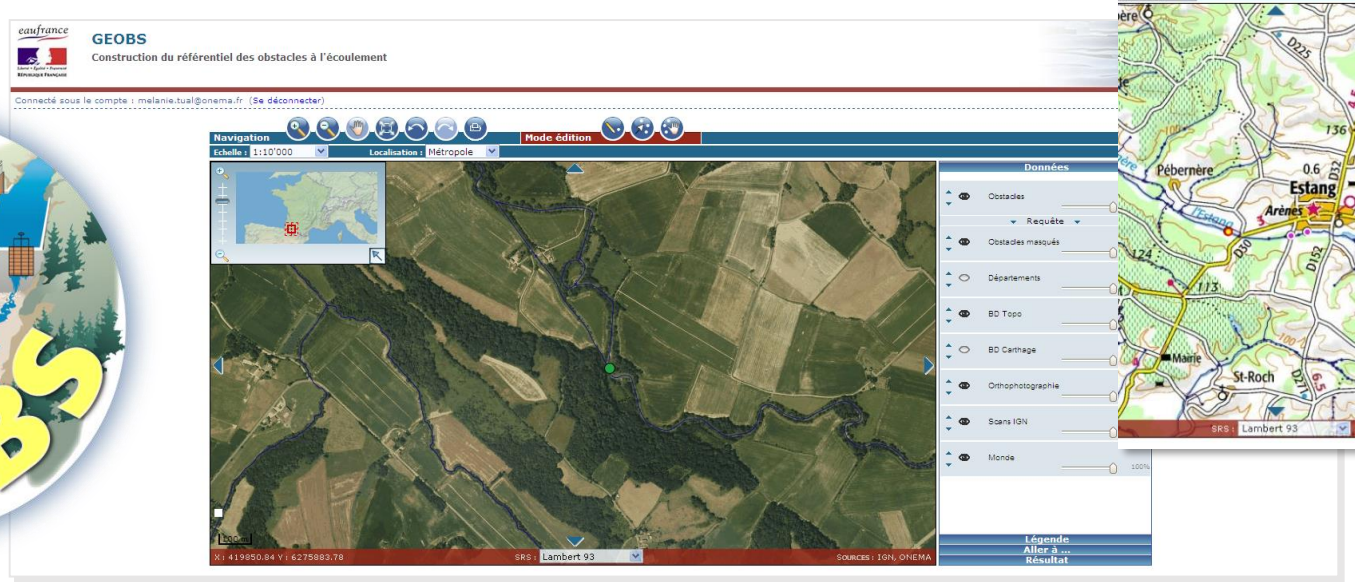
SUDOANG

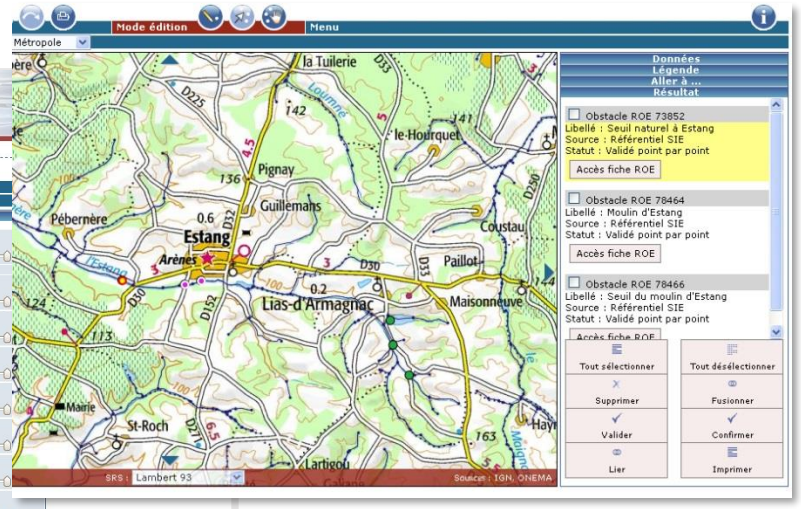
ROE: How ?

- **Creation of an adapted web tool: GéObs**

✓ Partnership BRGM-AFB

✓ **GéObs** (for « **Géo**référenceur des **Obs**ervations »)





AGENCE FRANÇAISE POUR LA BIODIVERSITÉ
ÉTABLISSEMENT PUBLIC DE L'ÉTAT

SUDOANG

ROE: How ?

- **Data quality**

✓ Realized by the territorial services of AFB + Trained partners in data collection 

✓ Consists of:

  - **Merge** identical obstacles
  - **Check** the geographical location of obstacles - Precisely **reposition** 
  - **Check / complete** the information requested in the ROE 
  - **Delete informations that do not need to be in the dataset** (natural obstacles for example)
  - **Expand the dataset** 

AGENCE FRANÇAISE POUR LA BIODIVERSITÉ
ÉTABLISSEMENT PUBLIC DE L'ÉTAT

SUDOANG

ROE: How ?

- **Data validation**

✓ Only realized by the territorial services of AFB

✓ Different status of validation

Untreated obstacles ➡ **No ROE code**

Treated obstacles ➡ **Unique ROE code**

- **« Reference in progress » or « Partner pending »**

Modified but have not yet passed the validation step

- **« Validated in reference dataset »**
- **« Frozen »** 

Obstacles with ROE code that have been removed from the database.

No reuse of the unique code.

AGENCE FRANÇAISE POUR LA BIODIVERSITÉ
ÉTABLISSEMENT PUBLIC DE L'ÉTAT

SUDOANG

ROE: Publishing ?

- **Real time extraction (SANDRE website)**

✓ Access to validated and frozen data

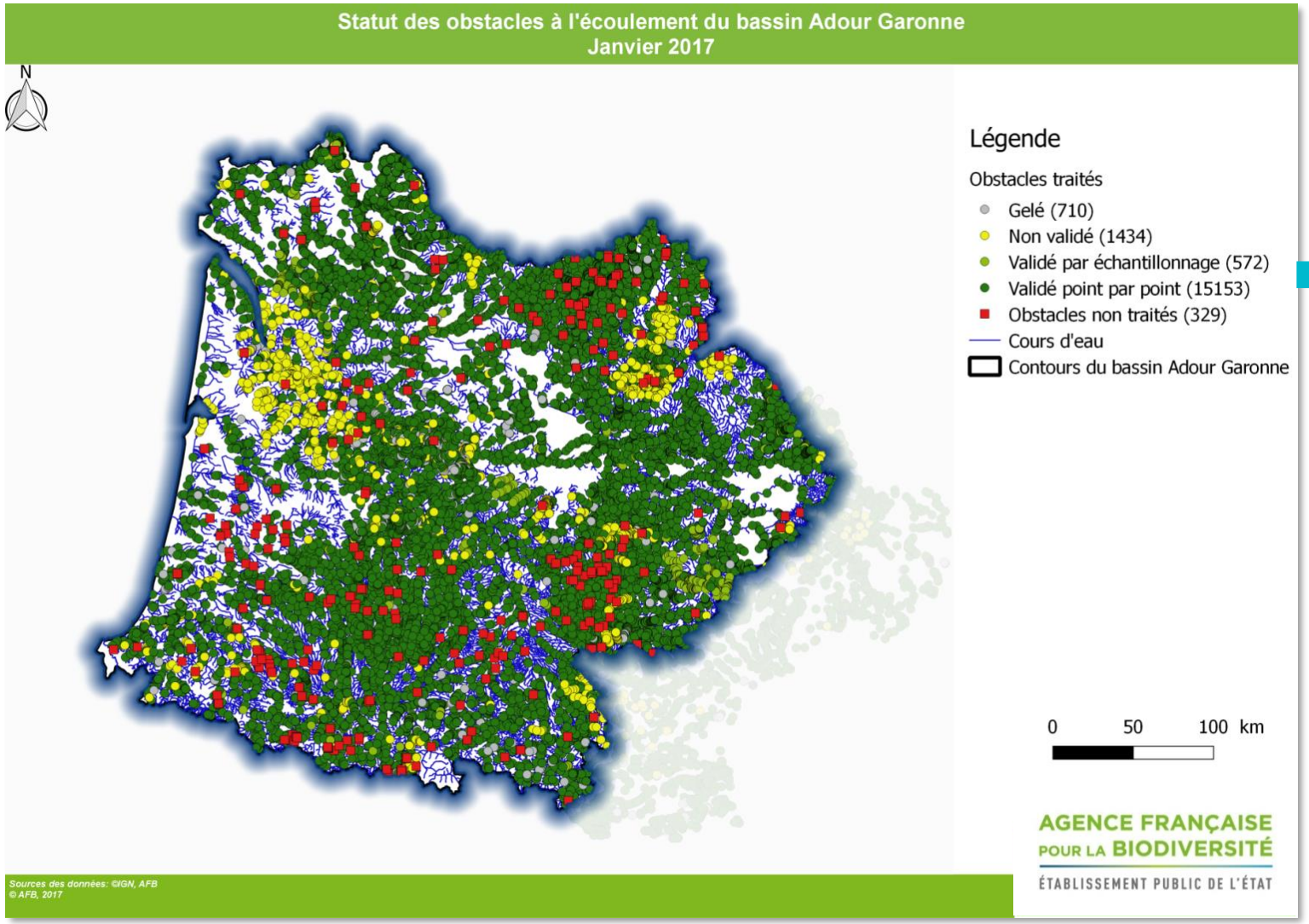
✓ Updated and interoperable version

✓ Different types of export: WMS/WFS, xml, csv, ESRI *etc…*

AGENCE FRANÇAISE POUR LA BIODIVERSITÉ
ÉTABLISSEMENT PUBLIC DE L'ÉTAT

SUDOANG

ROE: Recent situation in Adour Garonne basin



More than 16 000 validated obstacles for this basin

More than

100 000

validated obstacles at national level

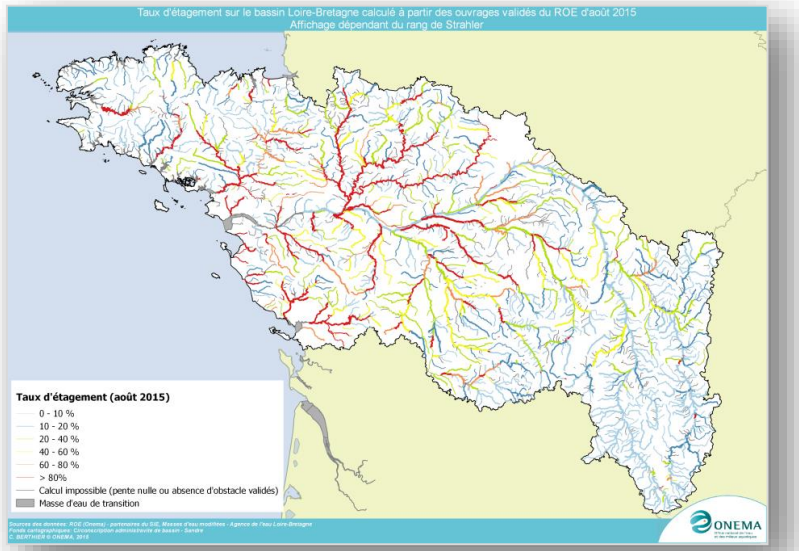
SUDOANG

Methodological convergence ROE-ICE

Example: Linking continuity alterations and impacts on biology

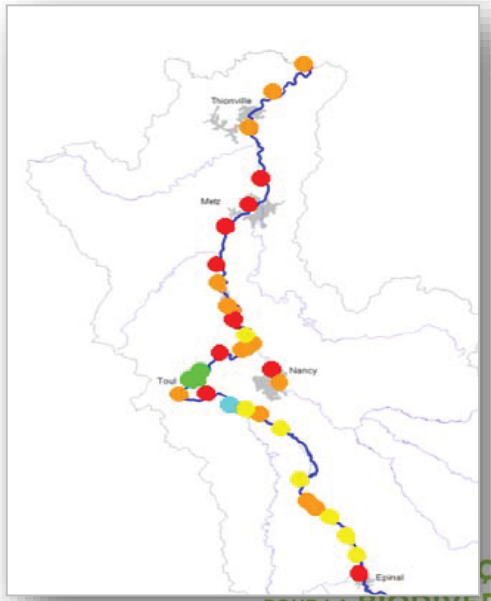
Watershed scale assessment

Gradient alteration & linear pressures



Reach scale assessment

Assessment of damming of rivers which prevents upstream passage of fish



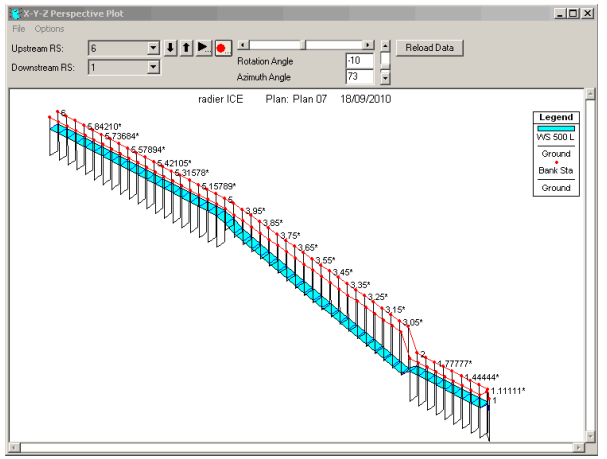
ÇAISE POUR LA BIODIVERSITÉ
ÉTABLISSEMENT PUBLIC DE L'ÉTAT

SUDOANG

ICE: Assessment of damming of rivers which prevents upstream passage of fish

Capabilities of swimming and jump (or others specifics abilities)

X



Geometry and hydraulic conditions at the level of instream barrier

Indicators (passability classes) for each species group

AGENCE FRANÇAISE POUR LA BIODIVERSITÉ
ÉTABLISSEMENT PUBLIC DE L'ÉTAT

SUDOANG

ICE: Definition of passability classes

- **Total barrier** (ICE class = 0)
- **High-impact partial barrier** (ICE class = 0,33)
- **Medium-impact partial barrier** (ICE class = 0,66)
- **Low-impact passable barrier** (ICE class = 1)
- **Barrier having indeterminate impact** (ICE class = NC)

AGENCE FRANÇAISE POUR LA BIODIVERSITÉ
ÉTABLISSEMENT PUBLIC DE L'ÉTAT

SUDOANG

ICE: For which type(s) of barriers ?

Vertical, subvertical or inclined obstacles, rock weirs, obstacles with equipped with moving parts, road or rail structures, complex configurations comprising a succession of inclined sections and other, more or less vertical sections

© Crédit photos : B.Voegtlé (Ecogea)

➔ no diagnosis for downstream migration

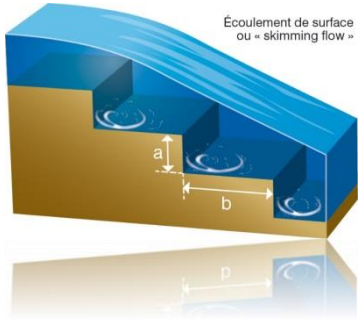
AGENCE FRANÇAISE POUR LA BIODIVERSITÉ
ÉTABLISSEMENT PUBLIC DE L'ÉTAT

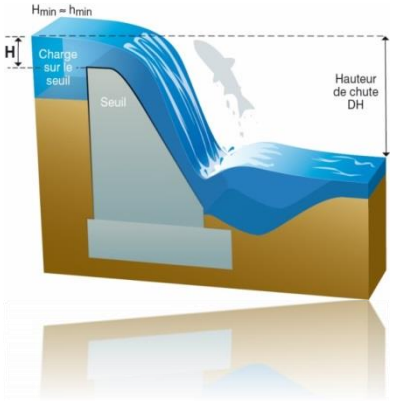
SUDOANG

ICE: How ?

Recurrent and essential parameters representative of the hydraulic configuration of each obstacle

- Head-drop
- Overflow height for an overflow chute, a notch or a gate
- Depth of the water in the plunge pool at the foot of an obstacle
- Slope
- Flow velocity of water
- *Etc …*



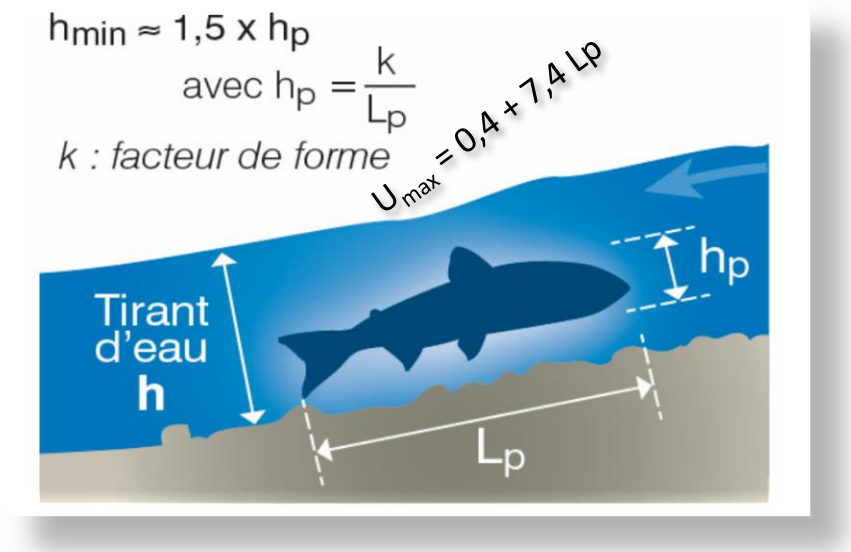


AGENCE FRANÇAISE POUR LA BIODIVERSITÉ
ÉTABLISSEMENT PUBLIC DE L'ÉTAT

SUDOANG

ICE: How ?
Species capabilities

Swimming activities: a necessary need for water and differentiated skills according to species



- **Cruising activity**
- **Sprint activity**
- **Sustained intermediate activity**

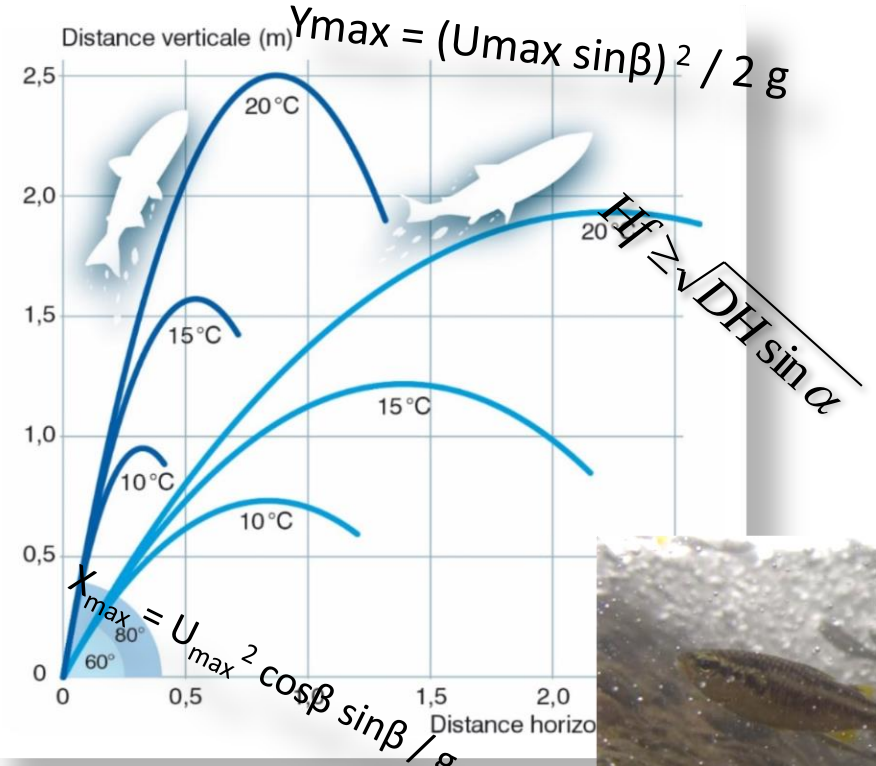
An experimental swimming speed approach correlated with in situ observation (Videler, 1993)

AGENCE FRANÇAISE POUR LA BIODIVERSITÉ
ÉTABLISSEMENT PUBLIC DE L'ÉTAT

SUDOANG

ICE: How ?
Species capabilities

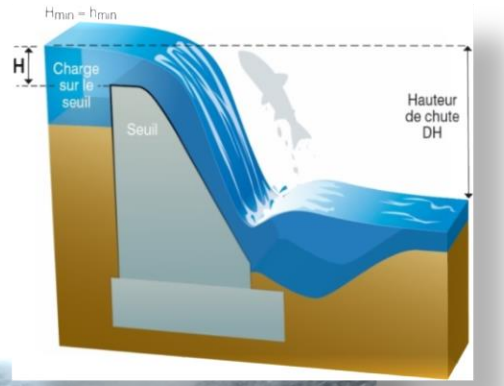
The jump: a ballistic approach



$$Ymax = (Umax \sin\beta)^2 / 2g$$

$$Hf \geq \sqrt{DH \sin\alpha}$$

$$X_{max} = U_{max}^2 \cos\beta \sin\beta / g$$



© Crédit photos : P. Valade (Ocea Consult')

AGENCE FRANÇAISE POUR LA BIODIVERSITÉ
ÉTABLISSEMENT PUBLIC DE L'ÉTAT

SUDOANG

ICE: How ?
Species capabilities

Specific abilities (crawling, suction effect etc…)

© Crédit photos : B.Voegtlé (Ecogea)

Focus on crawling → Low draught, slope, substrate water supply, lenght to cross → Use of surface tension created by the contact between their bodies and the wet wall to counteract the force of gravity

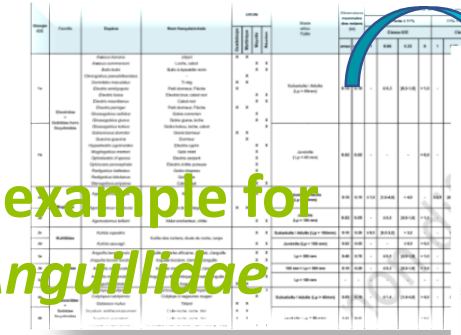
AGENCE FRANÇAISE POUR LA BIODIVERSITÉ
ÉTABLISSEMENT PUBLIC DE L'ÉTAT

SUDOANG

ICE: The assessment

For the use of ICE method, the different species have been grouped according to their capacities

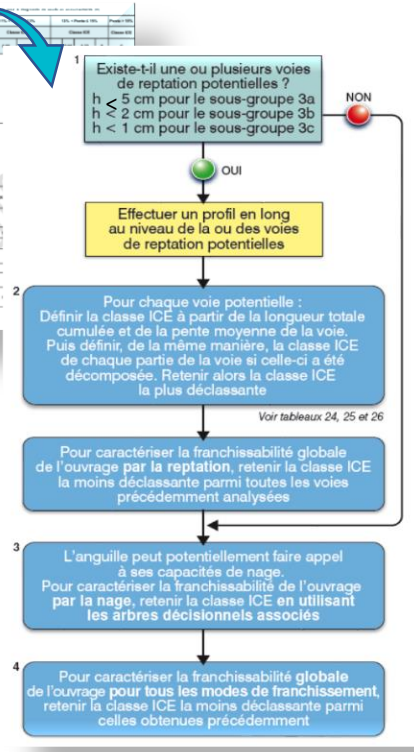
Finally, creation of 16 species groups (with some subdivisions), more than forty comparison tables and several decision trees to produce the indicators



An example for *Anguillidae*

(for the French overseas departments, islands)

© Crédit photos : B.Voegtlé (Ecogea)



- Identification of the passageways for the crawling
- Comparison slope profile *vs* distance to be crossed
- Scoring of each passageway
- Characterization for other capacities (swimming)
- Final scoring

AGENCE FRANÇAISE POUR LA BIODIVERSITÉ
ÉTABLISSEMENT PUBLIC DE L'ÉTAT

SUDOANG

ICE: Banking of various data

Description of:

Vertical, subvertical or inclined obstacles, rock weirs, obstacles with equipped with moving parts, road or rail structures, complex configurations comprising a succession of inclined sections and other, more or less vertical sections

+ tidal gates
+ downstream facilities
+ fish passage devices

no diagnosis of fish passage efficiency

AGENCE FRANÇAISE POUR LA BIODIVERSITÉ
ÉTABLISSEMENT PUBLIC DE L'ÉTAT

SUDOANG

Construction of ROE and ICE projects

2008 : Creation of the National Hydromorphology WG (AFB, Water Agencies, Ministry, research teams)

2008 : Creation of the sub ICE WG validated by the National Hydromorphology WG

2008-2009 : 1st ICE tests and construction of GeObs (censuses of the bases partners for the ROE)

2009 : 1st results

→ Sediment transport = **Problems of robustness of indicators requiring the continuation of R&D work**

→ Migration of aquatic organisms = **Focus on the fishes, group for which continuity requirements are best documented and knowledge strongest**

SUDOANG

Construction of ROE and ICE projects

2010 : the works of the ICE WG focused on the construction of a simple and robust protocol, ensuring a wide deployment on the territory. Opening of GeObs for the construction of the ROE

2010-2011 : Agreements « AFB-University of Liege » and « AFB-ECOGEA » for scientific support and writing

2011-2013 : Methodological works on ICE and *in situ* tests to calibrate the concepts, the implementation and to anticipate the operational transfer

2014 : Edition of reference guides and transfer to operators, implementation of the training cycle, start of the development to integrate the ICE module in GeObs

2017 and *after* : Final integration of the ICE module in GeObs to store the eponym dataset and automatically produce the assessments. Methodological transfer to French overseas territories (***in press***)

SUDOANG

Project co-financed by the INTERREG SUDOE Programme
through the European Regional Development Fund (ERDF)

www.sudoang.eu