1 - METHOD BACKGROUND			
NAME OR CODE			**ROE & ICE - Référentiel national des Obstacles à l'Ecoulement & Information sur la Continuité Ecologique**
COUNTRY			France
KEY REFERENCE			Onema (2010)
WEBPAGE			http://www.eaufrance.fr/spip.php?rubrique87/
CATEGORY			ROE makes an inventory of available info on longitudinal barriers and homogenizes available data; ICE collects data to assess the longitudinal continuity for fish communities
2 - METHOD CHARACTERISTICS			
A - SOURCE OF INFORMATION / DATA COLLECTION		Maps/Remote sensing	ROE is widely based on cartographic data and maps
		Field survey	ICE protocol is a field survey protocol to collect data on barrier characteristics and general physical channel characters
		Rapid field assessment	NOT APPLICABLE
		Existing database	To build the ROE, the authors first collected data coming from different national and local organizations. The application of the protocol ICE needs to collect bibliographic and existent data on fish species and communities (size, swim velocity, jumping capability, etc.)
		Modelling	Models are used to build decision trees helpful to support the assessment of the barrier passability
B - SPATIAL SCALE	HIERACHICAL SPATIAL SCALE	River catchment/Water body/ Reach/Cross Section	ROE inventories barriers at national scale; ICE protocol collects data at the local scale (single barrier); data from both systems can be coupled to carry out analysis at several scales (reach, single water body, catchment, region, etc.)
		Fixed length	NOT APPLICABLE
	LONGITUDINAL SPATIAL SCALE	Scaled to channel width	NOT APPLICABLE
		Variable length	ROE inventories barriers to longitudinal continuity at the national scale. ICE measures barrier characteristics at single barrier scale and for all the impacted reach length (it depends on barrier type and size)
	LATERAL SPATIAL SCALE	Channel	Both protocols focus only on channel artificial structures; ICE collects some general info on channel morphology
		Banks/Riparian zones	NOT APPLICABLE
		Floodplain	NOT APPLICABLE
C - TEMPORAL SCALE		Physical and morphological assessment	Both protocols focus on present time
		Hydrological assessment	NOT APPLICABLE
D - TYPE OF METHOD		Characterization/classification	The main aim of ROE is to develop an inventory of longitudinal barriers at the French national scale: info on barriers have been collected and homogenized (identification code, nomenclature and localisation). The ICE protocol serves to get more precise field information and characterize barriers in order to assess the status of the ecological continuity. A part of the protocol concerns fish species and groups of species and their capacity to pass barriers (groups are based on criteria such as size, morphology, jumping ability, similar eco-ethology)
		Assessment by index	Data collected by ICE are used to obtain indices of barrier passability for fish communities (target species or target group of species) and sediments: 4 classes of passability for fishes
		Deviation from reference	NOT APPLICABLE
		General assessment / Design framework	NOT APPLICABLE
		Modelling status / Scenario	NOT APPLICABLE
		Final expert judgment	NOT APPLICABLE
		Links with other systems	ROE and ICE can be used as a combined protocol. They can be used combined to other French methods (CarHyCE, SYRAH-CE & AURAH-CE) and get an overall evaluation of the hydromorphological status of rivers
E - REFERENCE CONDITIONS			NOT APPLICABLE
F - GENERAL INFORMATION	RIVER TYPOLOGY		NOT APPLICABLE
	TYPOLOGY LIMITATIONS		NOT APPLICABLE
	TYPE-SPECIFIC (Protocol / Assessment method)		The ICE protocol makes a different diagnosis on the basis of the type of barrier
	BASIS FOR STANDARDS / THRESHOLDS		Barrier passability classes (4) are defined on the basis of the level of upstream passability for the species of groups of target species and as function of time (duration of non passability conditions), function of hydrological and thermal conditions during the migration period. Classes are the following: total barrier, partial major barrier, partial significant barrier, low impact barrier. Passability is defined with the support of modelled decision trees (built considering species characteristics and indicators of barrier characteristics)
	REACH SCALE SURVEY STRATEGY		ICE protocol records info on barrier profile (longitudinal and cross section) and physical channel data in the impacted area both upstream and downstream the barrier
	TIMING AND FREQUENCY		ROE needs to be updated regularly. The definitive ICE protocol is under development (at present state it is not a simple, rapid tool)
	DATA PRESENTATION (OUTPUT/LAYOUT)		ROE = an open and integrative database for the national scale and a web application Géobs®
	METHOD SUPPORT / APPLICATION TOOLS		ROE = an open and integrative database for the national scale and a web application Géobs®. ICE = a national standard protocol to collect data on barriers and a guide; an interpretative tool based on bio-physical capacity of fish communities to pass barriers and for sediment; a database on existing data (on fish communities)
	SPATIAL COMPARISON		Data are collected at the national scale, and allow for comparison between rivers in France
	CONNECTION TO ECOLOGY		The connection to ecology is direct, given that the ICE protocol considers barrier passability from the point of view of fish communities
	USERS		Final results (database and web application) can be used by everybody; both tools (ROE and ICE) are useful for management planning as well as for scientists (database of data). The application of the ICE protocol needs some training
	SCALE INFORMATION		Info are collected at the local scale (single barrier) but they can be plotted at the large national scale
	NUMBER OF END PARAMETERS		NOT AVAILABLE

3. RECORDED FEATURES			
A - CATCHMENT / VALLEY	LARGE SCALE CHARACTERISTICS		Large scale characteristics available from cartographic and topographic maps
	HYDROLOGICAL REGIME	Hydrological conditions	ICE records discharge conditions during measurements
		Metrics of hydrological regime	NOT APPLICABLE
		Hydro-peaking	NOT APPLICABLE
	VALLEY FORM / FEATURES		NOT APPLICABLE
B - CHANNEL	CHANNEL PATTERN / PLANFORM		NOT APPLICABLE
	CHANNEL FORMS		NOT APPLICABLE
	BED CONFIGURATION		NOT APPLICABLE
	CHANNEL DIMENSIONS		ICE records channel width (both bankfull and wetted widths), depth and slope, both upstream and downstream the barrier
	FLOW-TYPE		NOT APPLICABLE
	PHYSICAL / HYDRAULIC VARIABLES		NOT APPLICABLE
	SUBSTRATE		ICE collects info on channel substrate (size) both upstream and downstream the barrier
	IN-CHANNEL VEGETATION		NOT APPLICABLE
	WOODY DEBRIS		NOT APPLICABLE
	ARTIFICIAL FEATURES AND STRUCTURES		Transversal structures (barriers to longitudinal continuity): Weir, small weir, dam, deflector, bridge structures, etc.. The ICE protocol collects feature/structure measured in the field: longitudinal profile, several structural measures (height, material, etc.), filling (for dam, weirs), planform, cross section form, state of conservation, etc. Description of fish pass when present
C - RIVER BANKS/ RIPARIAN ZONE	BANK PROFILE / SHAPE		NOT APPLICABLE
	BANK MATERIAL		NOT APPLICABLE
	RIPARIAN VEGETATION STRUCTURE		NOT APPLICABLE
	LONGITUDINAL CONTINUITY OF RIPARIAN VEGETATION		NOT APPLICABLE
	RIPARIAN VEGETATION WIDTH		NOT APPLICABLE
	VEGETATION COMPOSITION, COVERAGE AND OTHER RIPARIAN VEGETATION CHARACTERISTICS		NOT APPLICABLE
	ARTIFICIAL FEATURES AND STRUCTURES		NOT APPLICABLE
	LAND USE		NOT APPLICABLE
D - FLOODPLAIN	FLUVIAL FORMS		NOT APPLICABLE
	INFO ON FLOODPLAIN FEATURES		NOT APPLICABLE
	LAND USE		NOT APPLICABLE
4. RIVER PROCESSES			
A - LONGITUDINAL CONTINUITY		Sediment and wood	The aim of the two protocols is to get information on the longitudinal continuity of both sediment and biological communities (fishes)
		Water flow	NOT APPLICABLE
B - LATERAL CONTINUITY		Lateral hydraulic continuity	NOT APPLICABLE (but indirectly assessed)
		Sediment (and wood) lateral continuity	NOT APPLICABLE
C - BANK EROSION / STABILITY			NOT APPLICABLE
E - CHANNEL ADJUSTMENTS		Planimetric (pattern & width)	NOT APPLICABLE
		Vertical	NOT APPLICABLE
F - VERTICAL CONTINUITY		Groundwater connection	NOT APPLICABLE
5. APPLICATION TO WFD			
OFFICIAL METHOD (WFD implementation) / COMMONLY USED METHOD (not compulsory)			The protocols have been developed because of the need to collect info on the existence, location and characteristics of barriers in an homogenous way with the objective to plan management actions and the final aim to reach the good ecological status
APPLICATION TO ALL WATER BODIES			It applies to all water bodies where artificial longitudinal barriers are present
USED IN THE CLASSIFICATION OF HIGH-STATUS / OTHER STATUS CLASSES			At present, the method is not used for this purpose but it was developed with also the aim to provide a support for the definition of all ecological status
USED TO PREDICT RISK OF DETERIORATION			Results of ICE combined to ROE could be useful for this purpose
USED TO IDENTIFY IMPROVEMENT TARGETS			The ROE database is an integrative tool which should be updated regularly and therefore could be used in monitoring actions. ICE definition of barrier passability is useful to define management actions
USED TO HELP IDENTIFY CAUSE OF ECOLOGICAL IMPACTS			The link to ecology is direct, therefore it can be used for this purpose (especially for fish communities)
KEY STRENGTHS FOR RIVER MANAGEMENT			The method has wide applicability in water management both at local and national scales (using homogenous data). The ICE protocol is not yet definitive