

	Coding category	Coding category description	Notes and or justification	Codes (some codes will be captured iteratively)
Bibliographic details	Unique article id	Unique identification code associated with the article		Unique ID
	Publication details	Full citation details (Authors, Title, Publication)		Author, Title, Publication
	Publication type	Type of publication		Select: Journal article, published report, unpublished report, PhD Thesis, book chapter, book
	Publication year	Year of publication		Year (XXXX)
	Permanent link	Note the unique permanent identifier (e.g. permalink, DOI)		DOI; http: /
	Linked article	Is this article reporting the same study as another article?		Provide unique ID of linking article
	Data type	Primary empirical or secondary. Select from dropdown list	If the data type is secondary (i.e. Systematic review; Traditional literature review; Non-systematic meta-analysis) then the article will be listed in a separate database. Only primary empirical research will be coded using this form.	Primary empirical; Secondary
	Main focus(i) of study	What was the main focus or foci of the study. Select one or more options from dropdown list.		Fish welfare; Flesh quality; Economic viability;
	Study summary	Brief summary of study		Free text detail
Geographic Location	Study location by Country(ies) field studies	Geographical location(s) of the study by country. Select country(ies) from dropdown list.	Field study location	List of country(ies)
	Study location by Country(ies) laboratory studies		Laboratory location	List of country(ies)
	Coordinates of study location field studies	What is the longitude and latitude of the field study site?	Needed to create Evidence Atlas interactive, web-based geographical information system showing all meta-data and coding	Latitude and longitude in decimal degrees
	Coordinates of study location laboratory studies	What is the longitude and latitude of the laboratory study site?	Needed to create Evidence Atlas interactive, web-based geographical information system showing all meta-data and coding on a cartographic map.	Latitude and longitude in decimal degrees
	FAO Major fishing area	Which of the FAO major fishing areas for inland waters and marine areas was the study located? Select area(s) from dropdown list.	Follows: <a href="http://www.fao.org/fishery/area/search/en">http://www.fao.org/fishery/area/search/en</a>	List of FAO Fishery areas
	Study design	What type of study design was used? Select from dropdown list	Randomised Controlled Trial: A study design that randomly assigns participants into an experimental group or a control group; Quasi-experimental: With control but lacks random assignment; Observational (e.g. case studies of fisheries using humane stunning methods and surveys that may have been conducted to investigate potential uptake)	Randomised Controlled Trial; Quasi-experimental; Observational;
	Detail study design	Additional notes about study design (e.g. type of observational study)		Free text detail
	Spatial scale	At what scale was the study carried out? Select from dropdown list		On-board fishing vessel; Laboratory; Fish farm; not reported; not applicable
	Fish capture technique	If the study was carried out on-board a fishing vessel, how were the fish captured? Select from dropdown list.		Trawling; Gill net (trammel or tangle net); Trolling; Rod and line; Pole and line; Purse seine; Long line; Trap; Harpoon; Not applicable; Information not available
	Sample size	What sample size was used?	Number of fish used in the study or number of people surveyed	Free text sample size
	Comparator type, Replicated, randomised	What comparator was used and was the study replicated and randomised? Select from dropdown list	Other stunning or killing method used as a comparator may include those that are not approved as humane by OIE (2019).	Control (no stunning); other stunning or killing method; No comparator; replicated; randomised;
	Detail of other stunning or killing method	Name of stunning or killing method used as comparator	Other stunning or killing method used as a comparator may include those that are not approved as humane by OIE (2019).	Free text type of comparator
	Number of Replicates	How many replicates were there? Select from dropdown list		Number of replicates
Population	Population	Fish species or group. Select from dropdown list	Following ASFIS list of species for fishery statistics purposes <a href="http://www.fao.org/fishery/collection/asfis/en">http://www.fao.org/fishery/collection/asfis/en</a>	Latin and English name of specific fish species; Group names for mixed species (e.g. Flatfishes nei)
	Developmental stage	Developmental stage of fish. Select from dropdown list.		Juvenile; Adult; Unknown
	Average weight of fish	What was the average weight of fish stunned	Weight of fish may affect stunning method efficacy and if farmed fish are tested then this information will be of relevancy to wild-caught fish of the same species.	Free text average weight with SD; or information not provided
	Average size of fish (cm)	What was the average size of fish stunned	Size of fish may affect stunning method efficacy and if farmed fish are tested then this information will be of relevancy to wild-caught fish of the same species.	Free text average weight with SD; or information not provided
	Environment	What environment was the study conducted in? Freshwater; Brackish or Saltwater. Select from dropdown menu.		Freshwater; Saltwater; Brackishwater; not clear

Are 2 or more primary humane stunning methods/devices being compared?	Primary is defined as the first method used to stun fish. Some studies may test two primary methods (e.g. a study comparing the efficacy of semi-dry electrical to mechanical percussive). Only humane stunning methods as defined by OIE (2019) to be included. Select from dropdown list	Stunning is sometimes carried out in 2 stages e.g. percussive followed by spiking. This code relates to the first (primary) stunning method applied in the slaughter process.	Yes/No. If 'yes' add extra child codes in Eppi Reviewer (i.e. stunning method 2; stunning method 3 etc) and fill out responses for all relevant questions.
Is the primary stunning method novel or modified and not yet recognised as humane?	Is the primary stunning method novel or modified and not yet recognised as humane? Select from dropdown list.	Any novel or modified stunning methods that are potentially humane but not yet recognised by the OIE (2019) will be categorised separately.	Novel; modified; classified as humane by OIE
Primary stunning method(s)/device(s)	Primary stunning method(s) or device(s). Select from dropdown list		Manual percussive; Automated percussive; Dry electrical; Semi-dry electrical; Wet electrical; Spiking/coring; Free bullet
Availability of primary stunning device	Is the stunning device commercially available/commercial prototype/custom made for research? Select from dropdown list		Commercially available; Commercial prototype; Custom made for research
Name of commercially available device	Name of commercially available device		Free text: Name of device
Placement of fish in primary stunner	Are individual fish placed manually or mechanically in stunner? Select from dropdown list	If fish have to be placed manually in the stunner this will have economic and practical implications for commercial use.	Manual; Mechanical; not stated
Is orientation of the fish required?	Is orientation of the fish required? Select from dropdown menu Yes;No;not clear		Yes;No;not clear
Detail about percussive device used	What type of percussive device was used? E.g. Priest, automated powered by compressed air, handheld captive-bolt		Free text detail of percussive device/method used
Were pressure parameters reported for percussive stunning?	What parameters were measured for percussive stunning? Select from drop down menu		Impact energy; Momentum; Velocity; Mass; Pressure; Piston area; Stroke length; Area of instrument head; Shape of instrument head; Target area and angle of incidence
Actual percussive parameters reported	Data reported for percussive parameters		Free text detail of percussive parameters reported (E.g. velocity 4-6 bar; stroke length 200mm; Flat bedded cylinder (head))
What voltage parameters were recorded? (electrical stunning)	Which voltage parameters were recorded? Select from dropdown list		Exposed minimum voltage (V); Delivered minimum voltage (V); Peak pulse voltage; RMS voltage; Pulse voltage; Voltage not reported; not applicable
Actual voltage data reported (electrical stunning)			Free text detail of voltage reported
Was a constant current stunner or constant voltage stunner used? (electrical stunning)	Constant current stunner or constant voltage stunner. Select from dropdown list.		Constant current stunner; Constant voltage stunner
What current parameters were reported? (electrical stunning)	Which current parameters were reported? Select from dropdown list	Direct current (DC); Alternating current (AC); Waveform (e.g. sinusoidal, non-sinusoidal)	AC; DC; AC/DC mixture; Current density; Waveform; Duty cycle; Mark space ratio; On period; Off period; Minimum current; Latency; not reported; not applicable
Actual current data reported (electrical stunning)			Free text detail of actual data for current parameters reported
What frequency (Hz) parameters were reported (electrical stunning)?	What frequency parameters were reported? Select from dropdown list		Frequency (min or max not stated); Maximum frequency; Minimum frequency; Pulse frequency; Pulse shape; Frequency duration; not reported; not applicable
Actual frequency (Hz) data reported (electrical stunning)			Free text detail of frequency (Hz) parameters
What other electrical parameters were recorded?	What other electrical parameters were recorded? Select from dropdown list.		Duty cycle; Mark space ratio; On period; Off period; electrode separation; electrode shape; electrode size; application site(s)
Actual data for other electrical parameters reported			Free text
Duration of stun applied (electrical stunning)	What was the duration of the stun in seconds?		Free text Duration in seconds or milliseconds
Was the experiment conducted in fresh, salt or brackish water? (electrical stunning only)	Was the experiment conducted in fresh, salt or brackish water? Select from dropdown list		Freshwater; Saltwater; Brackishwater; not clear
What water parameters were reported for electrical stunning?	What water parameters were recorded? Select from dropdown list		Conductivity; Oxygen level; Temperature; Salinity
Actual water parameters recorded (electrical stunning)			Free text detail of parameters reported
Was the electrical current (in amps) passing through individual fish measured?	Select yes or no from dropdown list		Yes/No
Detail primary stunning device method used, other than percussive or electrical	Further detail about spiking, coring or free bullet methods		Free text detail (i.e. target location and assessment of accuracy)

Secondary treatment	Secondary treatment or killing method	Was a secondary method used to kill the fish? Secondary method is defined as the second method used in the slaughter process.	Secondary treatments or stunning killing methods are often applied as part of the slaughter process. For example, sometimes, tuna are stunned percussively first and then spiked, and trout are electrically stunned and then percussively stunned. Placing fish into ice slurry or chilled water may also inhibit recovery and induce death post-stunning (which may also have implications for flesh quality).	Mechanical percussive; Manual percussive; Spiking; Gill cutting; Ice slurry; Chilled water
	Detail about secondary treatment or killing method	Detail about: Availability of device; commercial name; temperature of ice; parameters used; manual or mechanical placement of fish etc		Use the template for the primary stunning method questions and fill out responses for all relevant questions.
Fish welfare parameters measured	Parameters used to measure and confirm consciousness	Which neurological, behavioural, physiological, physical indicators were measured? Select from dropdown list	EFSA (2018) recommends the use of EEG to confirm unconsciousness. This is regarded as the 'gold standard' indicator. However, the use of EEG is not always practical and other indicators may be use. Recording these indicators may provide an indication of the reliability of the results.	Vestibular-ocular reflex; Rhythmic opercular movements; Response to tactile stimuli; Tonic-clonic seizures; Brain waves (EEG); Heart rhythm and electrical conductivity (ECG); Escape attempts; Loss of equilibrium
	IF EEG measured to confirm consciousness provide a description of what characteristics of EEG were inspected.			Free text
	Were the parameters used to measure and confirm consciousness suitable for the fish species?	Did the author use a recognised method for that species or conduct pre-tests using a control group to test the parameters? Select from dropdown list	This may provide an indication of the reliability of the data collected	Recognised method; Pre-tests; Not stated
	How long were indicators tested for, to measure state of consciousness?			Free text detail. For example, indicators tested once a minute for 6 minutes, after which the status of fish was decided. Intermittent measures taken for 30 minutes after to ensure no recovery.
	Were the parameters to measure and confirm consciousness assessed quantitatively, semi-quantitatively or qualitatively?	Quantitatively (e.g. EEG); Semi-quantitatively (e.g. consciousness index score); Qualitatively (purely observational no scoring) Select from dropdown list		Quantitative; Semi-quantitative; Qualitative
	Were any other parameters measured to assess fish welfare?	Parameters for fish welfare, other than those uses to assess consciousness. For example, cortisol, lactate and osmolality in blood plasma level to measure stress	This may provide an indication of pre-slaughter stress	Free text detail
	Was post stunning flesh quality assessed?	Select yes or no from dropdown list	If the stunning method causes damage to this fish this will affect the economic value of the product (e.g. making processing by automated filleting machines impracticable)	Yes/No
Parameters measured for flesh quality	Post stunning flesh quality assessment	What parameters were measured to assess post stunning flesh quality? Select from dropdown list		Visual inspection for haematoma (inside the muscle and /or along the spine); Spinal damage (confirmed by x-ray); General Proteolytic activities; Cathepsin B and L activity; pH; Drip loss (water holding capacity); Water distribution; Myowater dynamics; Gaping score; Flesh colour (Colorimetric assessments); Texture analysis; Shear force; Myofibril fragmentation index (MFI); Myofibril microstructure; Rigor index; Total volatile base nitrogen; shelf life; electrical conductivity (EC);
	Time taken to assess post stunning flesh quality	How long after stunning was flesh quality assessed for?		Free text detail. E.g. 24 and 20h post-mortem.
Confounding variables	Were any pre-slaughter treatments applied to the fish?	Were any pre-slaughter treatments applied to the fish that may stress them? Select from dropdown list	Some pre-slaughter treatments may also stress fish and impact flesh quality	Handling; Live chilling; Crowding; Grading; Pumping; Transportation; Fasting; Removal from water
	How long and what conditions were fish kept in before being assessed for flesh quality?			Free text detail E.g. Stored in ice slurry for X minutes
	Fish welfare	What outcomes were reported for fish welfare? Select from dropdown list		Time between capture and death or loss of consciousness; Time taken to reach unconsciousness following stunning; Consciousness index score; Duration of unconsciousness following stunning; Time from onset of unconsciousness to death; Stress level

Outcomes reported	Flesh quality	What flesh quality outcomes were reported?	These have already recorded in the section for flesh quality parameters measured above.	
	Stunning device	What outcomes were reported for the stunning device? Select from dropdown list	An example would be, mean induced current passing through individual fish (in lab based experiments) or for mechanical devices: is stunning performance affected by wear and tear/lack of lubrication	Mean induced current through individual fish; Stunning performance of mechanical equipment affected by wear and tear /lack of lubrication and/or regular maintenance
	Environmental, social, economic, ethical or practical application considerations	Did the author comment on or record any social, economic, ethical or practical considerations associated with humane stunning? Select from dropdown list		Social or socio-economic; Environmental; Economic; Ethical; Practical; not stated
	Environmental	Detail of environmental considerations		Free text detail: E.g. by-catch also stunned by method
	Social or socio-economic	Detail of social or socio-economic considerations		Free text detail: E.g. fish placed by hand in stunner may increase labour and cost requirements; stunning device reduces labour requirement on-board fishing vessels
	Economic	Detail of economic considerations		Free text detail:E.g. cost of stunning equipment; consumer willingness to pay if there is a net cost to implementation of stunning
	Ethical	Detail of ethical considerations		Free text detail:E.g. Stunning device appropriate for average size but larger or smaller specimens may not be stunned effectively
Improvements	Practical	Detail of practical considerations		Free text detail: E.g. ease of implementation on-board fishing vessels; most practical location on board fishing vessels for the stunning device
	Author suggestions to improve study design	Did the author suggest improvements that could be made to their study?	Some authors suggest ways to improve study design. For example, future work should use EEG to confirm unconsciousness; future work should look at post-mortem flesh quality implications associated with the depletion of energy reserves arising from electrical stunning.	Free text detail; not stated
Notes	Any other notes			

OIE (2019). World Organisation for Animal Health (OIE) Aquatic Animal Health Code 22nd Ed., 2019

EFSA (2018) European Food Safety Authority. Guidance on the assessment criteria for applications for new or modified stunning methods regarding animal protection at the time of killing. EFSA Journal. 2018;16: 1–35.