



A COLLISION CLASSIFICATION KEY TO STRENGTHEN SHIP STRIKE DATA ACQUISITION

Report from the Pelagos “Collisions and Shipping” Focus Group (PCSF)

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Editors:

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1. CONTEXT

Ship strikes are one of the main threats to Mediterranean large cetaceans, such as fin and sperm whales. Evaluating the mortality due to ship strikes is key to implement management measures. For instance, in order to evaluate the effectiveness or the need for strengthening of the new northwestern Mediterranean Particularly Sensitive Sea Area (NW Med PSSA), a correct assessment of the impact of collisions is required.

The definition of the impact of collisions is challenging, as recording collision events is also difficult. Vessel operators rarely notice a collision and carcasses often sink unnoticed at the bottom of the ocean. Furthermore, when a dead whale strands on the shore, its level of decomposition can hinder the identification of the mortality cause.

Vessel operators can report collisions they do observe. These observations should be submitted to the International Whaling Commission (IWC) database and to the local authority since the application of the PSSA. However, a recent work of the Pelagos “Collisions and Shipping” Focus Group (PCSFG) assessed that existing reports are sometimes incomplete and can therefore prevent robust analysis.

Regarding data on strandings, while the national networks are organized, they often lack the means to conduct complete post-mortem analyses. Furthermore, reporting protocols slightly differ between France, Monaco and Italy (and Spain, in the case of the PSSA).

2. REPORT OBJECTIVE

In order to achieve a uniform system to report collisions within the Pelagos Sanctuary (and within the PSSA perimeter), this report proposes a “Collision Classification Key” (CCK). The CCK aims at classifying the “status” of events in order to strengthen the quality of data acquisition and, consequently, data quality and following assessments. In turn, the CCK can also highlight ways to improve the reporting process (Figure 1).

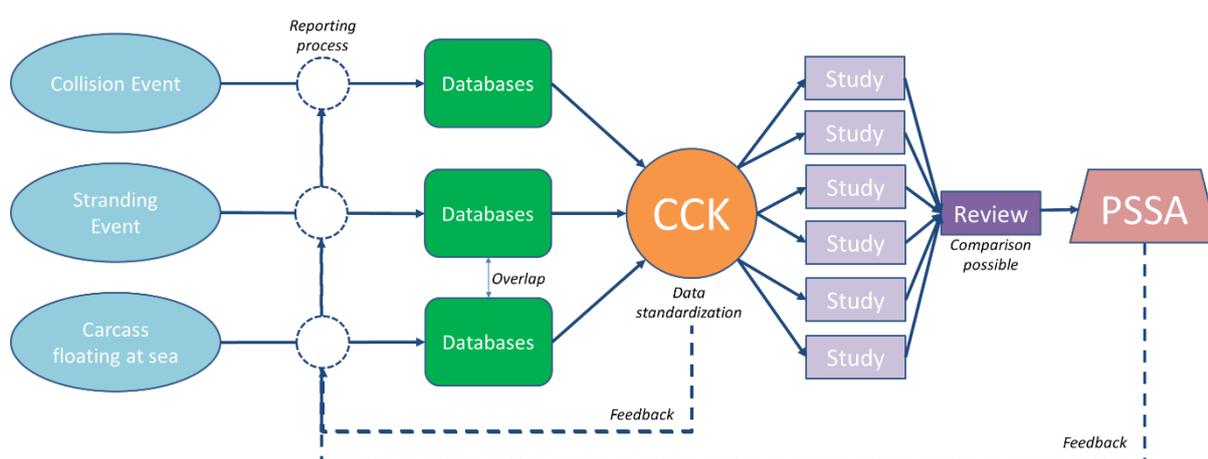


Figure 1. Conceptual illustration of the added value of the Collision Classification Key (CCK).

3. METHODOLOGY

The initial draft of the CCK was written using several sources:

- Conclusions of the PCSFG (previous cycle) on the IWC database.
- ACCOBAMS-ECS, 2018. Report of the joint ACCOBAMS/ASCOBANS/ECS/SPA-RAC workshop on marine debris and cetacean stranding. pp1-117.
- ACCOBAMS. 2019. Best practices in monitoring and management of cetacean stranding. ACCOBAMS-MOP7/2019/Doc38/Annex15/Res.7.14. pp 1-12
- ACCOBAMS and ASCOBANS, 2019. Best practice on cetacean post-mortem investigation and tissue sampling. ASCOBANS/MOP9/Doc.6.2.5a. pp 1-75.
- Geraci J.R., Lounsbury V., Yates N. 2005. Marine Mammals Ashore – A field guide for strandings. pp. 1-382
- IWC. 2013. Report of the Scientific Committee – Annex J, Appendix 2 – Criteria for evaluating vessel strike events”. *Journal of Cetacean Research and Management*. IWC/65/Rep01 Scientific Committee Report (2013) Vol 15. pp 1-554
- Moore M.J., Van der Hoop, J., Barco S.G., Costidis A.M., Gulland F.M., Jepson P.D., Moore K.T., Raverty S., and McLellan W.A. 2013. Criteria and case definitions for serious injury and death of pinnipeds and cetaceans caused by anthropogenic trauma. *Diseases of Aquatic Organisms*. Vol. 103. pp 229-264. doi: 10.3354/dao02566

4. THE COLLISION STATUS

Based on the aforementioned references, we here give a definition of the collision statuses that the key will lead to. The following table gives the definition and the sources for each status.

STATUS		DEFINITION	SOURCE
CONFIRMED	L1 (Level 1)	<p>There is evidence that a strike occurred.</p> <p>Strike was witnessed by the vessel operator/crew or by the operator/crew of a nearby vessel</p> <p>A dead animal at sea or a stranded animal (even with a performed necropsy) cannot be characterized as a “Level 1 Confirmed” collision. We cannot be 100% sure that these events are collisions.</p> <p>Thus, a Level 1 Confirmed collision status characterizes a collision from a regulatory standpoint.</p>	IWC, 2013; FWGC discussions
	L2 (Level 2)	<p>There is evidence that a strike occurred beyond a reasonable doubt.</p> <p>Strike was not witnessed, but evidence of a collision was found on the vessel (e.g., whale skin or tissue). Also, evidence of collision may be physical such as speed reduction or strike noise associated with the observation of a whale/carcasses with evidences of collision.</p> <p>The evidences of collision on the dead or alive whale suggest that the whale was alive when struck. Evidences can be:</p>	ACCOBAMS, 2019; IWC, 2013; Moore et al.,2013; FWGC discussions

	<ul style="list-style-type: none"> - massive blunt impact trauma (defined by disarticulated vertebrae or fractures of one or more heavy bones including skull, mandible, scapula, vertebra or adult rib, and a focal area of severe haemorrhaging); - propeller wounds (i.e. deep evenly spaced slashes or cuts into the blubber) on the dorsal aspect. <p>In stranding events, the collision is defined as the cause of death through a necropsy performed by a veterinarian trained to identify collision events. Evidences reported by the veterinarian can be the following:</p> <ul style="list-style-type: none"> - open wounds with sharp (incising) - sharp- and blunt-trauma (chop wounds) sequelae, histopathology supportive of gross findings of antemortem sharp trauma <p>For floating carcasses, wherever necropsies are not possible, evidences are mainly on the back or the sides of the whale:</p> <ul style="list-style-type: none"> - Fresh sharp traumas with one or more linear to curvilinear laminar incising wounds that cause damage to axial muscles, skull and vertebral column; - Fresh blunt traumas with hemorrhage and edema in the blubber, subcutaneous tissue, and skeletal muscle <p>The collision must be validated by photo-evidences</p>	
<p>LIKELY (Probable)</p>	<p>The report is likely to be true; having more evidence for than against, but some evidence is lacking.</p> <p>Vessel operator/crew or operator/crew of a nearby vessel believes that a strike occurred but cannot confirm the strike with absolute certainty; or whale was found on the bow of a ship in a more advanced state of decomposition than category 2 but there is other evidence that the whale was alive when struck (e.g. the time when the strike was thought to have occurred is consistent with decomposition).</p> <p>In stranding events or if the carcass is available for study (case of whale stuck on a ship bow), a necropsy is performed by a veterinarian who was not trained to identify collision events, but identify the evidences listed in “Level 2 Confirmed” status. Besides, if performed by a trained veterinarian, the evidences show open incised wounds with sharp or sharp- and blunt-trauma sequelae are present, but histopathology findings of trauma are limited or not present, the collision status should be defined as “Likely (Probable)”.</p> <p>For floating carcasses, wherever necropsies are not possible, evidences are similar to the ones described in the “Level 2 Confirmed” status, but are not validated through photo-evidences.</p>	<p>IWC, 2013, Moore et al.,2013</p>

<p>UNCERTAIN (Possible)</p>	<p>The report may be true; however, a majority of evidence is lacking.</p> <p>Uncertain events can be the following:</p> <ul style="list-style-type: none"> - Vessel operator/crew or operator/crew of a nearby vessel believes that a strike may have occurred but there is significant uncertainty; - Vessel operator/crew or operator/crew of a nearby vessel believes that a strike occurred, while the vessel operator/crew or operator/crew of a nearby vessel believes that a strike did not occur; - Whale found on bow but evidence is not clear whether strike was ante- or post-mortem. <p>The necropsy is limited or not performed, but the whale stuck, floating or the one stranded exhibits open wounds and/or bony lesions consistent with sharp trauma are present on the back or the sides, with or without other signs of pathology (e.g. entanglement or disease).</p>	<p>IWC, 2013; Moore et al.,2013</p>
<p>UNCONFIRMED (Rejected)</p>	<p>The report is not credible.</p> <p>Third-hand report; or no credible eyewitnesses; or lacking sufficient detail or documentation to be credible.</p> <p>The necropsy was not performed or results show more evidences against than for a collision as the cause of death.</p> <p>Dead animals at sea do not show evidence of fresh collision marks on the back or the sides.</p>	<p>IWC, 2013</p>

5. THE COLLISION CLASSIFICATION KEY

The Collision Classification Key (CCK) is a tool, which helps to classify collision events. The CCK offers a sequential key of classification steps, each with multiple alternatives, the choice of which determines the next step.

In the CCK below, the reader chooses the alternative (i.e., A, B, C) in the Statement 1. At the end of the line of each alternative, the next Statement to read is indicated, and the reader has to choose an alternative in this next Statement, and so on. At one point, given the alternatives selected, the Collision classification Status will be disclosed to the reader, allowing him to classify the event.

STATEMENT NUMBER	STATEMENTS	NEXT STATEMENT	COLLISION CLASSIFICATION STATUS
<u>Stat. 1</u>	A. The event is a collision	Stat. 2	
	B. The event is an observation of a dead whale at sea	Stat. 6	
	C. The event is a stranding	Stat. 10	
<u>Stat. 2</u>	A. There is a direct witness of the collision event (vessel operator, crew, MMO...)		CONFIRMED L1
	B. There is no direct witness of the collision event, but indirect ship strike cues were observed (Shock to the vessel; Vessel speed reduction; Vessel damage)	Stat. 3	
<u>Stat. 3</u>	A. No whale was observed in the area after the indirect ship strike cues		UNCONFIRMED (Rejected)
	B. A whale was observed alive before the indirect ship strike cues		UNCERTAIN (Possible)
	C. A whale was observed alive after the indirect ship strike cues	Stat. 4	
	D. A whale was observed dead after the indirect ship strike cues	Stat. 5	

<u>Stat. 4</u>	A.	Fresh ship strike cues are observed on the whale's body (propeller cut, blunt force trauma, blood in water) and there is photo-id evidences		CONFIRMED L2 or LIKELY (Probable)
	B.	Fresh ship strike cues are observed on the whale's body (propeller cut, blunt force trauma, blood in water) but there is no photo-id evidence		LIKELY (Probable) or UNCERTAIN (Possible) or CONFIRMED L2
	C.	Ship strike cues are not observed on the whale's body		UNCERTAIN (Possible)

<u>Stat. 5</u>	A.	The decomposition state is "Fresh" (DCC-1) ¹	Stat. 6	
	B.	The decomposition state is "Slight decomposition" (DCC-2), "Moderate decomposition" (DCC-3)	Stat. 8	
	C.	The decomposition state is "Advanced decomposition" (DCC-4)		UNCONFIRMED (Rejected) - Dead before potential collision & cannot assess cause of death

<u>Stat. 6</u>	A.	Ship strike cues are observed on the whale's body (propeller cut, blunt force trauma, blood in water)	Stat. 7	
	B.	Ship strike cues are not observed on the whale's body		UNCONFIRMED (Rejected)

¹ DCC stands for "decomposition condition categories" from the ACCOBAMS and ASCOBANS (2019) best practice for post-mortem investigation and tissue sampling.

<u>Stat. 7</u>	A.	Ship strike cues are observed on the left, right or up (back) side of the whale's body and photo-id evidences exist		CONFIRMED L2
	B.	Ship strike cues are observed on the left, right or up (back) side of the whale's body and photo-id evidences do not exist		LIKELY (Probable)
	C.	Ship cues are observed on the down (belly) side of the whale's body		UNCONFIRMED (Rejected) - <i>Dead before potential collision or cannot assess cause of death</i>

<u>Stat. 8</u>	A.	Ship strike cues are observed (propeller cut, blunt force trauma)	Stat. 9	
	B.	Ship strike cues are not observed on the whale's body or in the environment (i.e., blood in water)		UNCONFIRMED (Rejected)

<u>Stat. 9</u>	A.	Ship strike cues are observed on the left, right or up (back) side of the whale's body and photo-id evidences exist		LIKELY (Probable) - <i>To be defined based on photo;</i> - <i>Death linked to another collision event.</i>
	B.	Ship strike cues are observed on the left, right or up (back) side of the whale's body and photo-id evidences do not exist		UNCERTAIN (Possible) - <i>Death potentially linked to another collision event</i>
	C.	Ship cues are observed on the down (belly) side of the whale's body		UNCONFIRMED (Rejected)

			- Dead before potential collision or cannot assess cause of death
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<u>Stat. 10</u>	A.	The examiner is a veterinarian trained to identify collision events and a complete necropsy was performed to assess the vitality of injuries also using fat embolism evaluation		CONFIRMED L2
	B.	The examiner is a veterinarian, who has not attended a dedicated course to identify collisions event, or the examiner is a member of the stranding network (not a vet	Stat. 11	
	C.	The examiner is not a member of the stranding network (citizen, newspaper	Stat. 12	

<u>Stat. 11</u>	A.	Photo-evidences of strike cues exist (propeller cut, blunt force trauma	Stat. 9	CONFIRMED L2
	B.	Photo-evidences of strike cues exist but are not conclusive		UNCERTAIN (Possible)
	C.	Photo-evidences of strike cues do not exist or do not show strike cues (propeller cut, blunt force trauma)		UNCONFIRMED (Rejected)

<u>Stat. 12</u>	A.	Photo-evidences of strike cues exist (propeller cut, blunt force trauma)		LIKELY (Probable)
	B.	Photo-evidences of strike cues exist but are not conclusive		UNCERTAIN (Possible)
	C.	Photo-evidences of strike cues do not exist or do not show strike cues (propeller cut, blunt force trauma)		UNCONFIRMED (Rejected)