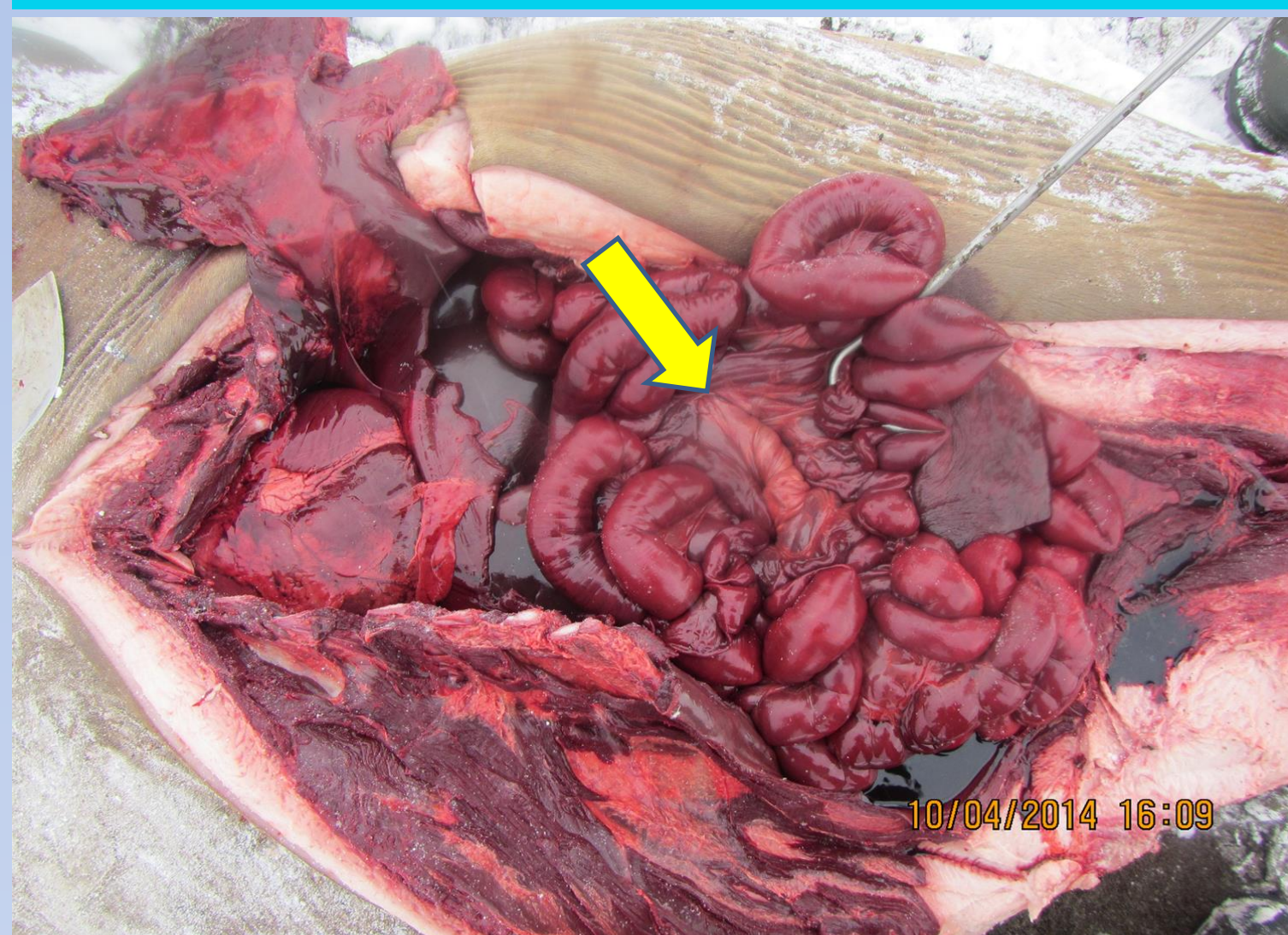


Mortality Due to Trampling and Mesenteric Root Torsion in Pacific Walrus

Raphaela Stimmelmayer¹, Anna Bryan², Warren Harding Lampe³, Leo Ferrera³, Taqulik Hepa¹ Department of Wildlife Management, North Slope Borough, Barrow, AK 99723; Arctic Marine Mammal Program Alaska Department of Fish and Game, Fairbanks, Alaska 99701³ Native Village of Point Lay, Alaska

Background: Pacific Walrus (*Odobenus rosmarus*) are an important subsistence species for Inupiaq, Yupik and Chukotkan native people. Understanding the role of natural causes of morbidity/mortality, disease and toxins is a high priority from a Native food security and food safety perspective. In recent years disturbance related mortality at coastal haul-outs along the Chukchi Sea coast has emerged as a management and conservation issue for the Pacific walrus population. Investigation and documentation of haul out mortalities play an important role in understanding and defining prospective and retrospective health status of free ranging Pacific walrus and are an excellent tool to identify known and emerging marine threat issues (i.e. 2011 Northern Pinniped UME Miller et al. 2011).

Mesenteric torsion



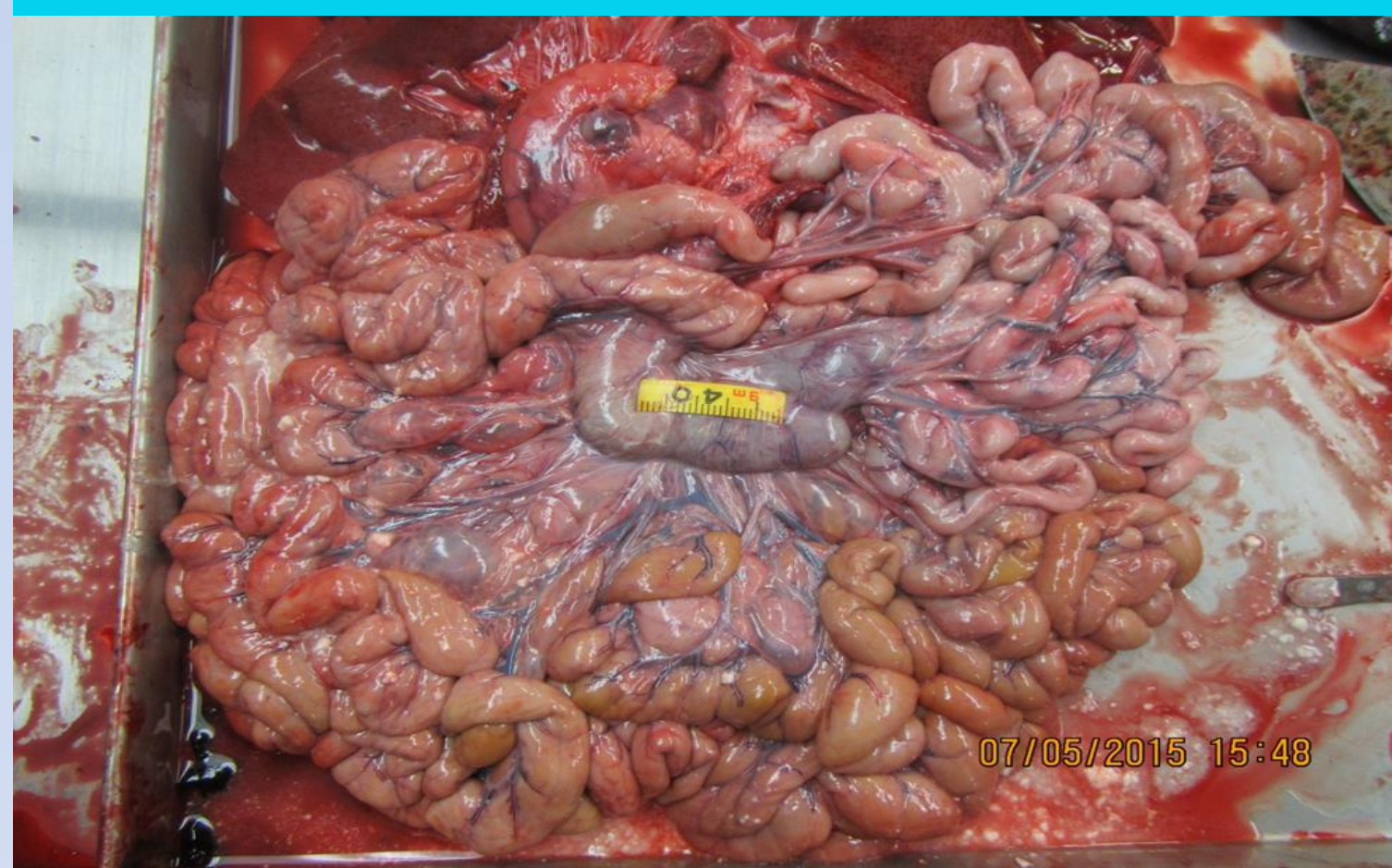
Case material: 2014 Point Lay (2-5th October, 2014)

- complete mesenteric torsion (Case # 29 six 360 Degree turns and #31 three 360 degree turns)
- Other findings: epistaxis, extensive muscular bruising (head and neck region), renal and lung hematoma (#31), congested enlarged spleens (both). empty stomachs and intestines.
- Age class: YOY and calf; males, good body condition ;

Predisposing factors in calves/YOY

- Trigger: being “rolled” during stampede event
 - Relatively large abdominal cavity for body size
 - Single chambered stomach
 - small intestine (SI) length ~ 20 times body length (TBL)
 - SI: 2.286 cm (calf ~122 cm TBL) SI/TBL ratio (19)
 - SI: 4.237 cm (adult ~ 366 cm TBL) SI/TBL ratio (11.5)
 - short dorsal mesentery attachment
 - emptiness of GIT tract

Example of Small intestines



Conclusion: Stampede associated occurrence of mesenteric torsion in young walrus has not been reported previously among commonly reported gross findings of mortality due to trampling (see Table 1.). Due to the time delay between time of death and the forensic investigation, is it difficult to ascertain when these occur (ante/peri/post mortem) and if these mesenteric torsion as observed contribute to cause of death. Independent of its clinical relevance for cause of death, mesenteric torsion has emerged as notable additional sign of trampling for YOY/calves and should be regularly looked for during forensic investigations of stampede events. We suggest that during field examination of haul out mortalities by biologists and/or veterinarians' examination of body cavities is included as part of the standard forensic protocol to document stampede associated internal injuries.

Table 1. GUIDE FOR FORENSIC INVESTIGATION OF HAUL OUT MORTALITIES : SIGNS of TRAMPLING

Gross Findings	St. Lawrence island, AK 63.4000° N, 170.1667° W	Icy Cape, AK 70.3297° N, 161.8742° W	Point Lay 2011 69.7411° N, 163.0086° W	Point Lay 2014 69.7411° N, 163.0086° W	Cape Lisburne 2015 68-52-30.4600N / 166-06-39.8950W
Body shape##			Flattened chest	Flattened chest	Flattened chest
Central nervous system	Spinal torsion/intracranial hemorrhage	Skull fracture*	Skull fracture#	Not examined due to carcass condition and time constraints	Not examined due to time constraints
Sensory organs		Bloody eyes	Popped eyes	Popped eyes	
Snout		Bloody nares/muzzle	Bloody nares/muzzle	Bloody nares/muzzle; worn whiskers	Bloody nares/muzzle; worn whiskers; bite wounds (brown bear); Zygomatic arch fracture
Thoracic cavity	Free fluid/lung congestion; pneumothorax	Bloody fluid	Not examined due to carcass condition	Pneumothorax; <u>lung hematoma</u>	Bloody fluid; lung hematoma; tracheal hematoma; crushed trachea;
Abdominal cavity		Bloody fluid	Not examined due to carcass condition	<u>Mesenteric torsion;</u> <u>renal hematoma;</u> <u>bloody fluid;</u> <u>organ congestion</u>	<u>mesenteric torsion;</u> <u>renal hematoma;</u> <u>bloody fluid;</u> <u>liver hematoma;</u> <u>spleen hematoma;</u> <u>greater omentum hematoma</u>
Integumentary system			Ulcerative cutaneous lesions (UME 2011)	<u>Penetrating tusk puncture wounds</u>	
Reproductive organs	Uterine prolapse			<u>Anus/Vulvar bleeding/bruising</u>	
Umbilicus	Umbilical hernia				
Immune system		Hemorrhagic lymph nodes			
Blubber/skeletal muscle (head/neck/ /chest/rump)	Bruising/hematoma	Bruising/hematoma	Not examined due to carcass condition	Bruising/hematoma	Bruising/hematoma

al. 2011; Stimmelmayer unpubl.data; 2014 Stimmelmayer unpubl.data. Cape Lisburne: 2015 Goertz, Stimmelmayer, unpubl.data. Note: *; due to carcass condition and time constraints only 2 examined; # on external examination evident; underlined indicate new stampede associated necropsy findings. ## calves and YOY.

