

**Peer Reviewed Papers**

Hendricks KEM, **Penfold LM**, Evenson DP, Kaproth MT, Hansen PJ. (2010). Effects of airport screening X-irradiation on bovine sperm chromatin integrity and embryo development. *Theriogenology*, 73: 267-272.

Johnson WE, Onorato DP, Roelke ME, Land ED, Cunningham M, Beldon C, McBride R, Jansen D, Lotz M, Schindle D, Howard JG, Wildt DE, **Penfold LM**, Hostetler JA, Oli MK, O'Brien SJ. (2010). Genetic restoration of the Florida panther. *Science*, 329: 1641-1645.

Stanton DWG, **Penfold LM**, Zhan X, Bruford MW. (2010). Microsatellite loci for the okapi (*Okapia johnstoni*). *Conservation Genetics Resources*, 2: 337-339.

Terrell KA, Wildt DE, Anthony NM, Bavister BD, Liebo S, **Penfold LM**, Marker L, Crosier AE. (2010). Evidence for compromised metabolic function and limited glucose uptake in spermatozoa from the teratospermic domestic cat (*Felis catus*) and cheetah (*Acinonyx jubatus*). *Biology of Reproduction*, 83: 833-841.

**Barnes SA**, Cepeda AM, **Penfold LM**. (2011). Effects of radiographic contrast media on domestic cat epididymal sperm. *Theriogenology*, 75: 329-336.

Govoni KE, Goodman D, Maclure RM, **Penfold LM**, Zinn SA. (2011). Serum concentrations of insulin-like growth factor binding protein-2 and -3 in eight hoofstock species. *Zoo Biology*, 30: 275-284.

**Metrione LC**, Harder JD. (2011). Fecal corticosterone concentrations and reproductive success in captive female southern white rhinoceros (*Ceratotherium simum simum*). *General and Comparative Endocrinology*, 171: 283-292.

**Penfold LM**. (2011). An overview of the assisted reproduction and genome resource banking program at White Oak Conservation Center in the service of species conservation. *International Zoo Yearbook*, 45: 154-159.

Terrell KA, Wildt DE, Anthony NM, Bavister BD, Leibo SP, **Penfold LM**, Marker LL, Crosier AE. (2012). Different patterns of metabolic cryo-damage in domestic cat (*Felis catus*) and cheetah (*Acinonyx jubatus*) spermatozoa. *Cryobiology*, 64: 110-117.

**Penfold LM**, Hallager S, Boylan J, deWit M, **Metrione LC**, Oliva M. (2013). Differences in fecal androgen patterns of breeding and nonbreeding kori bustards. *Zoo Biology*, 32: 54-62.

**Penfold LM**, Powell D, Traylor-Holzer K, Asa CS. (2014). "Use it or Lose it": characterization, implication and mitigation of female infertility in captive wildlife. *Zoo Biology*, 33: 20-28.

**Barnes SA**, Teare JA, Staaden S, **Metrione L**, **Penfold LM**. (2016). Characterization and manipulation of reproductive cycles in the jaguar (*Panthera onca*). *General and Comparative Endocrinology*, 225: 95-103.

Tubbs CW, Moley LA, Ivy JA, **Metrione LC**, LaClaire S, Felton RG, Durrant BS, Milnes MR. (2016). Estrogenicity of captive southern white rhinoceros diets and their association with fertility. *General and Comparative Endocrinology*, 238: 32-38.

Flacke GL, Schwarzenberger F, **Penfold LM**, Walker SL, Martin GB, Miller RP, Paris MCJ. (2017). Characterizing the reproductive biology of the female pygmy hippo (*Choeropsis liberiensis*) through non-invasive endocrine monitoring. *Theriogenology*, 102: 126-138.

**Metrione LC**, Bateman HL, Swanson WF, **Penfold LM**. (2018). Characterization of the behavior and reproductive endocrinology of the giant river otter (*Pteronura braziliensis*) in managed care. *Zoo Biology*, 37: 300-309.

**Metrione LC**, Sim RR, Cavanaugh B, Coty T, McCain S. (2019). Novel pregnancy diagnosis and altrenogest supplementation lead to successful pregnancy in a black-footed cat (*Felis nigripes*). *Journal of Zoo and Wildlife Medicine*, 50: 508-510.

Mylniczzenko ND, **Sumigama S**, **Wyffels JT**, Wheaton CJ, Guttridge TL, DiRocco S, **Penfold LM**. (2019). Ultrasonographic and hormonal characterization of reproductive health and disease in wild, semi-wild, and aquarium-housed southern stingrays (*Hypanus americanus*). *American Journal of Veterinary Research*, 80: 931-942.

**Paxton AB**, Blair E, Blawas C, Fatzinger M, Marens M, Holmberg J, Kingen C, Houppermans T, Keusenkothen M, McCord J, Silliman BR, **Penfold LM**. (2019). Citizen science reveals female sand tiger sharks (*Carcharias taurus*) exhibit signs of site fidelity on shipwrecks. *Ecology*, 100: e02687.

Daly-Crews K, Edell RH, **Metrione LC**. (2020). Fecal progesterone and estrogen metabolite monitoring for cyclicity and pregnancy in southern tamandua (*Tamandua tetradactyla*). *Zoo Biology*, 39: 239-245.

**Gillis J**, Bercier M, **Rattner FK**, Citino S. (2020). 63,XX, SRY-negative, pseudohermaphroditism in a Somali wild ass (*Equus asinus somalicus*). *Veterinary Record Case Reports*, 8: e001164.

Goblet C, Lewis B, Jacobsen V, Jarboe M, Silva D, **Penfold L**, Newell Fugate AE. (2020). Exposure of managed red river hogs (*Potamochoerus porcus*) to urine from males stimulates estrous cycling and modulates fecal sex steroid metabolites in males and females. *General and Comparative Endocrinology*, 285: 113262.

**Metrione LC**, Hunter D, **Penfold LM**. (2020). Seasonal fecal glucocorticoid metabolites in bison living with or without wolves. *Journal of Wildlife Diseases*, 56: 175-178.

**Wyffels JW**, **Adams CL**, George R, Adams L, Clauss T, Hyatt M, Newton A, **Penfold LM**. (2020). Testosterone and semen seasonality for the sand tiger *Carcharias taurus* in aquariums and *in situ*. *Biology of Reproduction*, 102: 876-887.

**Wyffels JT**, Adams LM, Bulman F, Fustukjian A, Hyatt MW, Feldheim KA, **Penfold LM**. (2021). Artificial insemination and parthenogenesis in the whitespotted bamboo shark *Chiloscyllium plagiosum*. *Scientific Reports*, 11: 9966.

**Wyffels J**, Coco C, Schreiber C, Palmer D, Clauss T, Bulman F, George R, Pelton C, Feldheim K, Handsel T. (2020). Natural environmental conditions and collaborative efforts provide the

secret to success for sand tiger shark *Carcharias taurus* reproduction in aquaria. *Zoo Biology*, 39: 355-363.

Dvorniky-Raymond ZT, Donnelly KA, Emerson JA, **Penfold LM**, Citino SC. (2021). Evaluation of a visual enzyme-linked immunosorbent assay (EIA) for pregnancy detection in four ungulate species. *Journal of Zoo and Wildlife Medicine*, 51: 926-932.

**Gillis JD**, **Penfold LM**, Mylniczenko ND. (2021). Initial characterization of male southern stingray (*Hypanus americanus*) reproductive parameters and preliminary investigation of sperm cryopreservation. *Animals*, 11: 2716.

**Penfold LM**, Norton T, Asa CS. (2021). Effects of GnRH agonists on testosterone and testosterone-stimulated parameters for contraception and aggression reduction in male lion-tailed Macaques (*Macaca silenus*). *Zoo Biology*, 40: 541-550.

Moresco A, **Penfold LM**, Iankowski G, McCain S, Crook E, Faliano A, Crane J, Wack RF, Goodnight SH. (2022). Reproductive suppression of giraffe (*Giraffa camelopardalis*) under managed care using a GnRH immunological product. *Zoo Biology*, 41: 65-73.

Stoops M, Moresco A, O'Brien JK, **Penfold L**, **Gillis J**, Wojtusik J, **Mettrione L**. (2021). Overcoming reproductive disorders in female greater one-horned rhinoceros (*Rhinoceros unicornis*) to improve artificial insemination and natural breeding success. *Clinical Theriogenology*, *In press*.

**Penfold LM**, Criffield M, Cunningham MW, Jansen D, Lotz M, Shea C, Onorato D. (2022). Long-term evaluation of male Florida panther (*Puma concolor coryi*) reproductive parameters following genetic introgression. *Journal of Mammalogy*, *In press*.

### **Book Chapters, Manuals**

**Penfold LM**, O'Brien J. (2011). Importation of non-domestic ruminant semen for management of zoological populations using artificial insemination. In: *Fowler's Zoo and Wild Animal Medicine: Current Therapy Vol 7*. RE Miller, ME Fowler. Academic Press, 604-611.

**Penfold LM**. (2013). Reproduction. In: *Zookeeping: An Introduction to the Science and Technology*. MD Irwin, JB Stoner, AM Cobaugh. University of Chicago Press, 190-199.

**Penfold, LM**. (2013). Population management. In: *Zookeeping: An Introduction to the Science and Technology*. MD Irwin, JB Stoner, AM Cobaugh. University of Chicago Press, 200-202.

Holt WV, **Penfold LM**. (2014). Fundamental and practical aspects of semen cryopreservation. In: *Animal Andrology: Theory and Applications*. PJ Chenoweth, SP Lorton. CAB International, 76-99.

**Mettrione L**, Eyres A. (2014). *Rhino Husbandry Manual*. International Rhino Foundation. 327 p.

Swanson WF, **Penfold LM**. (2018). Reproductive technology – captive wildlife breeding: mammals and birds. In: *Encyclopedia of Reproduction 2<sup>nd</sup> Edn*. M Skinner. Academic Press, 782-790.

**Metrione LC**, Flora P, Foster W, **Penfold LM**. (2019). The first bachelor group of African elephants in a North American Zoo. In: Wellness for Elephants. MC Morris, VD Segura, DL Forthman, TL Maple. Red Leaf Press, 156-168.

**Penfold LM**, **Wyffels JT**. (2019). Reproductive science in sharks and rays. In: Reproductive Sciences in Animal Conservation, Advances in Experimental Medicine and Biology. P. Comizzoli. Springer Nature Switzerland AG, 465-488.

**Penfold LM**, **Gillis JD**, Pye GW. (2021). Exotics and wild species: specificity and disease control or transmission. In: International Embryo Transfer Society Manual 5<sup>th</sup> Edn. *In press*.

### Abstracts

**Metrione LC**, **Barnes S**, **Penfold LM**. (2011). Spontaneous ovulation in jaguars (*Panthera onca*). International Society for Wildlife Endocrinology, Toronto, Canada.

**Metrione LC**, Hunter D, **Penfold LM**. (2012). Living with the threat of predation: fecal corticosterone metabolites in bison. International Society for Wildlife Endocrinology, Vienna, Austria.

Mylniczzenko N, **Penfold L**. (2012). Ultrasound findings in southern stingrays (*Dasyatis americana*) with and without reproductive disease. International Association for Aquatic Animal Medicine, Atlanta, USA.

**Metrione LC**. (2013). Pregnant, or not pregnant, that is the question. International Society for Wildlife Endocrinology, Chicago, USA.

**Metrione LC**, Flora P, Foster W, **Penfold LM**, Hilton C. (2013). Relationships of dominance and tractability with serum testosterone among a bachelor group of African elephants (*Loxodonta africana*). American Association of Zoo Veterinarians, Salt Lake City, USA.

Van der Goot AC, Martin GB, **Metrione LC**, Paris MCJ, Schook MW, **Penfold LM**. (2013). Attempted control of estrus and ovulation in white rhinoceros using a synthetic progestagen and slow-release GnRH analogue. International Elephant and Rhino Conservation and Research Symposium, Pittsburgh, USA.

Bateman HL, **Metrione L**, Swanson WF. (2014). Reproductive characteristics of captive giant otters. International Otter Congress, Rio de Janeiro, Brazil.

**Sumigama S**, **Penfold LM**, Mylniczzenko N. (2014). Development of criteria for categorizing ultrasonographic images of uterine health assessments in the southern stingray (*Dasyatis americanus*). American Association of Zoo Veterinarians, Orlando, USA.

**Adams CA**, **Penfold LM**. (2015). Techniques for determining hormone concentrations in southern stingray (*Dasyatis americana*) plasma using enzyme immunoassay. International Society for Wildlife Endocrinology Conference, Berlin, Germany.

**Daly-Crews K**, Kopel E, O'Leary M, **Metrione L**. (2015). Space-utilization of an innovative exhibit for tigers (*Panthera tigris*). Association of Zoos and Aquariums Annual Conference, Salt Lake City, USA.

Hensley KA, **Metrione LC**. (2015). Fecal progestagen monitoring to demonstrate the efficacy of melengestrol acetate (MGA) implants as a reversible contraceptive for primates. International Society for Wildlife Endocrinology Conference, Berlin, Germany.

**Metrione LC**, Flora P, Foster W, **Penfold LM**. (2015). Serum testosterone and cortisol as they relate to behavior among group-housed bull African elephants (*Loxodonta africana*). International Society for Wildlife Endocrinology, Berlin, Germany.

Morilla L, Bateman H, **Metrione L**. (2015). The relationship of fecal cortisol metabolite concentrations to environmental variables and reproductive success in zoo-housed giant river otters (*Pteronura brasiliensis*). Association of Zoos and Aquariums, Salt Lake City, USA.

Agnew M, Feltre Y, Agnew D, Christensen B, **Penfold LM**, Moresco A. (2016). Reproductive management: approaches to choosing contraceptives and diagnosing infertility. American Association of Zoo Veterinarians, Atlanta, USA.

Clauss TM, Alsina MM, Schreiber CM, Coco CS, **Wyffels JT**, Dill JA, Camus AC. (2016). Viscera torsion in an adult female sand tiger shark (*Carcharias taurus*) following routine physical examination. Eastern Fish Wildlife Health Conference, Atlantic Beach, USA.

Mylniczenko ND, **Wyffels JT**, **Penfold LM**. (2016). Progress in understanding reproductive disease in southern stingrays (*Dasyatis americana*). American Association of Zoo Veterinarians, Atlanta, USA.

Peele EE, Barrington P, Lankford TE, **Wyffels JT**. (2016). Aging bonnethead shark (*Sphyrna tiburo*) pups using umbilicus morphology. American Elasmobranch Society, New Orleans, USA.

**Wyffels JT**, Adams LM, Christiansen EF, Clarke III EO, Clauss TM, George RH, Heym KJ, Hyatt MW, Mylniczenko ND, **Penfold LM**. (2016). Collection of semen from multiple shark species including the sand tiger shark (*Carcharias taurus*). International Association for Aquatic Animal Medicine, Virginia Beach, USA.

**Wyffels JT**, Bulman F, Coco CS, Fatzinger H, Henningsen A, Jewell J, Martin S, McKnight M, Schreiber CM, Sloan P, **Penfold LM**. (2016). Development and dissemination of tools to access reproductive status of sand tiger sharks (*Carcharias taurus*) and advance the field of assisted reproduction in sharks. Regional Aquatics Workshop, New Orleans, USA.

**Wyffels JT**, **Penfold LM**. (2016). Comparative morphology of shark sperm using light and electron microscopy. American Elasmobranch Society, New Orleans, USA.

**Adams CL**, **Penfold LM** (2017). Gender differences and challenges with determining seasonal testosterone concentrations in male and female sand tiger sharks (*Carcharias taurus*). International Society of Wildlife Endocrinology, Orlando, USA.

Boisseau N, **Metrione LC**, Edwards KL, **Adams CL**, Brown JL, **Penfold LM**. (2017). Trials and tribulations of measuring fecal testosterone and glucocorticoid metabolites in male western lowland gorillas. International Society of Wildlife Endocrinology, Orlando, USA.

Brewer C, Schumann A, **Penfold LM** (2017). Fecal testosterone and aggression in the blue billed curassow. International Society of Wildlife Endocrinology, Orlando, USA.

**Daly-Crews KB, Metrione LC, Penfold LM** (2017). Fecal testosterone monitoring in eastern diamondback rattlesnakes (*Crotalus adamanteus*). International Society of Wildlife Endocrinology, Orlando, USA.

**Metrione LC**, Hunter D, Kruse C, Hansen J, **Penfold LM**. (2017). Interpreting statistical differences in bison (*Bison bison*) fecal glucocorticoid metabolite concentrations. International Society of Wildlife Endocrinology, Orlando, USA.

**Penfold LM**, Graves S, **Adams C**, Puill-Stephan E, Heym K, McKnight M (2107). Sweating the small stuff: application of scientific management increases laboratory reproduction in staghorn coral (*Acropora cervicornis*). American Association of Zoo Veterinarians, Dallas, USA.

Stoops MA, O'Brien JK, Niederlander J, **Metrione L**, Pootoolal J, Niemuller C, Hagen D, Delk K, Douglas RH, Proudfoot J. (2017). Evaluation of bio-release P4 LA300 and estradiol17 $\beta$  to induce estrous cycles and breeding in anestrus African white rhinoceroses (*Ceratotherium simum simum*). International Society of Wildlife Endocrinology, Orlando, USA.

**Adams, CL, Penfold S** Graves, K O'Neil MS, McKnight M (2018). Challenges and advancements in cryopreservation of staghorn coral (*Acropora cervicornis*) sperm. Regional Aquatics Workshop, Tampa, USA.

**Daly-Crews K**, Beshel M, **Metrione L**. (2018). Preliminary validations of a field-friendly, non-invasive method for hormone monitoring in striped newts (*Notophthalmus perstriatus*). Annual Southeast Partners in Amphibian and Reptile Conservation Meeting, Black Mountain, USA.

**Gillis JD, Penfold LM**. (2018). Developing assisted reproductive technologies in banteng (*Bos javanicus*) and lowland anoa (*Bubalus depressicornis*). Association of Zoos and Aquariums, Jacksonville, USA.

Hayes L, **Metrione L**. (2018). Managing 2.3 Sumatran tigers at the Dallas Zoo with an out-of-the-box approach. Felid Taxonomic Advisory Group Meeting, Fresno, USA.

**Metrione LC**, Ivy JA, Brewer C, **Penfold LM**. (2018). Relatedness in southern white rhinoceros: preliminary results and implications for breeding management at White Oak. Association of Zoos and Aquariums, Jacksonville, USA.

**Wyffels JT**, Bulman F, Coco C, Handsel T, Schreiber C, **Penfold LM**. (2018). Sand tiger (*Carcharias taurus*) shark plasma testosterone and semen seasonality for *in situ* and *ex situ* sharks. Regional Aquatics Workshop, Tampa, USA.

**Adams CL**, **Wyffels JT, Penfold LM**. (2019). Relationship between thyroid and testosterone hormones in aquarium and wild sand tiger sharks (*Carcharias taurus*). International Society of Wildlife Endocrinology, Skukuza, South Africa.

**Metrione LC**, Kruse C, Wesley B, Hunter D, **Penfold LM**. (2019). Relationships of nutrition to fecal glucocorticoid metabolites in bison (*Bison bison*). International Society of Wildlife Endocrinology, Skukuza, South Africa.

**Metrione LC**, Price C. (2019). Characterization of ex situ sand tiger shark habitat use and behavior: using ZooMonitor to understand well-being and reproduction. Association of Zoos and Aquariums, New Orleans, USA.

Mogey, RC, Clark, AS, **Adams, CL**, Hart, RC, and Walker, SL. (2019). Conserving primary antibody stocks: The development of robust indirect competitive enzyme linked immunosorbent assays (ELISA). International Society of Wildlife Endocrinology, Skukuza, South Africa.

Moreseco, A, **Penfold, LM**. (2019). Ovarian suppression in giraffe with Improvest. International Society of Wildlife Endocrinology, Skukuza, South Africa.

**Pham Ho NK**, Duskin L, Price C, **Metrione L**. (2019). Visualizing sand tiger shark (*Carcharias taurus*) space use and behavior in aquariums using ZooMonitor and ArcGIS. Regional Aquatics Workshop, Columbus, USA.

**Wyffels JT**, Hoopes L, **Adams CL**, Handsel T, Hyatt M, Newton A, **Penfold LM**. (2019). Endocrine and nutritional parameters and semen quality for *in situ* and aquarium sand tiger sharks (*Carcharias taurus*). American Elasmobranch Society, Snowbird, USA.

**Wyffels JT**, Hoopes L, Christiansen E, **Adams CL**, Handsel T, **Penfold LM**. (2019). Supplementation of elasmobranchs: are we hitting the mark? Regional Aquatics Workshop, Cincinnati, USA.

**Gillis JD**, Woad KJ, Watts JA, Holt WV, **Penfold LM**, Yon L. (2020). Comparison of directional and conventional cryopreservation methods for domestic boar (*Sus domesticus*) sperm. *Cryobiology*, 97: 305.

**Metrione L**, **Pham Ho NK**, Price C, Duskin L, Stamper MA, **Penfold L**. (2020). Characterization of sand tiger shark space use and behavior to understand wellbeing and reproduction. Association of Zoos and Aquariums Virtual Conference.

Anderson CE, **Gillis JD**, Miller SN, Davis MR. (2021). Production of live offspring from unilateral (left) ovariectomized Potamotrygon rays (*Potamotrygon castexi*, *P. leopoldi*, *P. motoro*). International Association for Aquatic Animal Medicine, Tampa, USA.

Eade L, Kelly E, Janssen J, **Metrione L**. (2021). Understanding aggressive and dominance relationships to guide management of *ex situ* *Carcharhinus melanopterus*. Association of Zoos and Aquariums Virtual Conference.

**Gillis JD**. (2021). How do mating systems influence biobanking strategies? Association of Zoos and Aquariums Virtual Conference.

**Gillis JD**, Montano G, **Penfold LM** (2021). Comparison of conventional and controlled rate freezing methods to cryopreserve white spotted bamboo shark (*Chiloscyllium plagiosum*) sperm: implications for elasmobranch biobanking efforts. International Embryo Technology Society, Savannah, USA.

**Mowle, K**, **Penfold, LM**. (2021). Determining baseline sex steroid hormone concentrations in adult and juvenile zebra sharks (*Stegostoma fasciatum*). International Society of Wildlife Endocrinology Virtual Conference.

**Pham Ho NK, Metrione L**, Price C, Duskin L, Stamper MA, **Penfold L**. (2021). Three-dimensional GIS: from visualization to analysis, a technique to incorporating depth into habitat use descriptions for aquariums. Association of Zoos and Aquariums Virtual Conference.

Stoops M, **Metrione L**, **Gillis JD**, Wojtusik J, Bezjian M, Flacke G, Myers G, James M, **Penfold LM**. (2021). Successful artificial insemination with induced ovulation in a fully anesthetized greater one-horned rhino. Association of Zoos and Aquariums Virtual Conference.

### Newsletters and Non-scientific Publications

Kopel EM, **Daly-Crews K**, **Metrione L**. (2016). Location and activity preferences of tigers living in a complex habitat. *Animal Keeper Forum*, 43: 254-258.

**Gillis JD**. (2019). Exciting PhD research: Advancing genome resource banking methods for Action Indonesia GSMPs'. *Action Indonesia Newsletter*, p. 2.

Hayes L, **Metrione L**. (2019). Managing 2.3 Sumatran tigers in a rotating group system to mitigate potential social stress and promote breeding at the Dallas Zoo. *Animal Keeper Forum*, 46: 10-16.

### Grants

**Penfold LM, Sumigama S**. (2013). Understanding causes of reproductive disease in southern stingrays. \$9,424. Morris Animal Foundation.

**Penfold LM**. (2017). Understanding stingray reproductive disease. \$8,350. Morris Animal Foundation.

**Penfold LM**. (2017). Discovering how sand tiger sharks rely on shipwrecks of the Graveyard of the Atlantic for key habitat. \$5,000. SeaWorld Busch Gardens Conservation Fund.

**Penfold LM, Wyffels J**. (2018). Reproductive research to support captive sustainability of sand tiger sharks, *Carcharias taurus*. \$15,000. SeaWorld Busch Gardens Conservation Fund.

**Metrione LC, Pham Ho NK**, Price C. (2019). Characterization of sand tiger shark enclosure use and behavior to understand wellbeing and reproduction. \$12,130. Association of Zoos and Aquariums Conservation Grants Fund and Disney Conservation Fund.

**Metrione LC, Pham Ho NK**, Price C. (2020). Characterization of sand tiger shark enclosure use and behavior to understand wellbeing and reproduction. \$11,700. Association of Zoos and Aquariums Conservation Grants Fund.

Stoops MA, O'Brien J, Robeck T, **Metrione L**. (2020). Transformative approach to building sustainable rhino populations within our nation's zoos: a rhino assisted reproductive endeavor. \$445,069. Institute of Museum and Library Services.



## SEZARC 2010-2022 PUBLICATIONS

Christensen E, Hyatt M, **Penfold LM.** (2021). Seasonal reproductive health assessments of in situ sand tiger sharks (*Carcharias taurus*) to develop a seasonally appropriate health database for ex situ populations. \$23,709. Association of Zoos and Aquariums Conservation Grants Fund.

Roth T, Pennington P, Freeman E, **Metrione L,** Miller M, Ramer J, Schook M. (2021). American Institute of Rhinoceros Science (AIRS)—a model for saving species with science ex situ. \$770,601. Institute of Museum and Library Services.