



SWFS NEWS

Inside this edition: Rhino Species ID Test / Airstrike Management / SWFS Board Vacancy

New rhino horn species ID test: an international collaboration

By Kyle Ewart, Australian Centre for Wildlife Genomics

An international team of SWFS members has developed a validated and standardized species identification test for seized rhino horn. This newly published test provides a blueprint for international collaboration to advance method development and validation for the wildlife forensic community.

The rhino poaching crisis is well known to members of the SWFS community. One of the biggest challenges facing investigations of seized horns is the robust identification of the rhino (or substitute) species involved, especially in non-range state countries. When a suspected rhino horn is seized, authorities need to know what species it comes from, including if it is actually rhino, in order to trigger appropriate law enforcement actions.

Because of the high value of these products, there are many fraudulent rhino horns on the black market, including those made from water buffalo horn and even

horse hoof! Further, because there are five extant species of rhino: two African species, the white rhino and black rhino; and three Asian species, the Indian rhino, Javan rhino and Sumatran rhino, knowing the species of rhino the horn belongs to will provide authorities with important intelligence information and guide where conservation and enforcement efforts should be directed.

In June 2016 discussion at the RhODIS Scientific workshop held in South Africa identified the urgent need for an internationally standardized rhino species identification test. This led to a collaboration between six organizations in four different countries, including: the Australian Centre for Wildlife Genomics at the Australian Museum Research Institute and Flinders University, both based in Australia, the Wildlife DNA Forensics Unit at Science and Advice for Scottish Agriculture in the UK, the Institute of Ecology and

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Welcome from the SWFS President

Dear SWFS Members

Happy New Year and welcome to the January 2018 issue of SWFS news.

The start of the year is always a good excuse to take stock, lay your plans out on the table and, depending on your state of mind, convince yourself that it's all under control and achievable, or just panic at the impossibility of it all. If you're like me then, as usual, reality will probably fall somewhere in between. That said, this year seems likely to be particularly busy with international initiatives involving the Society and its members set to increase even more.

In this edition, alongside all of the project and casework news, there are a couple of articles I want to draw particular attention to, as they relate directly to you, the members. First of all, we have a vacancy on the board, as a result of Christina Lindquist's decision to step down. We are seeking an immediate replacement, so please see page 13 if you are interested in the post, or think that you can persuade a shy colleague to step forward.

On a similar note, and following my message in the last edition, the SWFS board have agreed to put in place a process for the staggered turnover of board members (see VP Tasha Bauman's article on page 12 for details). This means that every two years there will be vacancies on the board for new members, beginning at the start of the next board term in mid-2019. Once again, your Society needs you, so please consider this opportunity.

Alongside these changes, SWFS is continually looking to improve the resources available to our membership. In the short term, we have decided to bring our membership management process online, which should not only also provide members with instant access to lab and member listings within the Society, but should also help make our membership team less stressed – see page 18 for info.

Possibly more exciting to everyone is an initiative to create a small project award fund to support R&D / validation projects in wildlife forensics. The board has approved this concept in principle and we are now thrashing out the detail, but applications would be limited to members and awards would be offered either annually or every two years. This initiative was effectively proposed to us by a member and seems to make a lot of sense, wherever affordable. The role of the board, in addition to organizing the SWFS meetings, is to help our members increase their ability to do forensic science, so if there are other ideas out there, please email them to us.

In the meantime, enjoy the latest edition, let us know what you are doing and carry on the good work!

Regards

Rob Ogden



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Society for Wildlife Forensic Science
www.wildlifeforensicscience.org

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Letter from the Director of Communications

Happy New Year! Wishing you a healthy and prosperous year. I hope that is clearly communicated to you. As Communications Director that is my goal. I hope to facilitate timely, clear and concise communications to our members and beyond. Getting accurate information when you need it in an organization that spans the globe can be a difficult task. My friends in Africa and India are sleeping while I am at work. At the end of my day folks in Australia are just getting up. You can see the difficulty when our times do not overlap. In this age of electronic communications the Society for Wildlife Forensic Science has put time and resources into our web page (<https://www.wildlifeforensicscience.org/>) to help bridge this gap.

On our web site you will find a wealth of information! Landing on the home page, there are links to some current events, with many more links to other important information. You can connect to the previous issues of our newsletter full of articles and information on wildlife forensics. You will find a review of the SWFS meeting that was held in Edinburgh Scotland last year with a lot of great pictures illustrating all the hard work accomplished at the meeting. Importantly, you will find the information needed to become a valued member of the Society for Wildlife Forensic Science. There is a tab, "Programs", that will connect you to the information to become a Certified Wildlife Forensic Scientist, enter your lab into the proficiency testing program or let you know how to participate in the student mentorship program.

Make sure you return to the web page on a regular basis as significant changes are coming. Our next meeting of the SWFS will be in Denver, Colorado in 2019 so you will want to see the event updates as they are posted regularly to the web site. In an effort to continually improve, we have planned many updates and additions to our web site. Perhaps even a little more interactive materials.

Currently you can go on the web site and order your tickets for the Wyoming Game & Fish Commissioner's License Raffle tickets for a chance to participate in the hunt of a lifetime. Soon there will be translations of several of our documents in French, courtesy of Jean-François Dubois, Senior Wildlife Officer for Environment and Climate Change Canada.

We are also planning to establish a member restricted access section of the web site to host resources reserved for Society members and to make contact with colleagues easier. If you can think of anything specific you would like to see on the site, please forward your suggestions and content to me (bcassidy@dnasolutionsusa.com) as we are in the planning stages right now. I look forward to working with you to continually improve our communications. As always – Keep It Wild!

Brandt Cassidy, Ph.D.



Is it a bird? The Application of Molecular Tools to the Management of Wildlife Airstrikes.

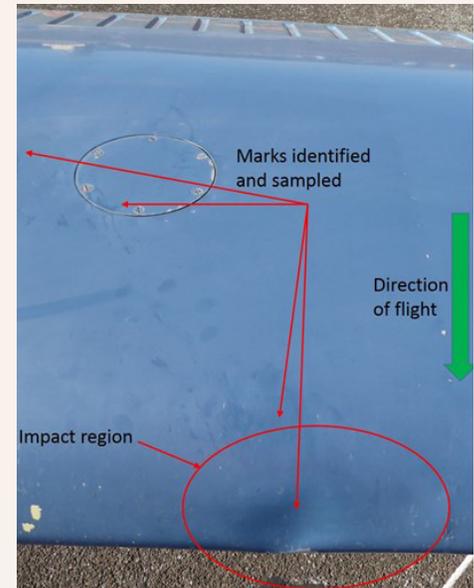
By Matthew Lott, Research Assistant, Australian Centre for Wildlife Genomics

A recent wildlife airstrike at Adelaide's Parafield Airport highlighted the important role that molecular tools can play in the management of problem species around Australian aerodromes. The pilot of a light aircraft reported striking what he initially believed to be a drone while on approach to the airport in Adelaide's northern suburbs. A subsequent inspection of the aircraft revealed minor damage to the right wing.

Officials from the Australian Transport Safety Bureau (ATSB) searched the area but were unable to recover any debris. Residue from the impact region was provided to the Australian Centre for Wildlife Genomics at the Australian

Museum for genetic analysis. DNA testing revealed that a grey-headed flying-fox (*Pteropus poliocephalus*) was responsible for the strike. While historically rare in South Australia, since 2010 grey-headed flying-foxes have been dispersing to Adelaide in increasing numbers.

Airstrike incidents involving wildlife cause millions of dollars in damages each year, and represent a significant safety hazard. It is therefore imperative that stakeholders have the tools to rapidly ascertain the identity of species that are disproportionately responsible for damaging aircraft. This will facilitate the development of more targeted management strategies that will not only maintain the high level



of risk management for which the aviation industry is known, but will also contribute to the protection of Australia's unique wildlife.



An introduction to the ForCyt project

by Lucy Webster, Science and Advice for Scottish Agriculture, SWFS TWG chair

For those of us who work in the DNA analysis side of wildlife forensics, we may all be familiar with the sense of dread when asked by an investigator if we can identify the Webster's striped swamp owl (*Hypotheticalus websterii*) from a toenail – a species we have never heard of and does not exist in our country but was recently added to CITES due to pressures from the international toenail trade. While DNA from this species should amplify with standard tests, there is only one cytochrome b sequence on GenBank for this species and it was submitted in the 1990s by an institution that no longer exists. With no first-hand knowledge of this species, or sufficiently reliable reference data, we have to be very clear on these limitations to our capability when we respond to the investigator.



Hypotheticalus websterii

The absence of accessible validated reference DNA data can be a huge stumbling block when it comes to providing sound DNA species identification results in wildlife forensic casework. In-house databases may only include a limited number of species, most of which would have native range within that country and yet an illegal wildlife trade investigation can be initiated in any country from source to consumer. While there might be a sequence or two on GenBank, the reliability of these sequences could be brought into question in court, and the original sample used to produce the sequence may not be accessible, traceable, or have a reliable morphological identification. In order to address this gap, the ForCyt project has begun with financial support from U.S. Agency for International Development (USAID) through the Wildlife TRAPS Project. This project aims to develop validated reference mitochondrial genomes (mitogenome) from a number of heavily traded animal species of particular conservation concern for use in forensic casework.

Initial work has been carried out to identify DNA samples for use in the project that have a curated record traceable to an individual animal that was identified morphologically to species-level by

a suitable expert. The next step is to produce the reference mitogenomes from these samples and this work will be started in February 2018. By producing a full mitogenome, reference DNA sequences produced will be useful for all labs that use mitochondrial genes for species identification, irrespective of the genes that they routinely use.

The ForCyt project is led by Dr Ross McEwing from TRACE Wildlife Forensics Network and Nick Ahlers from TRAFFIC, in partnership with laboratories from Malaysia, South Africa, Australia, the USA and the UK. My role in this project is as chair of the SWFS Technical Working Group, and I can see a huge benefit to SWFS membership in the quality reference material that will be produced. For more details on the project, please see our paper which details the first phase of work [1].

This international collaborative project will produce a flexible, yet forensically robust resource which will be of benefit to wildlife crime investigations around the globe. Who knows, perhaps we will include the lesser-spotted Webster's swamp shrew in the next phase...

1. Ahlers et al 2017, 'ForCyt' DNA database of wildlife species. FSI: Genetics Supplement Series Volume 6, December 2017, Pages e466-e468. <http://dx.doi.org/10.1016/j.fsigss.2017.09.195>

New rhino horn species ID test: an international collaboration

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Biological Resources in Vietnam and the WIFOS Laboratory, Department of National Parks in Thailand as well as TRACE Wildlife Forensic Network.

Through our combined efforts, we have developed a new test, based on DNA sequence differences at the cytochrome-b region, that can identify the species of a seized horn, including some commonly used substitutes. Importantly, the test has been validated and standardized across the aforementioned labs, two critical components of a test used in a forensic investigation. Validation studies are relatively rare in wildlife forensic science (in comparison to human forensics), which is largely due to the scale and number of species involved in the illegal wildlife trade, and the often limited resources available to the labs tasked with carrying out forensic testing. However, following reports such as the 2009 National Research Council and the PCAST report on the state of forensic sciences, published validation studies are



becoming expected standard practice. We have ensured that the test we have developed for these high profile species is reproducible, robust and works on even very small amounts of rhino DNA, ensuring that this test is currently the most effective and appropriate method to identify the species of rhino horn. As part of this testing, the Thai and Vietnamese labs were even able to carry out species identification

in actual seizure investigations, showing its real-world applicability.

This project has exemplified the value of international collaboration and through combining our efforts we hope that we have developed a test that will improve the enforcement and prosecution outcomes of rhino horn trafficking crimes, and subsequently act as a deterrent for individuals that wish to enter the illegal rhino horn trade.



Harmony in Action – Towards International Standardisation in Wildlife Forensics and Crime Scene Investigation

By Kim Frazier, Wyoming Game and Fish

In November of 2017 a workshop was held in The Hague, Netherlands aimed at the harmonization of development and training programs in the fields of Wildlife Crime Scene Investigation (WCSI) and Wildlife Sample Analysis (WSA) in Africa. Twenty seven technical experts from around the globe, including six key African range states, were invited to participate in this workshop with the end goal of developing standards in training programs and assessment for both WCSI and WSA, and to determine the basic infrastructure/equipment of a wildlife forensic laboratory for WSA.

The workshop was a collaboration between the European Commission's Forensic Alliance Against Wildlife Crime

Initiative and the USAID Wildlife TRAPS project. It was organized by the Netherlands Forensic Institute, TRACE Wildlife Forensics Network, TRAFFIC and UNODC's Wildlife and Forest Crime Unit. SWFS was represented by Lucy Webster (chair of the Technical Working Group) and me (double hatting with my OSAC role).

Topics of discussion included: standards and guidelines, minimum infrastructure/equipment required for a forensic laboratory and protocol/training requirements for practitioners. A great deal of work was performed in advance of the meeting to compile documents from various agencies around the world already dealing with these questions. With these documents



Workshop discussion, Novotel, the Hague, Tuesday 28th November

as the basis, the group was split into two groups- WSA and WCSI- to further discuss the issues.

During the WSA side of the meeting, it was decided that the SWFS Standards and Guidelines written by the Scientific Working Group for Wildlife Forensics (SWGWILD) would serve as the basis of the Wildlife Forensic International Standards and Guidelines. Some edits/additions



Workshop participants, the Hague, Tuesday 28th November

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Harmony in Action – Towards International Standardisation in Wildlife Forensics and Crime Scene Investigation

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to these S&Gs were suggested and Lucy now plans to tackle these with the aid of the TWG members. A great deal of information was compiled on the minimum requirements for an operating wildlife forensic lab, training for practitioners and training assessment. This information should be available soon.

The WCSI side of the meeting discussed protocols and training for wildlife crime scene investigators. There was a great deal of concern with current variation in the training of first responders to a crime scene and

a plan was developed for developing protocols/training programs for first responders and wildlife crime scene investigators.

The workshop was a success in bringing together technical experts in the field and a tremendous amount of work was accomplished to meet the goals of the workshop. Looking forward, a number of activities have been identified to ensure that our ideas are put into action and we are optimistic that funds will be available to make them happen.



Workshop dinner,
Wednesday 29th November



Workshop participants, the Hague

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Update on international transfer of forensic-related samples - CITES

By Rebecca Johnson, Director SWFS Membership and Outreach, and Rob Ogden, President SWFS

One of our primary goals at SWFS is to take leadership on matters that we believe are of significance to our members. In this vein, the society has recently been involved in working with CITES and members of the Standing Committee to examine mechanisms to facilitate the efficient international movement of samples for forensic or enforcement purposes, particularly those of suspected CITES-listed species.

As background for those members who weren't able to join us at our 2017 SWFS meeting in Edinburgh: At the 17th Conference of the Parties to CITES meeting (CoP17, Johannesburg, 2016) decision 17.85 was adopted. Paragraph (a) is particularly relevant to many of our member laboratories. It states: "a) examine mechanisms to facilitate the efficient international movement of samples for forensic or enforcement



purposes, for consideration by the 18th Conference of the Parties;"

In response to this decision, SWFS, in collaboration with the Australian Government and the Australian Museum Research Institute, prepared an information document ahead of the 69th meeting of the Standing Committee

(recently held in Geneva 27 November – 1 December 2017) for consideration by the parties. This document aimed to raise awareness of the decision and present the key issues and options for addressing them.

At the Standing Committee, the information document was presented by the Australian delegation and it was decided to combine actions in relation to this decision with another related issue on simplified procedures for CITES permitting. Both topics will now be the subject of a working group, in which SWFS will participate, to develop a proposal that will be voted on at CITES CoP 18, in Sri Lanka, in 2019.

We will keep you posted on developments.



27th Congress of the International Society for Forensic Genetics (ISFG), Seoul, 28th August to 2nd September.

By Adrian Linacre, Flinders University

In late August, I was one of over 600 delegates who attended the biennial ISFG conference, held this year in South Korea. The hosts were so friendly and made us all feel at home. This was my first visit to Seoul and I actually returned shortly after, such was my fascination in the mix of eastern cultures with Buddhist temples and shrines throughout the city contrasting with the very modern western shopping arcades and high-rise buildings.

The themes of ISFG this year were: application of massively parallel DNA sequencing (NGS to some), body fluid identification using either mRNA or methylation analysis, transfer of DNA and body fluids to aid in evaluation of DNA evidence, and interpretation of complex mixtures. Good quality science is core to the success of the ISFG congresses. Workshops

before the congress are run by those who lead their field and are really well attended, and there is always the chance to network at welcoming events and conference dinners (see other photos!).

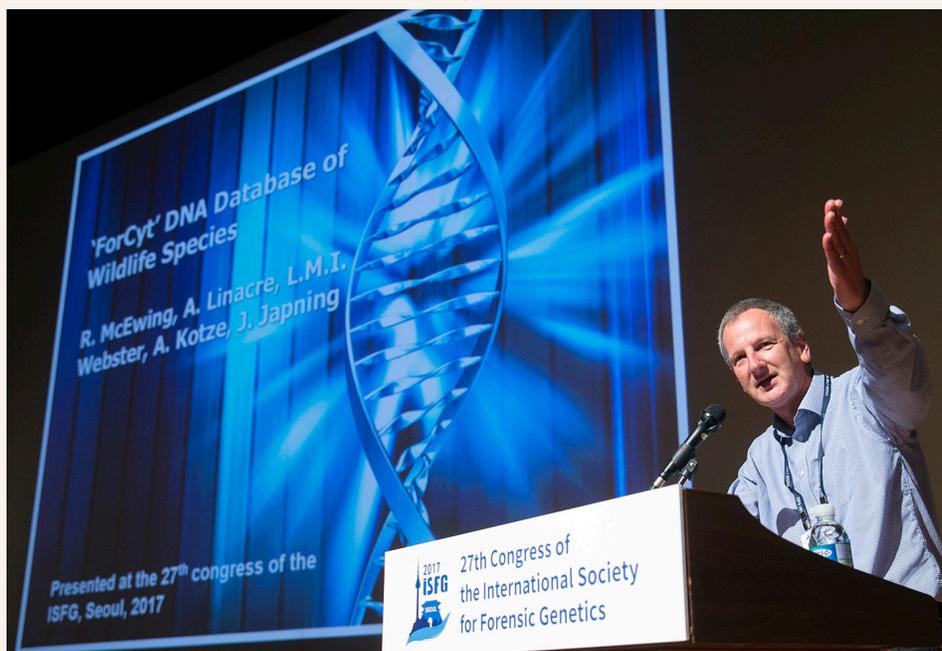
In my opinion, the ISFG conference showcases cutting edge science in human identification and is by far and away the best human genetics meeting to attend. I have championed non-human talks at previous ISFG meetings and had the real honour of having been invited to give two plenary talks in the past (at the 22nd and 24th meetings in Copenhagen and Vienna respectively). There are no parallel streams at an ISFG, rather all talks are in one auditorium and therefore with only one stream there is very high competition for oral presentations. I was asked to present this year on the ForCyt initiative on



behalf of all the authors. A photo was taken with me in full flow – not hailing a taxi. I am delighted to report that I received very positive feedback and much support. This underlines how there is real interest in wildlife forensic science within the ISFG community and I think that the only reason there is not more exposure is that almost all forensic laboratories are funded to focus on human identification only, with little spare capacity to assist with alleged wildlife crimes.



The next meeting of the ISFG will be held in Prague in September of 2019. I very much encourage as many of us as possible to think about coming along. Our colleagues in the human identification community are welcoming and, if more from the wildlife forensic science community attend, our profile can only increase.



Represent!

By Brandt Cassidy, DNA Solutions

The 2018 Annual Scientific Meeting of the American Academy of Forensic Sciences convenes on February 19, 2018. Approximately 5,000 world-renowned professionals representing all 50 United States (of America) and 71 other countries worldwide will present educational seminars and posters covering activities in all areas of forensic science. Although the meeting has a general emphasis on human forensics, other disciplines are often represented.

The upcoming meeting will be the first time that a group of abstracts has been presented on behalf of the Society for Wildlife Forensic Science. This move forms a concerted effort to promote the Society and the efforts of our members around the world. The wildlife forensic presentations, coordinated by Christina Lindquist, have been accepted for oral presentation by the screening committee. We each were congratulated on the acceptance of our abstract, as only a portion of the abstracts submitted to the screening committee are selected for presentation.

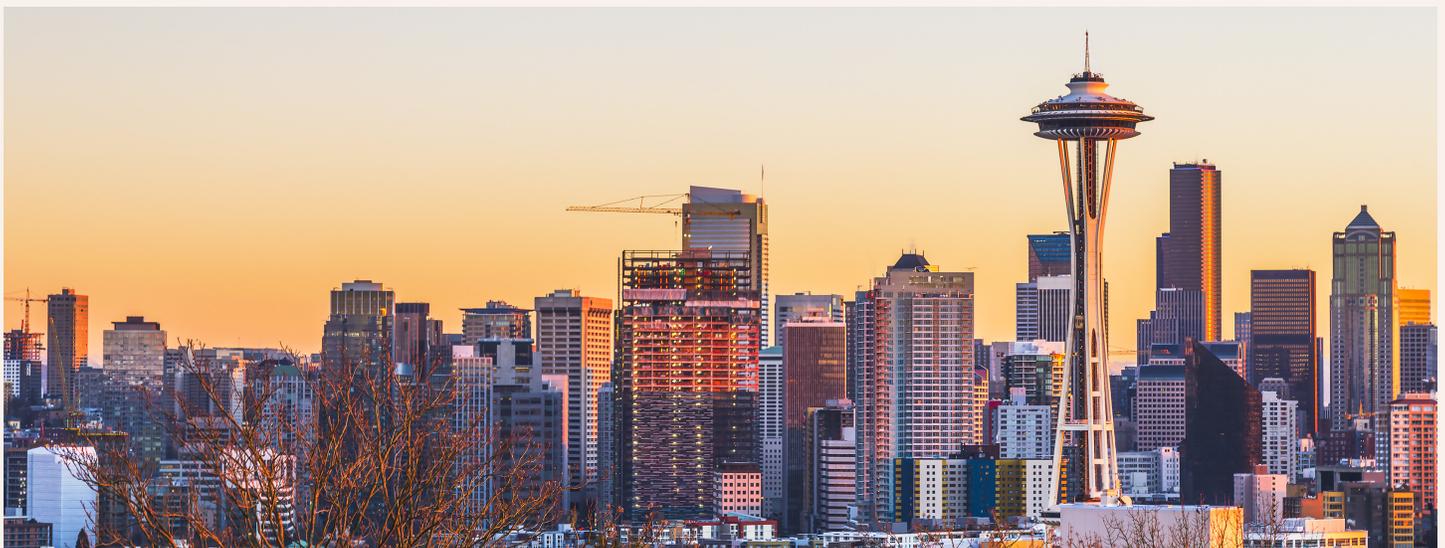
To bring attention to our related presentations, all are titled with the prefix “A Different Kind of DNA Casework: ...” followed by our own specialty. Teri Kun will present “When it Barks or Purrs”, Kimberly Frazier will present “When It Has Fangs or Antlers”, Brandt Cassidy will present “When It Has Antlers”, Piper Schwenke will present “When It Has

Fins”, and Mary K. Burnham-Curtis will present “When It Has Horns or Tusks”.

Each of the presenters will have 15 minutes to describe the application of forensic techniques for the protection of wildlife and prosecution of those committing crimes involving wildlife. Scientific data and case studies will highlight the work being done in our laboratories and across the globe. James Creecy will also present his work in the same session in a talk titled “The Rapid Online Wildlife Identification Network (ROWIN): A Bioinformatic Analysis Pipeline Developed for Wildlife DNA Forensics”.

If you are going to the AAFS meeting, we hope you will plan to attend this session held on Thursday within General Session I at 10:30am to 12:00 noon. If you know of other delegates who will be attending the AAFS meeting, please let them know about this group of talks so they can help spread the word. It would be great to fill the room so we can show the forensic community the impact we have in the field of forensic science and impart on other delegates the work that we are so excited about.

See <https://www.aafs.org/meetings/aafs-70th-annual-scientific-meeting-seattle-washington-2018/> for more information about the meeting.



Further support for SWFS from Wyoming Game and Fish Commissioners: Donated license to be auctioned via phone bids through March 28

By Tasha Bauman, Wyoming Game & Fish

The Society for Wildlife Forensic Science would like to thank the Wyoming Game and Fish Commissioners Gay Lynn Byrd and Patrick Crank for the donation of a 2018 Commissioner’s License. Wyoming statutes state that, that each appointed Commissioner can issue at full price complimentary elk, deer or antelope licenses to a charitable organization.

SWFS received one license from Gay Lynn Byrd that will be auctioned off by taking phone bids from January 2nd through March 28th. The bidding will start at \$8,500 and the license will be awarded to the highest bidder. To place a bid, please contact Tasha Bauman at +1-307-760-9336. The profits from the commissioner’s license will go to support the Technical Working Group.

Commissioner Patrick Crank asked the Society to sell a license with the goals of raising awareness of the

Wyoming Game and Fish Outdoor Expo, and to give every hunter the opportunity to win a Commissioner’s License.

The Society for Wildlife Forensic Science is selling a Commissioner’s License on behalf of the Wyoming Outdoor Expo. Raffle tickets can be purchased at <https://raffles.ticketprinting.com/raffle/6364-Wyoming-Game--Fish-Commissioners-License-Raffle/>. SWFS will receive 10% of the ticket sales.



SWFS Board Composition

By Tasha Bauman, Wyoming Game and Fish

The Society for Wildlife Forensic Science board is looking to make some changes over the next several years. We want to encourage board turnover and the inclusion of new board members, so the plan is to stagger the terms over which board members serve to create gradual change in board composition over the long term. This process has already started, as President Rob Ogden and myself have asked for volunteers who

would be prepared to step down in either 2019, 2021 or 2023.

We are aiming for a situation where new members, starting in 2019, have up to two 4-year terms, as per the bylaws, before having to step down. They must then wait at least one term before being eligible for re-election.

The turnover systems would look something like this:

Year	Original Board Members	Board Members Rolling off	New Board Members
2017	12	0	0
2019	9	3	3
2021	6 + 3 from 2019	3	3
2023	3 + 3 from 2019 & 2021	3	3
2025	0 + 3 from 2019, 2021, 2025	3	3
2027	9 (the process starts over)	3	3

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SWFS Board Composition

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Using this system would allow for gradual change and would mean that the entire board would rotate every eight years. With a couple of exceptions, initial board members that reach their term's end would be eligible to come back on after four years. Any person elected into the vice president position, up to the end of their eight-year term, is granted a further eight years of incoming, sitting and outgoing presidential position on the board.

For this change to be successful we need Society members to step up and volunteer for a board position.

This is a wonderful leadership opportunity for each of you, so we ask that you please consider getting involved. If you are interested please, send an email to Rob Ogden (rob.ogden@tracenet.org) and Tasha Bauman (tasha.bauman@wyo.gov). We are anticipating a graceful turnover and are looking forward to working with our members.

Note: Aside from this re-structuring, we also have a board position available immediately. If you are interested, please see the article below.

Board Vacancy – Nominees Required

By Rob Ogden, SWFS President

As of the end of 2017, SWFS has a vacancy on its twelve-person board of directors. This is due to Christina Lindquist taking the decision to step down during an upcoming maternity period. Christina has been a key member of the board since SWFS was established, contributing hugely to the development of the Society and the SWGWILD Standards & Guidelines, and almost single-handedly producing the Wildlife Forensics Quality Management System template, used by many members around the world. She has managed all of this with a particularly impressive blend of enthusiasm, professional expertise, efficiency and calm.

On behalf of the entire board, I would like to thank Christina for her service to SWFS. She remains a member and we look forward to her continued support of SWFS activities over the coming years.

So, we now need to fill the vacant board position. We are seeking an enthusiastic wildlife forensic scientist to join the current group of directors. In terms of workload, the new director will be expected to attend six board meetings per year (1-2 hours by teleconference), as well as the biennial Society meeting. Over time, it is likely that the new member will take

on some additional responsibilities relating to their particular interests and the needs of the Society. The position is entirely voluntary.

Prospective board members will need to be nominated by two existing directors, with a vote being taken in the case of multiple nominees. If you are interested in applying for a position on the board, in the first instance please contact our vice-president, Tasha Bauman (tasha.bauman@wyo.gov), by 28th February 2018. If you have any questions or queries about the role of a board director, please get in touch. All enquiries are very welcome.

The SWFS board of directors must adhere to the Society's bylaws; prospective board members are encouraged to read these on the SWFS website when considering an application (<https://www.wildlifeforensicscience.org/mission/bylaws/>).

Please note that to integrate with the new system of rolling board membership (see page 12), the new board member will join the existing 2017 cycle, serving three years remaining in this term until 2021, with an option to be re-elected for a further four years beyond.

Mary K. Burnham Curtis, Ph.D.

What's your current position?

Currently I'm a Senior Forensic Scientist and the Team Leader for the Genetics Section at the US Fish and Wildlife Service's National Fish and Wildlife Forensic Laboratory.

How long have you been in this position?

I've been Team Leader since 2007, but I came to the Lab in March 2001 from the USGS Great Lakes Science Center in Ann Arbor.

Can you give me a brief overview of what it is you do in your work?

As Team Leader of the Genetics Section, I oversee the casework and case-related research that is conducted at the lab that involves genetic analysis. My current staff consists of 3 full time analysts (including myself), 1 analyst/NGS research geneticist, an evidence/database technician, and a lab technician. As a casework analyst, I would be responsible for conducting the genetics analyses necessary in a case to answer the question posed by the investigator. Those questions are primarily "What species is it?" and "Does this evidence originate from the same animal as that piece of evidence?" Any background research directly related to our casework is conducted by the analysts with assistance from our awesome lab technicians. My primary area of expertise is freshwater fish identification with morphology and genetics, and I also do population genetics analyses on Bald and Golden eagles, North American cervids (when necessary...), sturgeon and paddlefish. And of course, we

are often asked to identify many items of unknown origin.

How did you first get involved in Wildlife Forensics?

I became actively involved in what is currently known as "Wildlife Forensics" when I was hired to work at the Lab in Ashland. Prior to that, I and a colleague back at the USGS Great Lakes Science Center were doing something that was more like a precursor to Wildlife Forensics. The Great Lakes Fishery Commission (an entity that is part of the International Joint Commission, which is a US-Canadian partnership in the Great Lakes region) would often call on us to assist State natural resources law enforcement with fish identification questions related to commercial and sport fishing, primarily with lake trout and walleye. It was mostly to address investigative questions, and there was no expectation that we would become expert witnesses, but we were using all the same techniques and best practices to answer species ID questions.

What was your first impression of Wildlife Forensics?

I was first aware of "Wildlife Forensics" when I picked up a copy of the US Fish and Wildlife Service's "People, Land, and Water" newsletter back in 1988 or 1989. The USGS Lab I had just been hired into as a Cooperative Education Student was originally a US Fish and Wildlife Fishery Research Lab before they moved most of USFWS research into the US Geological Survey. The main story in that issue



Mary K. Burnham Curtis & son, local emergency rescue training

of PL&W was the dedication of the National Fish and Wildlife Forensic Lab in Ashland, Oregon, and I was fascinated. At that moment, I decided that getting a job at the NFWFL was going to be on my career list!

What has surprised you most about working with Wildlife Forensics?

I think what has surprised me most is the volume of material that is involved in the illicit trade, and the ability of the criminals to move from one resource to another. A pleasant surprise was that since genetic techniques are pretty standard as applied to different species, my training in phylogenetics, evolution, and classical taxonomy was much more applicable to my job than knowledge I had about the criminal justice system when I first started working at the Lab.

Mary K. Burnham Curtis, Ph.D

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What do you find most challenging about Wildlife Forensics?

Keeping up with the new and diverse questions that the special agents and wildlife inspectors come up with. In any given week I'll field calls about whether or not we can identify any number of different species (some of which we've never dealt with yet), questions about whether an item in shipment qualifies as a biological sample or not (and thus does it or does it not need the accompanying paperwork...), and receive photographs for provisional identification. The biggest challenge, currently, I think, is compliance with best practices and the changing landscape of lab accreditation.

What would you say most motivates you to do what you do?

I grew up on the Great Lakes and was exposed to the commercial fishing culture of the Great Lakes communities. When I was offered an opportunity in grad school to work on Lake Superior on a project that involved the commercial lake trout fishermen, I was really excited. I originally thought I wanted to be a college professor or academic researcher, but being out on the water with people who work daily with the resource gave me a greater appreciation for applied research. That's what motivates me to this day – I want to do something that has a direct positive impact on the resource and meets my desire to be a good steward of our natural treasures.

What were you doing before you began your current position?

Prior to working at the NFWFL,



One of Curtis' neighbours caught on trail cam

I was hired from my Cooperative Education program by the USFWS National Fisheries Research Center – Great Lakes, and was initially placed as a Fishery Biologist on the Research Vessel Cisco doing fish population dynamics work on Lake Michigan. Once USGS took control of USFWS research, I was assigned to set up a genetics lab to study population genetics of Great Lakes fishes such as lake trout and Coaster brook trout. As part of my duties, I was able to set up cooperative studies with several National Parks (Yellowstone and Voyageurs), Great Lakes Fishery Commission, other USGS labs, and the Partnership for Ecosystem Research and Management (PERM Unit) at Michigan State University.

Tell me about some of the people you've met while working in Wildlife Forensics?

I have been honored to work with a plethora of amazing people working in Wildlife Forensics – from the

inspectors and agents that work for the USFWS, NOAA Fisheries, and State natural resource agencies, to colleagues in the State, Federal, and international wildlife forensics and natural resources communities. I was lucky enough to be assigned an opportunity to meet with members of forensic labs in Malaysia, Indonesia, Philippines, Thailand, and China back in 2012, some of whom I've been able to reconnect with in the last few years at SWFS meetings and events. I've also been honored to have been able to interact with some of our representatives on the judicial side, particularly Bob Anderson, with whom I had the scary honor of participating in a mock trial. There are so many amazingly diverse people who work in this field, and I am always awed by their unwavering dedication to their professions.

Mary K. Burnham Curtis, Ph.D

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Tell me about someone who has influenced your decision to work in Wildlife Forensics?

My first interaction with the Law Enforcement aspect of natural resource management was with the head of the Law Enforcement Committee of the Great Lakes Fishery Commission. Back in the 1980's, the USFWS/OLE (Office of Law Enforcement) agents were co-located with the National Fisheries Research Center, and we all went to regional meetings together. The members of the Law Enforcement Committee asked me to work with some of the commercial fishermen to set up criteria by which they could legally recognize different lake trout forms in the Great Lakes as restoration activities were showing improvement. That's when I first realized how science could be used to address legal questions. For the next few years, my then-supervisor and I worked with the Great Lakes Science Center (GLSC) to educate the Great Lakes fishery managers about the usefulness of genetic techniques to answer some of their fish identification questions.

Where did you grow up?

I grew up in Riverside, Illinois, a small town in the western Chicago suburbs. I spent most of my childhood summers in Leland, Michigan, where my grandmother had a home.

What was it like to grow up in Riverside?

Riverside is still a relatively small town (population was less than 10,000 when I was a kid) compared to the surrounding area. It was

originally designed by Frederick Law Olmstead as "A Village in A Park" with the residential area expanded from a large park along the Des Plaines River (we called it Swan Pond) in the middle of town. Many of the early homes were designed by architects including Lewis Sullivan, Frank Lloyd Wright, and Daniel Burnham (who happens to be a distant relative of mine). The Burlington Northern railway ran right through the downtown, and we loved taking the train into Chicago to go shopping. I lived about a mile from my school and we would walk or ride our bikes every day past the big ball field, the kiddie park, and the Convent next to St. Mary's church. Fourth of July was always a blast – our fire department would battle the North Riverside fire department with a "tug of war" where they would shoot fire hoses at a barrel strung up across the Big Ball Field. It was very "small town America"!

Did you go to college? Yes

Where did you go, and what was that like?

I did my undergrad studies at DePauw University in Greencastle, Indiana, a small Methodist college in the center of Putnam County, in south central Indiana, surrounded by cornfields. Their curriculum was based on a liberal arts core, but their specialties have always been their music, management, and journalism programs (the Society of Professional Journalists, formerly Sigma Delta Chi, was founded at DePauw). I actually entered college intending to go to medical school

to be an orthopedic surgeon, but I got sidetracked by my fascination with bugs and fish and ended up with a degree in zoology! The small size of the school (only about 2500 students at the time) made it easy to take advantage of leadership opportunities and participate in a lot of activities – my favorite was the DePauw Women's Little 500 bike race. I rode on my freshman dorm team, and two years with my fraternity team before working on the Race Board as Rules Chair. After my undergrad, I attended University of Michigan to get a Masters Degree and ended up with a PhD project studying intralacustrine speciation of lake trout in the Great Lakes. Upon completion of my degree, I was hired by the USFWS National Fishery Research Center in Ann Arbor, Michigan.

What might someone be surprised to know about you?

I worked for a year between stints in graduate school as an "Ergonomic Technician" with Unisys Financial Systems group in Plymouth, Michigan. My job was to create high-resolution images of thousands of bank checks to be used in the development of the first digital scanning device for financial institutions. Eventually, I was in charge of conducting the opinion surveys for the processed check images. This was the program that ultimately enabled banks to offer digital check images instead of customers having to save all of their cancelled checks.

Mary K. Burnham Curtis, Ph.D

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The interest in Wildlife Forensics seems to be growing. Why do you think that is?

Well, first of all, you cannot discount the effect of crime shows in the movies and television – the “CSI-effect” is HUGE. I also think that interest in Wildlife Forensics is growing because of a greater awareness of the world’s resources and the manner in which different cultures and countries manage them. Our younger generations are growing up with more of a conservation ethic than previous generations, so they seem more aware of endangered species and natural resource stewardship. I think there’s an added effect from technological advances in the science of genetics as well. Genetic tests are more accessible, and becoming easier to learn and apply to resource questions.

What would you tell someone who is thinking about starting in Wildlife Forensics?

First – not to be a Debbie-downer, but – do your homework and find out what the career prospects are. There are a limited number of labs that are doing wildlife forensics, and funding is always an issue, particularly as agencies push for laboratory accreditation. That being said, opportunities do exist. The basis of wildlife forensics is the science – so make sure that your educational background provides the training in the basics of animal science, particularly phylogenetics, taxonomy, and evolution. Good knowledge of the principles of animal ecology and behavior



are also helpful, as is a working knowledge of statistics. Finally – the ability to write and communicate are absolutely essential. You can learn the legal aspects later – just make sure you have a good science foundation.

What do you think will change about Wildlife Forensics over the next five years?

More people will have training in genetics techniques, for sure. Hopefully, traditional morphologists won’t become scarce! I think we’ll also start to see a maturation of the science behind wildlife forensics such that techniques and protocols will become more standardized and streamlined – similar to how the human forensic field has progressed. Also, as technology becomes more accessible, new technologies will be easier to incorporate into the range of tools used by Wildlife Forensic Scientists.

How would you describe yourself?

I would describe myself as an extroverted introvert. I’m also a Scorpio, so don’t get me mad.

What do you do when you aren’t working?

It depends on the season – I am an unapologetic bibliophile and yarn hoarder, so a lot of my down time is spent reading or knitting. In the winter I like to downhill ski, and in the summer I like to go out hiking or out on my paddleboard.

What’s next for you in your work?

What are you looking forward to?

My 5-year plan is currently to catch up on my casework so I can address several papers languishing on my desk. At the end of those 5 years, I intend to retire, unless someone has a bulletproof reason why I shouldn’t (tbh, that would involve a large sum of money). I’m looking forward to sleeping late and walking the dog when it’s not 0-dark-thirty in the morning, travelling back to the Midwest to see my family, camping with my husband, and maybe some international travel.

Membership update: New Online Process on the Horizon

By Sherryn Ciavaglia, SWFS Membership & Communications Officer Support and Rebecca Johnson, SWFS Director of Membership and Outreach

I've recently been recruited to assist our SWFS Membership Officer, Rebecca Johnson, and streamline the process of SWFS membership applications and renewals. This is part of a planned future upgrade to our membership process. All current members would be aware that the membership process has until now been reliant on a series of emails, forms and spreadsheets that is far from automated. Following the success of the improved SWFS website to offer purchasing options associated with our recent SWFS2017 conference, we've decided to take a leap and migrate the membership application and renewal process over to the same type of web-based system. This will provide a more secure and robust home for our membership database.

We are currently in discussion with our web designer about how the website membership portal will look for members. To ensure that your membership fees are going towards the functions of the Society that really matter, we will be opting for an economical off-the-shelf package that will allow us to keep track of a fairly basic set of member details aimed at facilitating the renewal

process. We hope to provide functionality for members to edit their own profile to keep their details up to date and introduce automated membership renewal reminders, ensuring that renewal dates are not missed and freeing up our time to focus on wildlife forensic science! The payment process will be integrated into the system, so that the renewal process is instant. Note that we will still require referee reviews for new members, but the process should be much more automated than before.

If you do have any suggestions for improvements to the membership system that you would like to see in the future please send them along to us at sherryn.ciavaglia@sasa.gsi.gov.uk and Rebecca.Johnson@austrmus.gov.au by the end of March 2018. We'll do our best to incorporate the suggestions of members within the limitations of the system and our budget. We'll be in contact with an update as the online membership process nears the time of going live.

In Memoriam: Jane Eva Huffman-Roscoe

16 January 1952—25 July 2017

*By Sherman S. Hendrix, Gettysburg College and Bernard Fried, Lafayette College
Reprinted with permission. Appeared in Journal of the Pennsylvania Academy of Science, Vol. 91, No. 2, 2017. Courtesy of Journal of Parasitology, Allen Press.*

We are sad to report that the wildlife forensics community has lost a pioneer of the field and long-term supporter of our work. Many of you will recognize her as the co-editor of the 2012 text book, *Wildlife Forensics: Methods and Applications*.

Jane Eva Huffman-Roscoe died in Knowlton, New Jersey, at the age of 65 after a lengthy battle with cancer that forced her to retire from East Stroudsburg University (ESU) in June of 2015 as Distinguished Professor of Biological Sciences, a position awarded to her in 2007. Over almost three decades as a

dedicated scientist and teacher, Dr. Huffman led both her colleagues and research students by example. She was chairperson for 140 theses produced by her graduate students. In 2005, Jane established and became the director of the Northeast Wildlife DNA Laboratory at East Stroudsburg University. The DNA lab became an important resource for forensic analysis of wildlife DNA for various state law enforcement agencies. It aided physicians and assisted biotech and pharmaceutical companies with tick identifications and DNA identification of bacterial disease agents in ticks. In 2010, researchers in the lab developed an in-home

In Memoriam: Jane Eva Huffman-Roscoe

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diagnostic testing kit (Lyme-AID) for detecting Lyme disease in ticks, which will be replaced by the Cutter Lyme Disease Testing Kit. Through her directorship, Jane was called upon to testify as an expert witness in wildlife crime prosecutions. Even after her retirement, Jane continued to publish papers and books on wildlife diseases, particularly of black bears (*Ursus americanus*), and research involving ticks and tick-borne illnesses such as Lyme disease.

Jane earned a Bachelor of Arts in 1973 and a Master of Science in 1976 at the University of Connecticut. In addition, she was a member of the UConn women's basketball team before it became famous. Her interest in parasitology was ignited by classes taught by Professor Lawrence Penner at UConn. At the same time, she met her future husband, Douglas Roscoe, also a student in Penner's class, with whom she collaborated in several studies involving wildlife diseases (Keeler et al. 2011; Huffman and Roscoe 2014) in both Pennsylvania and New Jersey. Jane's excitement over various research projects frequently involved her students, friends, and family. Her brother, George, and Douglas Roscoe were recruited to capture short-tailed shrews for her M.S. project. Not to be outdone, Doug recruited her to study the trematode causing large losses of swans at a lake in New Jersey. She transformed the study into a Ph.D. thesis, which she began at the University of Delaware but transferred to Rutgers University to complete, earning her degree in microbiology in 1983. As her husband Doug relates, "We married in November of 1980 and built a home on a piece of land in northwestern New Jersey. Jane immediately involved our property in her research as she conducted experiments with captive swans and ducks, which provided no end of entertainment and education for our neighbor's children. Even Jane's herd of pet guinea pigs, which grazed the lawn, were not exempt from study. The ornithology professor at ESU, Terry Master, was invited to send over some students to test the stampede reaction of the guinea pigs to hawk silhouettes suddenly raised by the students." She also completed a Master of Public Health at ESU.



Jane began her teaching career at Rutgers but relocated to ESU in 1986 at the urging of Bernard Fried. He recalls the time he and Jane met when she visited him at Lafayette College to get his advice on graduate schools at which to work on a Ph.D. After some deliberation, they decided that for Jane the best bet would be to attend Rutgers at Newark and be supervised by the protozoologist Professor Ann Cali. Professor Cali did not push a particular area of study on her students, and Jane felt comfortable doing work on a trematode of waterfowl, *Sphaeridiotrema globulus*. Based on the body of work she had done with that fluke and others, she became a world authority on waterfowl trematodes.

In Memoriam: Jane Eva Huffman-Roscoe

16 January 1952—25 July 2017

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After she completed her dissertation, she visited Dr. Fried to ask about job prospects. It happened that at that time a position became available for a parasitologist at ESU. He recollects recommending to the then Chair of Biology that Jane would be ideal for the position.

Jane got the job and she spent her entire professional career at ESU. Moreover, Jane quickly rose through the ranks and became the Graduate Student Coordinator for the Department of Biological Sciences. In addition to numerous articles published with colleagues and her students, Jane and Fried published 40 articles together. These appeared in more than 10 journals abstracted and recorded on the Web. Two of their echinostome reviews (Huffman and Fried 1990; Fried and Huffman 1996) have each been cited more than 100 times.

Jane also was very active in the Pennsylvania Academy of Science (PAS) during her tenure at East Stroudsburg University. Along with various committee positions, Jane was President-elect in 2003–04, President in 2004–05, Assistant Treasurer from 1993 to 1995 and again from 1997 to 2000, Newsletter Editor from 1999 to 2004, Editor, Journal of the Pennsylvania Academy of Science, 2011–14, and an Editorial Board member of the Journal for many years. Another notable accomplishment was her being co-editor of three books published by the Pennsylvania Academy of Science (Majumdar 2005, 2009, and 2011), to which she also contributed several chapters. Her final book, with J. R. Wallace (2012), included an introductory chapter by her son, Eric G. Roscoe, detailing methods and applications for wildlife forensics for practitioners in that growing field. Her presence at annual PAS meetings will be missed. In addition to the board positions she held, she will be fondly remembered for leading and organizing the very popular prize drawings and raffles prior to the Annual Meeting member banquet. She was one of the most enthusiastic and cheerful people we have ever

known, one who always greeted others with a smile. A stone bench will be placed near Jane's grave with the inscription "Be curious and achieve your dreams," Jane did just that and much more.

Acknowledgments

Thank you to Douglas and Eric Roscoe, and to Terry Master and Matthew Wallace at ESU, for their invaluable assistance in producing this In Memoriam. This article is being published in both the Journal of Parasitology and the Journal of the Pennsylvania Academy of Science with the approval of the authors and editors.

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Update from OSAC Wildlife Subcommittee

By R. Christopher O'Brien, Vice-Chair OSAC Wildlife Subcommittee

Dear SWFS Community,

The OSAC (Organization of Scientific Area Committees) Wildlife Subcommittee would like to wish everyone a Happy New Year and hope that everyone had a safe and enjoyable holiday season. We on the OSAC had a productive 2017 and hope to continue our success into 2018. Firstly, there have been some personnel changes over the last year. Kathy Moore who was the first Chair of the Subcommittee has stepped down to become a regular member of the subcommittee and we thank her for her service and guidance through the first very rough years of the program. In her place Kim Frazier has stepped up and is now guiding the group through the next evolution of the OSAC. Jason Byrd has moved up in the world and is now sitting on the Scientific Area Committee and we know he will be a positive voice for wildlife forensics. Pepper Trail has stepped down from the subcommittee after putting in many hard years and has returned to his travel and lab work (he is a lucky man). We have also accepted several new members to the subcommittee (Mike Stockdale, Erin Meredith, Holly Ernest, and Susan Underkoffler) and we look forward to their input and energy in the years ahead.

The Wildlife Subcommittee continues to work on several work products that are in different stages of development. Below is a list of the active works:

- ⇒ Geographic Assignment
- ⇒ Public Sequences Validation
- ⇒ Serology Methods (for taxonomic identification)
- ⇒ Reference Collections
- ⇒ Reference Sampling – Live Mammals
- ⇒ mtDNA Training (for taxonomic identification)

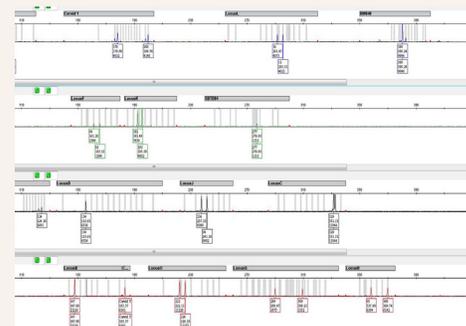
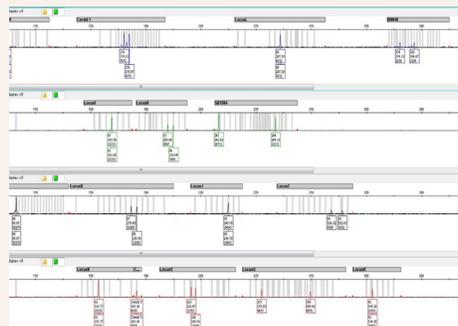
Further the Subcommittee has finished and passed up to the American Standards Board the following document:

- ⇒ General Standards
- ⇒ Report Writing Standards
- ⇒ Morphology Standards
- ⇒ Validation Standards – STRs
- ⇒ Validation Standards – Sequencing
- ⇒ DNA Standards

If you are interested in participating in the development of any of the standards that are active works please feel free to contact us and we will get you onto a task group.

The Subcommittee has also put forward what we feel are areas of need when it comes to funding for research. These have been pushed up the ladder and it will be a guessing game if the US federal government chooses to accept our recommendations. Keep an eye out and you may see one come down the pipeline. To date, we have asked for a collaborative research project to be undertaken by US federal, state, academia and private industry to create a viable STR panel with associated allelic ladder for White-tailed deer. This project is currently being undertaken and progress is being made.

We on the OSAC Wildlife Subcommittee hope everyone has an amazing 2018 and if you have any questions please do not hesitate to contact us.



ANZFSS 24th International Symposium

By Adrian Linacre, SWFS member & National President of the ANZFSS

Societies such as SWFS play a crucial role in representing our community and being our voice when called upon. I am delighted to be a member of not only SWFS but also the International Society for Forensic Genetics (and provide commentary on our recent congress on page 10 of this newsletter). Since September 2016 I have had the honour of being National President of the Australian & New Zealand Forensic Science Society (ANZFSS). This coming year will be a momentous year for the ANZFSS as we move to a professional membership category. As a professional society, we will be an independent voice for the forensic science community in this part of the world and have greater credibility when it comes to issues affecting our community.

Of primary interest to members of SWFS is that we have our biennial symposium this year in Perth, 9 to 13 September (<http://anzfss2018.com>). ANZFSS symposia are multi-disciplinary and there will be a stream for wildlife forensic science at this meeting. For the record, the wildlife session at the last symposium

in Auckland was chaired by our own Greta Frankham. There will be decent representation of the wildlife community at the symposium in Perth, for instance Rebecca Johnson is current President of the New South Wales Branch and I will play my part as the National President. Please consider this as a conference to attend in 2018 and put together abstracts as the deadline is Friday 9th February.

The meeting will be at the Perth Exhibition and Convention Centre in the heart of the city. Not only will there be excellent science, but we might just put on highly memorable social events (for which ANZFSS symposia are famous!). Perth is an amazing city for those that have not visited before. Yes, it is rather isolated, but has tremendous charm being on the banks of the Swan River with stunning scenery only a short drive from the city (and decent vineyards at Margaret River about 2 hours drive south). You will be made very welcome and I hope to see so many there!

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Recent publications:

The following recent wildlife forensic publications have been compiled using searches of the online database, Web of Science. This list covers the period from August 2017 to January 2018. We aren't commenting on their quality or advocating their application, hopefully you will have your own opinions about them. Please contact us if you know of papers that have been missed (particularly your own publications!) so we can include them in the next edition.

Wildlife Forensics:

ADAMOWICZ, S. J., HOLLINGSWORTH, P. M., RATNASINGHAM, S. & VAN DER BANK, M. 2017. International Barcode of Life: Focus on big biodiversity in South Africa. *Genome*, 60, 875-879.

AHLERS, N., CREECY, J., FRANKHAM, G., JOHNSON, R. N., KOTZE, A., LINACRE, A., MCEWING, R., MWALE, M., ROVIE-RYAN, J. J., SITAM, F. & WEBSTER, L. M. I. 2017. 'ForCyt' DNA database of wildlife species. *Forensic Science International Genetics Supplement Series*, 6, E466-E468.

ARULANDHU, A. J., STAATS, M., HAGELAAR, R., VOORHUIJZEN, M. M., PRINS, T. W., SCHOLTENS, I., COSTESSI, A., DUIJSINGS, D., RECHENMANN, F., GASPAR, F. B., CRESPO, M. T. B., HOLST-JENSEN, A., BIRCK, M., BURNS, M., HAYNES, E., HOCHEGGER, R., KLINGL, A., LUNDBERG, L., NATALE, C., NIEKAMP, H., PERRI, E., BARBANTE, A., ROSEC, J. P., SEYFARTH, R., SOVOVA, T., VAN MOORLEGHEM, C., VAN RUTH, S., PEELEN, T. & KOK, E. 2017. Development and validation of a multi-locus DNA metabarcoding method to identify endangered species in complex samples. *Gigascience*, 6.

BALAGUERA-REINA, S. A., VENEGAS-ANAYA, M., RIVERA-RIVERA, B. & DENSMORE, L. D. 2017. Scute Patterns as an Individual Identification Tool in an American Crocodile (*Crocodylus acutus*) Population on Coiba Island, Panama. *Journal of Herpetology*, 51, 523-531.

CIAVAGLIA, S., DRIDAN, H. & LINACRE, A. 2017. Getting more for less: can forensic tools for Australian wildlife enforcement support international compliance efforts? *Australian Journal of Forensic Sciences*, 618, 1-10.

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DOTY, K. C. & LEDNEV, I. K. 2018. Differentiation of human blood from animal blood using Raman spectroscopy: A survey of forensically relevant species. *Forensic Science International*, 282, 204-210.

EWART, K. M., FRANKHAM, G. J., MCEWING, R., WEBSTER, L. M. I., CIAVAGLIA, S. A., LINACRE, A. M. T., THE, D. T., OVOUTHAN, K. & JOHNSON, R. N. 2018. An internationally standardized species identification test for use on suspected seized rhinoceros horn in the illegal wildlife trade. *Forensic Science International-Genetics*, 32, 33-39.

Recent publications:

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Wildlife Forensics (continued):

FRANTZ, A. C., ZACHOS, F. E., BERTOUILLE, S., ELOY, M. C., COLYN, M. & FLAMAND, M. C. 2017. Using genetic tools to estimate the prevalence of non-native red deer (*Cervus elaphus*) in a Western European population. *Ecology and Evolution*, 7, 7650-7660.

FUCCI, N., CAMPOBASSO, C. P., MASTROGIUSEPPE, L., PUCCINELLI, C., MARCHEGGIANI, S., MANCINI, L., MARINO, L. & PASCALI, V. L. 2017. Diatoms in drowning cases in forensic veterinary context: a preliminary study. *International Journal of Legal Medicine*, 131, 1573-1580.

JANJUA, S., FAKHAR, I. A., WILLIAM, K., MALIK, I. U. & MEHR, J. 2017. DNA Mini-barcoding for wildlife trade control: a case study on identification of highly processed animal materials. *Mitochondrial DNA Part A*, 28, 544-546.

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MONDERMAN, L., JOBIN, R. M., PACKER, T. & SIM, Z. J. 2017. Forensic DNA analysis and wildlife investigations: A perfect match. *Forensic Science International*, 277, 124-124.

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TRAIL, P. W. 2017. Identifying Bald Versus Golden Eagle Bones: A Primer for Wildlife Biologists and Law Enforcement Officers. *Journal of Fish and Wildlife Management*, 8, 596-610.

VELDMAN, S., GRAVENDEEL, B., OTIENO, J. N., LAMMERS, Y., DUIJM, E., NIEMAN, A., BYTEBIER, B., NGUGI, G., MARTOS, F., VAN ANDEL, T. R. & DE BOER, H. J. 2017. High-throughput sequencing of African chikanda cake highlights conservation challenges in orchids. *Biodiversity and Conservation*, 26, 2029-2046.

ZENKE, P., EGYED, B. & PADAR, Z. 2017. Wildlife protection: demonstrability of wildlife crime with forensic DNA analysis Casework applications. *Magyar Allatorvosok Lapja*, 139, 631-639.

Recent publications:

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AMARAL, C. R. L., BITENCOURT, A., TEIXEIRA, C., PEREIRA, F., SILVA, D. A., AMORIM, A. & CARVALHO, E. F. 2017. Probing the potential of the Shark Panel InDel multiplex v2.0 on the forensic identification of batoid elasmobranchs. *Forensic Science International Genetics Supplement Series*, 6, E221-E223.

BAEZA, J. A. & BEHRINGER, D. C. 2017. Integrative taxonomy of the ornamental 'peppermint' shrimp public market and population genetics of *Lysmata boggessi*, the most heavily traded species worldwide. *Peerj*, 5.

CHIANG, W. C., CHANG, C. H., HSU, H. H. & JANG-LIAW, N. H. 2017. Complete mitochondrial genome sequence for the green humphead parrotfish *Bolbometopon muricatum*. *Conservation Genetics Resources*, 9, 393-396.

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