AMERICAN ASSOCIATION OF WILDLIFE VETERINARIANS

WINTER 2009

MESSAGE FROM THE PRESIDENT

Jonathan Sleeman

The One Health Approach

Last week my third-grade son came home from school, stood 6 feet away from me, and said "I am touching you!" My first thought was "what on earth is this school teaching my child?" but he went on to explain that because he was standing on the floor, and the floor was touching me, and therefore he was also touching me! I believe (at least I hope) that the teachers at his school were using this as an illustration of how connected we all are, and how our actions can impact people far away.

My last President's Corner discussed the need to connect with our international colleagues, and continuing with this theme of connectedness, this article highlights the need for another type of connectedness: the need to work more closely and collaboratively with our colleagues in the human and domestic animal health disciplines. This multidisciplinary "One Health" approach is not a new concept. Originally called "One Medicine," it was articulated by Dr. Calvin Schwabe in the 1960's as the study of health and disease regardless of species differences between human and animals. Several decades later this concept has taken on a greater relevance with 21st Century threats to human, animal and ecosystem health.

"…it is my belief that wildlife and ecosystem health practitioners are the most vital pieces of the One Health puzzle and the "glue" that binds it all together."

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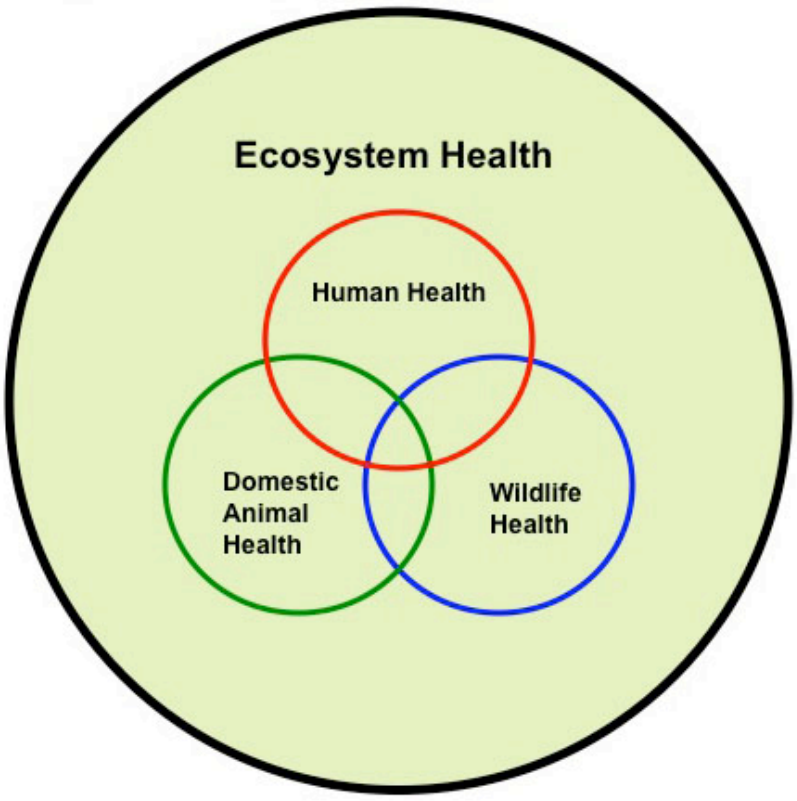
I will not go into the details concerning the current definitions of One Health and the needs and benefits of this approach here, as AAWV Advisory Council member Dr. Margaret Wild has written an excellent summary on page 4; I refer you to that article. However, from a personal perspective working as a wildlife veterinarian for a state natural resource agency, I would add that this approach is absolutely essential. So many of the health threats we face, whether it is from emerging infectious diseases such as highly pathogenic avian influenza or West Nile virus; endemic diseases such as rabies; or environmental contaminants resulting in poor water quality have human, animal and ecosystem health components. Addressing these issues requires strong coordination and collaboration among all tiers of public health, agriculture, and wildlife management government agencies. This is especially true when there is potential for conflict or differences of opinion concerning the origin of an infection, such as when diseases spill over or spill back among human, domestic animal and wildlife populations. Having a strong working relationship with the human health and agriculture departments in Virginia has greatly facilitated my work, and is something for which I am very grateful.

Unfortunately, and despite the importance and utility of such an inclusive approach, the wildlife component of the One Health approach is often neglected. We have all seen the Venn diagram of the three intersecting rings representing human health, animal health and ecosystem health; in my opinion, this diagram under-represents the importance of ecosystem health; the following illustration more accurately represents the true situation. Healthy humans and animals cannot exist without healthy ecosystems, and maintaining the integrity of the biosphere has to be our priority, our over-arching goal. Thus, it is my belief that wildlife and ecosystem health practitioners are the most vital pieces of the One Health puzzle and the "glue" that binds it all together, and it is essential that we take a leadership role. To that goal, Dr. Wild has spearheaded the development of an AAWV Position Statement on the One Health approach. Please take a look at the position statement on page 5 and send any ideas and comments to Dr. Wild at Margaret_Wild@nps.gov. I believe that this is one of the most important initiatives that the AAWV has embarked upon in recent time.



THE ECOLOGICAL CONTEXT OF HEALTH

AAWV Newsletter
is published by the
American Association of Wildlife Veterinarians

Founded in 1979, the AAWV is a national, non-profit organization of veterinarians interested in all aspects of wildlife health.

In Memoriam

Dear Folks,

Dr. Al Franzmann died on Friday, February 13, 2009. This is not a reason for sorrow or regret. He lived life fully and happily, had been increasingly uncomfortable for several months, and passed quickly. Al wrote the letter published in JAVMA that proposed the founding of AAWV, and he served as the AAWV's first President.

I will always remember Al's laugh and his simple saying "you can't beat having fun". He would have found it terribly funny to know he died on Friday the 13th, and would probably have said, "Wow, how's that for bad luck?" He was very surprised and proud to receive the WDA Distinguished Service Award at our Fairbanks meeting. I remember as his many accomplishments were read out he looked over at me with his big grin and lifted up is pant legs as if to spare his cuffs from getting in the "stuff". He was a very good friend and way ahead of his time.

Al's self-penned obituary has been posted on the AAWV website at www.aawv.net. Condolences can be forwarded to his wife Donna at 1416 W. Camino De La Oca, Green Valley AZ, USA 85622. Tel. 520-625-0184.

Dave Jessup

One Health: A Concept Whose Time Has Come

Margaret Wild, National Park Service

Over the past decade news headlines have been filled with reports of zoonotic diseases of public concern such as West Nile virus, avian influenza, and SARS. Most veterinarians are aware of the statistics: in the last 30 years, 75% of emerging human pathogens have been zoonotic and many share a link to wildlife. But these emerging diseases have also contributed to a broader awareness that human, animal, and environmental health are inextricably linked and that a holistic approach to their management is needed. Such an approach, originally termed One Medicine and now commonly called One Health, is gaining momentum. ***One Health seeks to promote, improve, and defend the health and well-being of all species by enhancing cooperation and collaboration between physicians, veterinarians, and other scientific health professionals.***

The concept of One Health is not new. The theory was promoted by William Osler and Rudolf Virchow in the 1800's and revived by Calvin Schwabe in the 1960's. And at the start of the 21st century it was the wildlife community with leadership that included the Wildlife Conservation Society (WCS; http://www.oneworldonehealth.org/) and AAWV members that were a driving force in resurgence of One Health.

Many wildlife veterinarians have practiced One Health concepts for years through collaboration with public health officials on surveillance and management of zoonotic diseases, promotion of biodiversity and habitat protection, and encouragement of stricter regulation of trade in wildlife and wildlife products. The concept of One Health is clear in the Pilanesburg Resolution passed in 2001 by the Wildlife Disease Association and Society for Tropical Veterinary Medicine (http://www.wildlifedisease.org/Documents/resolution.html). Similarly, many of the stated objectives of the AAWV align closely with a One Health approach of interdisciplinary collaboration and cooperation in education, research, and management. Most notably, the AAWV Strategic Plan objective to "stress the importance of the inter-relationships of human, domestic animals and wildlife as reservoirs of disease" is a foundation of One Health.

Now an opportunity exists to enhance and expand this practice as the One Health concept becomes mainstream and is endorsed by organizations such as the American Medical Association (AMA) and the American Veterinary Medical Association (AVMA). On July 15, 2008, the AVMA released the final report of the One Health Initiative Task Force titled "One Health: A New Professional Imperative" (www.avma.org/onehealth/). The report recommended formation of a One Health Joint Steering Committee (OHJSC) to begin implementing a broader set of recommendations that can be grouped into four goals:

- Develop, implement, and sustain a national strategy for improved public health based on the principles of One Health Commission.
- Create and implement communication efforts on the power of One Health to improve the health of people, animals, and the environment.
- Illustrate the value of One Health principles through demonstration projects.
- Extend the One Health Initiative to the international community to improve global health for people and animals.

The OHJSC has begun work on initial implementation of these recommendations with the primary focus on development of a One Health Commission. The steering committee solicited broad membership and includes wildlife veterinarians John Fischer representing the Association of Fish and Wildlife Agencies and me, Margaret Wild, of the National Park Service.

…in the last 30 years, 75% of emerging human pathogens have been zoonotic and many share a link to wildlife.

Wildlife veterinarians have an important role to play in communication and cooperation that can protect wildlife and wildlife health directly, and through improvements in the health of agricultural animals and humans. One of the most important messages may be the AAWV's objective of stressing the importance of the inter-relationships of humans, domestic animals and wildlife as reservoirs of disease. Wildlife species, just like humans and domestic animals, are victims as well as reservoirs of pathogens. Wildlife veterinarians can bring novel views and approaches to disease surveillance, prevention, control, and mitigation efforts. An apt example comes from the WCS's 2004 The Manhattan Principles on "One World, One Health" (www.oneworldonehealth.org/): promoting disease management that restricts the mass culling of free-ranging wildlife to situations where there is multidisciplinary scientific consensus that a wildlife population poses an urgent, significant threat to human health, food security, or wildlife health more broadly. With this application, One Health truly does promote and defend the health of all species.

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Given the AAWV's objectives and position at the crossroads of wildlife, human, and domestic animal health, the AAWV has produced a position statement (below) addressing the concept of One Health from a wildlife health perspective. The position statement draws in part from the WCS's *The Manhattan Principles on "One World, One Health"* and the AMA resolution (passed June 24, 2007). Please read and consider the statement, and address your comments and ideas to me at Margaret_Wild@nps.gov.

Look for updates on the One Health Initiative and actions of the OHJSC in future issues of the Newsletter. You can also find more information at the One Health Initiative website at www.onehealthinitiative.com. And look for the momentum behind One Health to continue to increase; One Health is indeed a concept whose time has come.

AAWV Position Statement on One Health *(DRAFT)*

Health care stewards of animals and humans face unprecedented challenges associated with emerging pathogens, loss of biodiversity, climate change, and explosive human population growth. About 60% of existing human pathogens and over 75% of those appearing over the past two decades are zoonotic. Many of these have a link with wildlife. An interdisciplinary "One Health" approach is needed involving veterinarians, physicians, public health and environmental health professionals, and specialists within these disciplines, working to collaboratively address health concerns associated with these complex issues.

The concept of One Health, previously termed One Medicine, is not new; the theory was promoted by William Osler and Rudolf Virchow in the 1800's and revisited by Calvin Schwabe in the 1960's. But recent health emergencies are revitalizing the concept for application today. Many human and animal medicine organizations, including the American Medical Association and the American Veterinary Medical Association, have endorsed the concept as a strategic need in health care transformation. In light of the integral role of healthy wildlife in conservation and health of all species, the position of the American Association of Wildlife Veterinarians is presented in the following statements on One Health.

The AAWV recognizes that:

- The majority of recently emerging infectious diseases are zoonotic, and many are linked to wildlife.
- The rise in emerging and resurging infectious diseases threaten not only human and domestic animals, but also wildlife species and ecosystems.
- By their very nature, the fields of veterinary and human medicine are complementary and synergistic in confronting, controlling, and preventing zoonotic diseases and their transmission among species.
- A One Health initiative aims to promote and implement meaningful collaboration and communication between veterinary medicine, human medicine, and multiple allied disciplines working locally, nationally, and globally to attain optimal health for people, animals, and our environment.

The AAWV supports:

- Promotion and implementation of a One Health initiative that includes wildlife health science as an essential component and promotes multidisciplinary collaboration.
- Cross-species disease surveillance, prevention, control, and mitigation efforts that recognize wildlife as a casualty of disease as well as a potential reservoir of disease.
- Enhancing the capacity of federal, state, and local wildlife agencies, tribal nations, and non-governmental organizations to plan, prevent, and respond to wildlife disease using adaptive, holistic approaches that take the complex interaction among all species into full account.
- Funding joint efforts for the development of diagnostic methods, vaccines, treatments, and management actions for the prevention and control of diseases across species.
- Development of educational and outreach programs that communicate and promote the importance of healthy wildlife and the role of wildlife veterinarians in One Health.
- Application of additional regulation on trade and movement of wildlife and wildlife products to not only protect wildlife populations but to lessen risks of disease movement, cross-species transmission, and development of novel host-pathogen relationships.
- Disease management that restricts the mass culling of free-ranging wildlife to situations where there is multidisciplinary scientific consensus that a wildlife population poses an urgent, significant threat to human health, food security, or wildlife health more broadly.

AAWV By-Law Revisions on Committee Development and Processes

Jonathan Sleeman, AWV President

As the AAWV continues to grow and expand its activities, we need to explore new ways of conducting business. The ever-increasing workload is beyond what the Officers and Advisory Council can do alone, especially if we are to achieve the objectives of our Strategic Plan of 2007. Consequently, we have proposed changes to the by-laws that will allow the AAWV to create permanent committees such as committees on policy, communications and student affairs, to name just a few ideas. These committees would be a great way for members to become more involved in AAWV decision-making, and would greatly enhance the organization by tapping into the ideas, energy and entrepreneurship of our talented members. The AAWV Board of Governors believes that the creation of permanent committees would be a positive step forward for the organization, and we hope that you will support the idea as this would allow you to get more involved in YOUR organization. Please take a look at the proposed changes to the by-laws and send any comments to Jonathan Sleeman at jonathan.sleeman@dgif.virginia.gov. As always, thanks for your participation in the AAWV.

[Editor's note: the new language is reproduced in red]

ARTICLE II - OFFICERS

Section 5 President - The president shall be the chief representative of the Association and preside over the Board of Governors. The president may appoint permanent and ad hoc committees for specific purposes to maintain a working Association in consultation with the Board of Governors and Advisory Council. The president shall represent the Association on the Wildlife Disease Association Council as Chairman of the Wildlife Veterinary Section. The President shall assure that the Association is appropriately represented at any other meetings the Association agrees to participate in including but not limited to those with The Wildlife Society, the United States Animal Health Association, and the American Association of Zoo Veterinarians. The President shall communicate regularly with other officers and the membership and shall provide a yearly summary of Association activities at or before the annual meeting.

ARTICLE IV – COMMITTEES

Section 1. Standing Committees shall be defined as those permanent committees established by the president in consultation with the Board of Governors and Advisory Council. These committees shall include, but not be limited to Communications, Policy, and Student Affairs. Committees shall function under guidelines established by the Board of Governors and Advisory Council and be responsible to the president. All final recommendations or reports by committees will require approval by the Board of Governors and Advisory Council before action is implemented. Membership on a committee and term of membership (usually 2 years) will be determined by the president in consultation with the Board of Governors and Advisory Council after solicitation for nominees from the members. Committee Chairs and members shall be eligible for reappointment at the discretion of the president. The president shall appoint biennially the Chair of each committee, and committee members shall be consulted by the president before a decision is made regarding reappointment or termination. Committee members may consult with the president if circumstances demand that they step down from committee membership before the end of their term.

Section 2. Ad hoc committees shall be defined as those non-permanent committees established by the president. The functional existence, charges and duties as well as operational guidelines of ad hoc committees will be clearly defined by the president at the time of establishment of the committees. The committees will be responsible to the president and be required to submit reports as requested by the president. All final recommendations or reports by the committees will require approval by the Board of Governors and Advisory Council before action can be implemented. Membership on an ad hoc committee and term of membership will be determined by the president.

TREASURER'S REPORT
JANUARY 1, 2008 - DECEMBER 31, 2008

ASSETS	AMOUNT (Dollars)
Checking account (US Bank)	17,369.78
CD 6 mo (9/18/08) (US Bank)	5,000.00
CD 12 mo (3/18/09) (US Bank)	5,000.00
Interest on CD	2.62
TOTAL ASSETS	***$27,402.40***
Bank Balance (1/1/08)	***$33,473.56***
INCOME	
Membership Dues	8,085.00
Thorne and Williams Fund	0.00
Restore void checks	320.00
WDA Auction proceeds*	928.63
TOTAL INCOME	***$9,333.63***
	$42,807.19
EXPENSES	
Bank Charges	9.75
Refund dues	40.00
Newsletter Layout	2,260.75
Newsletter Printing	685.35
Newsletter Mailing**	509.25
Cutting Edge Speaker	300.00
Officer Travel	2,587.68
USAHA Dues	600.00
Awards	74.94
Tom and Beth funds to WDA	3,620.00
CD 6 month	5,000.00
CD 12 month	5,000.00
Brochure	2,178.98
Display	869.17
MS Office program	141.04
Meeting support	
IWRC	150.00
AAZV	58.44
WDA	1,352.06
TOTAL EXPENSES	***$25,437.41***
BALANCE (Income less Expenses)	***$17,369.78***

* WDA Auction proceeds have been designated for assisting AAWV student chapters on a request basis.

**The Newsletter is now essentially 100% electronic, so mailing and printing costs will no longer be assessed as expenses.

Respectively submitted,
Mark L. Drew, AAWV Treasurer

CALL FOR NOMINATIONS

Tom Thorne–Beth Williams Award

The AAWV and WDA are seeking nominations for the Tom Thorne and Beth Williams Memorial Award. The award is given in acknowledgment of either an exemplary contribution or achievement combining wildlife disease research with wildlife management policy implementation or elucidating particularly significant problems in wildlife health.

Nominations are open to all professionals and students in the field of wildlife health, regardless of membership in the AAWV or WDA.

In addition to receiving a bronze award statuette of two black-footed ferrets and funding for travel to the annual conference to receive the award, the award recipient will have the privilege of honoring Tom and Beth by selecting a worthy project, of the type Tom and Beth might have supported, to receive funds from the Tom Thorne Beth Williams Endowment.

Submitted nominations should consist of a letter stating the nominee's name, affiliations, brief biographical history and a description of the contribution or achievements for which the person is nominated. For more information or to submit a nomination, contact William Lance at wlance@wildpharm.com.

Submissions are due by **May 15th** to be considered for the 2009 award.

Immunocontraception, Wildlife, and GonaCon™

Scott Bender, DVM
(Navajo Nation Tribal Wildlife Veterinarian)

Management of wildlife populations has always to some degree centered on the control of females in a population. This is especially true in gregarious species such as cervids; it is the extractive hunting of females that is limited, as one male can support reproduction in many females. Control of reproduction as a management tool has been a distant goal for many years, especially in those species where traditional extractive methods are technically or politically difficult to implement effectively. Two prime examples are feral horses on Government ranges in the US and exotic deer in National parks. In situations such as these, "birth control" may be a less objectionable option for management or eradication than hunting or trapping.

Population management can be a valuable tool in the management and prevention of wildlife and zoonotic diseases, given the availability of cost-effective and environmentally safe tools. Many methods have been researched to date, but success has been limited and very few have been put into practical application. The use of hormones, zona pellucida (PZP) vaccine, and injectable and surgical sterilization have all been tried, and many have proven to be ineffective, expensive or environmentally unsound. In fact one product put into the market as a male sterilant (Neutersol®, also known as Zinc Gluconate/Arginine), was recently pulled from the marked for unacceptable side effects. Moreover it was impractical as a wildlife management tool, as it required capture and close handling (intratesticular injection) of each animal for administration, and did not affect female reproductive efficiency - a significant shortcoming for many gregarious wildlife species.

An ideal wildlife contraceptive would have low cost, be species- or target-specific, easy to administer, and long-lasting with minimal or no environmental contamination. (The USDA Technical Bulletin No. 1853 (Terry Kreeger, DVM, Ph.D., Technical Coordinator), now 12 years old, is perhaps the best overview of contraception in wildlife management on the subject to date.) Recent work by the Bureau of Land Management on PZP in feral horses has shown some promise, reducing population growth from 20% to 10% per year (see http://www.blm.gov/nv/st/en/prog/wh_b/facts___stats/fertility_control.html for more information), but at a cost of $200 per vaccination treatment and $600 per mare for capture, feed and housing, the PZP approach is still cost prohibitive. In addition, the horses must be handled and contained for a period of time to administer the vaccine adequately - not exactly "wildlife ready".

Gonadotropin-releasing hormone (GnRH) makes an attractive target for an immunocontraceptive approach to population control for several reasons: it is the "master" control hormone of reproduction and reproduction behavior, playing a pivotal role in the reproductive process; being a protein, it can be made immunogenic; it is extremely conserved across species, and so may be useful in a wide variety of species; and as a protein, there shouldn't be an environmental residue issue. However, as with all great ideas, there are problems. One of the biggest is making this very small protein found in all mammalian species presentable to the immune system, and making it immunogenic enough that contraception will last for more than one reproductive cycle. (Delivery of immunocontraceptives is another big issue, which is for another day.....and someone else!)

In development by the USDA-National Wildlife Research Center for over 20 years, GonaCon™ may be close to the meeting the requirements for a GnRH vaccine. This vaccine has been shown to work in several different species and, with improvement of adjuvants, has been shown to elicit high anti-GnRH antibody levels and corresponding reductions in progesterone, estrogen and testosterone over prolonged periods of time. In addition, with new manufacturing technologies available today the cost per unit has fallen significantly.

Currently there are several field trials of GonaCon™ being done in bison, exotic cervids, feral horses and feral dogs. But while lab results have been promising, it is too early in these studies to make any firm conclusions. In addition, it will take additional research and field trials to work out applications and practicality. And of course, "Mr. Murphy" is often only found when we field folks start putting something into use. For example, an adjuvant that may work well in one species may not work or may be impractical in another - the tuberculosis (TB) vaccine BCG may be practical in some species, but as it is derived from mycobacterium, it would not be practical in a population affected by TB and under TB management as it would give false positives, and might also be "too reactive" and lead to unacceptable side effects such as abscesses.

Should GonaCon™ consistently work as well in the field as it has shown in these early trials, we may have another tool to add to our wildlife population and wildlife disease management tool box. The choice to use this tool would be up to each state and situation as needed - but wouldn't

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it be nice to have it available even if not applicable for your specific situation? For example, in areas of urban interface where trap-vaccinate-release is conducted for mesocarnivore rabies management, GonaCon™ could be an additional practical way to reduce rabies by affecting the reproduction and recruitment of immunologically naïve rabies-susceptible future populations.

While there are lots of theoretical models on what affect reproduction management would have on a population and disease management, little real-world effects are known. Until we have a practical immunocontraceptive, many questions will remain. For example could we break the cycle of rabies or brucellosis by interrupting the recruitment of naïve offspring for a few years? Could we decrease agriculture deprivation conflicts by lowering reproduction food demands yet maintain a stable population base of a predatory species? These and so many other questions are begging to be considered, let alone aggressively investigated.

In closing, I would say that we as wildlife medicine professionals should continue to encourage study, trials and practical application of immunocontraception, not only with NWRC's GonaCon™ but with other vaccines and materials that may become available. Necessity may be the mother of invention, but competition is what makes it practical!

Wildlife Medicine in North Dakota—A Report From the Front Lines

Dan Grove, North Dakota Game and Fish

When asked what I do for a living and I tell people that I'm the state wildlife veterinarian for the North Dakota Game and Fish Department, people have one of two reactions: they either look at me like I have two heads and do not know what to say, or they ask me to describe what I do and I start rambling on about disease surveillance and the ins and outs of the wildlife–domestic animal disease interface and then they give me the horrified look that indicates I have said way too much about retrieving lymph nodes and performing necropsies. I have tried to trim down my answers to these questions, but as I reflect on what I do on a weekly or even daily basis I realize how difficult it is to summarize my role as a wildlife veterinarian within the department when our profession utilizes not just our veterinary medical training but also requires knowledge of life history of numerous species of animals, knowledge of the diseases that affect these animals and what impact the disease has on the individual as well as the population, knowledge of the environment and man's effects on it, knowledge of the livestock industry as it pertains to our state and our region, and even understanding of the culture of the people within the state to be able to develop policies and practices that will be readily accepted by the general public.

Since I have been here in North Dakota we have organized and conducted our yearly CWD and bovine TB surveillance; we have seen die-offs of deer due to EHD and die-offs of waterfowl due to soybean impaction; we have assisted the state Department of agriculture in domestic animal disease surveillance; and more recently we have had to deal with die-offs of deer secondary to grain overload. We receive calls on a daily basis from concerned cattlemen because wildlife are eating their feed stores and they are worried about the diseases that their cattle are going to get from the deer or the pheasants or even the turkeys. Just this week we responded to a call about a dog that had been attacked by an unknown wild animal. I was asked to assist our furbearer biologist to help confirm or disprove the validity that the wild animal in question was a mountain lion. Currently the legislature for North Dakota is in session, which means that my role changes to "political advisor" or "disease expert" in regard to bills that will aid in overall wildlife management plans to help maintain a healthy population of wild animals in the state. As a result, time is spent reviewing current literature, consulting with other states facing similar issues, and preparing information to help the general public better understand the pros and cons of our management objectives.

In short, as a wildlife veterinarian with the North Dakota Game and Fish Department I am the clinician, the diagnostician, the organizer, the planner, the pathologist, the policy maker, the disease biologist, the field researcher, the laboratory researcher, the publisher, the personnel supervisor, the consultant, the student, the mentor, the public liaison, and, most importantly, I am the wildlife colleague, who with the assistance of many fellow wildlife professionals, bridges the gap between veterinary medicine, animal welfare, herd health, wildlife management and wildlife biology in the state of North Dakota.

UPDATE

AVMA Committee on Environmental Issues

R. Scott Larsen
AVMA CEI Zoo and Wildlife Representative

The American Veterinary Medical Association's Committee on Environmental Issues (AVMA CEI) has a broad membership including 11 veterinarians in ecology, zoo and wildlife medicine, toxicology, agriculture, private practice, government service, public health, and other disciplines. Current CEI members that are also members of AAWV, AAZV, and/or other allied organizations include Dr. Dave Jessup representing veterinary ecology, Dr. Cindy Driscoll representing aquatic animal medicine, Dr. Scott Larsen, representing zoo and wildlife medicine, and Dr. Peregrine Wolff representing small ruminant medicine. This committee serves to guide the AVMA on environmental issues. If there are any environmentally-related issues that AVMA members feel should be addressed or environmentally-related policies that AVMA members feel need attention, this is the committee through which action and guidance should be taken.

AVMA Policy Statements

Veterinary Wastes:

The AVMA encourages the use of sound science to characterize veterinary medical waste hazards, associated risks, and define methods to minimize those risks. The AVMA encourages relevant state and federal agencies dealing with veterinary medical waste to use reasonable approaches in the formulation of regulations that consider risk/benefit analyses, the environment, the impact on the veterinary profession, and the health and welfare of patients. **The AVMA Executive Board approved CEI-recommended revisions to this policy.**

Global Climate Change and Animal Health:

The American Veterinary Medical Association recognizes that climate change has serious far-reaching negative implications for animal and ecosystem health, and the potential to place unprecedented demands on societies and entities responsible for managing animal health. The AVMA therefore encourages:

- The One Health approach with strong coordination and collaboration among all tiers of public health, agriculture, and animal management government agencies to address climate change issues of mutual concern;
- Enhancing the capacity of federal, state, and local public health agencies, tribal nations, and non-governmental organizations to prepare for and respond to animal disease threats and animal health impacts linked to climate change;
- Well designed research to increase understanding of the potential impacts of climate change on animals and ecosystem health, as well as developing and enhancing early warning, surveillance and response systems to mitigate the animal health impacts of climate change; and,
- The development of educational initiatives to raise the awareness of the link between climate change, animal diseases and animal health among all stakeholders.

The CEI constructed this new policy statement, which was approved by the Executive Board.

Other Items

AVMA staff is working with CEI to update the AVMA CEI Database on Internships and Externships, and to post it on the AVMA website. This database contains contact and other information for environmentally-related internship and externship opportunities for veterinarians and veterinary students. Many programs in zoo and free-ranging wildlife are included on the list.

USAHA and AAWV— A Long and Successful Partnership

Colin Gillin, AAWV Secretary

The United States Animal Health Association (USAHA) has been the nation's animal health forum for over a century. It operates as a science-based, non-profit, voluntary organization. Its 1,400 members are state and federal animal health officials, national allied organizations, regional representatives, and individual members. The USAHA works with state and federal governments, universities, veterinarians, livestock producers, national livestock and poultry organizations, research scientists, the extension service and seven foreign countries to control livestock diseases in the United States. It represents all 50 states, 4 foreign countries and 34 allied groups serving health, technical and consumer markets. The USAHA serves as a national forum for communication and coordination concerning disease eradication, animal health, emerging disease, and other related issues. In addition, it serves as a clearinghouse for new information and methods for policy and programs development and development of solutions for animal health issues.

The Association's mission is implemented through the adoption of resolutions and recommendations aimed at solving animal health problems, and through deliberations of its 32 science-based committees. One such committee is the Committee on Wildlife Diseases. The mission of this committee is to promote an understanding of the importance of diseases to free-ranging wildlife, commercial captive wildlife and domestic animals, and the interactions of these groups of animals and diseases; to protect the integrity of native free-ranging wildlife populations while simultaneously protecting native free-ranging wildlife, commercial captive wildlife, and domestic animals of the United States from diseases they may share or which may be transmitted among them; to protect free-ranging wildlife of the United States from accidental introduction of diseases; to assist in the identification and management of disease problems of free-ranging and commercial captive wildlife; and to promote sound wildlife disease management practices among responsible agencies and industries. For years, AAWV members have filled the ranks of the Committee on Wildlife Diseases and have served in leadership roles including immediate past Chair John Fischer, Current Chair Steve Schmitt, and Vice Chair Colin Gillin.

The USAHA and the Committee on Wildlife Diseases meet annually and produce a printed proceedings of each meeting; these proceedings represent the most complete history of the nation's animal health endeavors over the past century. Future meetings will be held in San Diego, California on October 7-14, 2009 and Minneapolis, Minnesota on October 14-21, 2010. If you are not already a member of USAHA, we invite you join us in San Diego this October. For more information about the USAHA, go to www.usaha.org/index.shtml. For more information about the USAHA Committee on Wildlife Diseases, go to www.usaha.org/committees/wd/wd.shtml.

AAWV Plans Conference Activities for 2009

MarK Cunningham, AAWV Vice-President

This year AAWV will be meeting jointly with the American Association of Zoo Veterinarians on October 24-30 in Tulsa, OK, and will be sponsoring Dr. Ron DeHaven as the Cutting Edge Speaker. Dr. DeHaven is the Executive Vice-President of the American Veterinary Medical Association and will be speaking on the topic of "One Health." *[See related article on page 4- ed.]* AAWV member Sharon Deem will be chairing a session on Wildlife Conservation Medicine, and members Steve Osofsky and Dave Miller will be co-chairing sessions on One Health and Wildlife Welfare respectively. The AAWV will also be hosting workshops on wildlife necropsy and field wildlife medicine. Lastly, the AAWV will hold its annual business meeting and will be participating in the auction, the proceeds of which will benefit AAWV student activities. (As always, it's never too early to start thinking about auction items!)

Although not a joint conference, AAWV also will be participating in the Wildlife Disease Association Conference August 2-6, 2009 in Blaine, WA. The AAWV will be sponsoring the Cutting Edge Speaker and an informal business meeting will be scheduled. Hope to see you all there!

Following is the final version of the AAWV position statement on standards of care for anesthesia, analgesia, and surgery on free-ranging wildlife. This statement will be presented to the Fish and Wildlife Health Committee of the Association of Fish and Wildlife Agencies (AFWA) for endorsement. Thanks to all who contributed suggestions and comments. Now the hard work begins; please contact Jonathan Sleeman (jonathan.sleeman@dgif.virginia.gov) if you are interested in helping to draft the actual Standards of Care document. This will be an incredible opportunity to make a significant contribution to the fields of wildlife health and veterinary medicine.

AAWV Position Statement on Standards of Care For Anesthesia, Analgesia, and Surgery on Free-Ranging Wildlife

There are increasing numbers of research projects and wildlife management activities that involve anesthesia or surgical manipulation of wild animals. Wildlife managers, researchers, and veterinarians are increasing their participation in projects that involve anesthesia and surgery of free-ranging animals (invertebrates, amphibians, reptiles, fish, birds, and mammals). Many of these projects require that procedures be conducted in the field, usually under conditions that would be considered inadequate for the same procedures conducted in an animal hospital or laboratory. Institutional Animal Care and Use Committees (IACUC) considering projects involving anesthesia and surgery on free-ranging animals may lack the expertise, experience, or guidance to judge the appropriateness of the procedures being proposed. While some wildlife veterinarians and biologists have training and expertise in anesthesia and understand the risks of medical and surgical techniques used on free-ranging wildlife, we lack specific Standards of Care for anesthesia and surgery performed on free-ranging animals. This hampers the ability of agencies, researchers, and veterinarians to improve the well-being and care of free-ranging animals that are the subject of research and wildlife management projects, and could adversely affect the quality of the research or management effort. Wildlife veterinarians, i.e., veterinarians with specific training and field experience in the anesthesia, handling, care and medical and surgical procedures for free-ranging wildlife are a potentially untapped resource who can assist in such projects, provide insight into the medical and surgical techniques used in the field, and provide professional review and advice, or direct expertise to assist in the development, design and delivery of such projects. The following statements present the American Association of Wildlife Veterinarians (AAWV) position on anesthesia, analgesia, and surgery on free-ranging animals.

The American Association of Wildlife Veterinarians recognizes that performing anesthesia and surgery on wildlife requires specialized skills and training, and that the lack of specific Standards of Care for anesthesia and surgery on free-ranging animals could:

- Result in agencies, researchers and veterinarians using inappropriate procedures.
- Hamper the ability of agencies, researchers and veterinarians to justify the use of appropriate procedures, and obtain the necessary permits and institutional approval.
- Have serious implications for the well-being of the animals involved.
- Affect the quality and validity of the data gathered during such procedures.
- Be construed by the public as agency or institutional endorsement of the use of inappropriate procedures.

The American Association of Wildlife Veterinarians supports:

- The development of detailed Standards of Care that outline the appropriate procedures to use for anesthesia, analgesia, and surgery in free-ranging animals of all taxa based on scientific evidence.
- The development of the Standards of Care in consultation and with input from relevant stakeholders, wildlife management agencies, and other interested groups.
- The use of the developed Standards of Care by government agencies, non-governmental organizations, universities, and the Institutional Animal Care and Use Committees involved in management or research activities on free-ranging animals.
- The development of additional training opportunities for wildlife health professionals and veterinarians on the techniques and procedures outlined in the Standards of Care document.

The American Association of Wildlife Veterinarians urges:

- That wildlife management agencies, institutions, wildlife professionals, and other stakeholders work with the AAWV to develop, disseminate and adopt the developed Standards of Care for wildlife anesthesia, analgesia, and surgery.

Wildlife Medicine and Conservation Session Sponsored by AAWV at NAVC

The AAWV sponsored a very successful session on Wildlife Medicine and Conservation at the recent NAVC Conference in Orlando, January 16-21, 2009. AAWV President Jonathan Sleeman was program chair, and speakers included Drs. Mark Mitchell, Christian Walzer, and Kirsten Gilardi.

A diverse range of topics was covered, including wildlife diagnostics, pain management in wildlife, the role of reptiles in ecosystem health monitoring, veterinary work with free-ranging Przewalski's horses and Asiatic wild ass, and a lecture on wildlife myths and realities. AAWV member Cindy Driscoll did an excellent job moderating the session.

Next year's session will be organized by Kirsten Gilardi around the theme of urban wildlife, and promises to be an excellent conference. In addition, there will be special sessions on the wildlife-livestock interface and One Health.

Pictured left to right are Drs. Mark Mitchell, Christian Walzer, Kirsten Gilardi, Cindy Driscoll, and a very stressed looking Jonathan Sleeman.

Plan to Attend the 3rd International Chronic Wasting Disease Symposium!

The Utah Division of Wildlife Resources and the AAWV invite you to attend the 3rd International Chronic Wasting Disease Symposium in Park City, Utah on July 22-24, 2009. The theme for is "CWD—Advancing the Science and Developing the Tools." As new research continues to broaden our understanding of CWD, wildlife managers have been presented with new and unique challenges that necessitate a fresh look at how CWD should be managed in cervid populations. This symposium will explore issues such as prion research and biology, management and control of CWD in wild and captive cervids, human dimensions of CWD, CWD surveillance, and many other aspects of prion disease research.

Symposium registration includes breakfast, lunch, snacks, and a delicious banquet. The accommodations at the Park City Marriot are those of a first-class mountain hotel, and Park City, Utah is a beautiful historic Rocky Mountain town and premier summer vacation destination located only 36 miles from the Salt Lake International Airport. It is a great location to combine work and family, vacation, or to use as a starting point to tour some of the 7 National Parks of southern Utah that are within a few hours' drive from Salt Lake City. Go to www.regonline.com/cwd_symposium for more information.

New Marine Mammal Diagnostic Imaging Website is Up

The new www.marinemammalradiology.com website is designed to provide information about marine mammal diagnostic imaging studies. It includes descriptions of the types of modalities available, techniques to optimize the quality of radiographic studies, examples of normal radiographic anatomy and imaging of disease various disease processes from a variety of marine mammal species. The website is in the early stages of development and currently contains primarily normal and abnormal pinniped anatomy by traditional radiography, CT and MRI, but will be expanded as more data becomes available. The material is reviewed by a number of marine mammal specialists.

In addition to providing images to disseminate knowledge of marine mammal radiography, the site is also looking for image submissions to add to the database. Anyone is welcome to contribute high quality diagnostic imaging data. Full acknowledgment will be provided for studies used on the website; however there are no guarantees that data submitted will be included.

Size Does Matter, if You're a Moose...

From ProMed (edited)

Whatever is causing severely deformed antlers and early shedding among mainland moose in Nova Scotia could threaten the ability of this endangered species to produce offspring.

"That can have a major implication for the population," according to Dr. Scott McBurney, a wildlife pathologist with the Canadian Cooperative Wildlife Health Centre (CCWHC), Atlantic region. "I guess what you want to have (is) an understanding of — knowing that this is a population in decline — how those antler deformities may relate to the ability of that population to reproduce and multiply itself up to normal levels again."

Moose shed their antlers once a year and grow a new set the following year; the process is hormonally mediated. "It's at the point of life when (bull moose are) most sexually mature and good breeding potential that they grow their best set of antlers and they are an attractant to females," Dr. McBurney said. "A moose antler should be fairly large with a palm shape in the centre and tines - finger-like projections - sticking out from it. But what we're seeing with the moose in Nova Scotia is ranging from . . . very tiny twisted nubs in a mature moose, so, again, they would only be one to two inches high but severely twisted and deformed, to spike-like antlers that would more consistent with what you would see on spike of a goat or something like that — like no tines coming off of them, just single spikes." Some mainland moose also have antlers that are normal on one side but not on the other. And last November a hunter found the antlers of one fully developed moose that had shed a full month before they should have, suggesting that whatever process is disrupting antler formation may also be affecting the timing of antler development.

Age, nutrition, hormones, genetics and trauma can all affect antler growth. Copper deficiency is another potential cause Dr. McBurney is looking into. "With very small isolated populations that we see in Nova Scotia right now, it may be that inbreeding suppression that may be resulting in some of the antler deformities that were seeing as well," added Dr. McBurney.

Due to the logistical difficulties of monitoring the moose population, CCWHC staffers do not know how frequently these deformities are appearing in the moose population. Experts began detecting the abnormalities in 2000. " . . . I had five bull moose submitted to me this fall and of the five that were submitted, three had abnormal antlers and they were all from mainland Nova Scotia, which is the endangered population," said Dr. McBurney, who works at the University of Prince Edward Island Atlantic Veterinary College.

Mainland moose are located in isolated areas across mostly central Nova Scotia. The mainland moose has been on Nova Scotia's endangered species list since October 2003. The Department of Natural Resources estimates there are only about 1,000 left. Last year, the department and the Nova Scotia Mainland Moose Recovery team released a recovery plan to save the moose and enhance the population by 2012.

Gerald and Buff Corsi © California Academy of Sciences

What Killed Our Pelicans?

WDIN post (edited), January 2009

More than 400 endangered California brown pelicans have been found dead or dying since late December 2008, with disoriented and starving birds turning up on highways, in backyards and even in the Arizona desert. Now, after investigating theories ranging from bird flu to poisoning by lingering fire retardant used to fight the region's wildfires, California fish and game officials are beginning to suspect a less dramatic cause: cold temperatures.

Just before Christmas of 2008, animal rescue workers started to report a surge in pelicans appearing emaciated and near death. Jay Holcomb, the executive director of the International Bird Rescue Research Center in Fairfield, California said the surge in sick birds was alarming because most of the victims were adults and not the more vulnerable juveniles. "They were landing in odd places, on the road and parking lots, in the snow, some way inland. Adult birds don't do that." Many of the weakest birds died, and officials began performing post-mortem exams to see if a disease or toxin might be at work. The tip-off that cold temperatures might be a factor in the mortality event was the presence of frostbite. "It was severe in a lot of cases," according to David A. Jessup, senior wildlife veterinarian for the California Department of Fish and Game. "There were legs, toes and pouches frozen off."

The brown pelican's traditional turf is roughly from Northern California to Baja California in Mexico. In recent years, however, researchers say warmer weather and water, and plentiful sardines and anchovies, have led to pelican populations as far north as British Columbia. According to a preliminary report, many of the birds flooding West Coast animal hospitals and rescue centers were caught in a snowstorm and brutal cold snap on the Oregon-Washington border in mid-December, setting off an arduous and often life-threatening commute to warmer climes. "Pelicans were observed in the middle of that storm and then seen moving south," said Dr. Jessup. About a week later, ill birds started showing up on the California coast and inland. According to Dr. Jessup, large flocks might have been caught off guard on East Sand Island in the Columbia River, where observers reported thousands of birds still roosting in early December. Deborah Jaques, an Oregon wildlife biologist specializing in sea birds, said there might have been as many as 5,000

Gerald and Buff Corsi © California Academy of Sciences

pelicans on the island when the storm hit, packing 60 mile-an-hour winds and temperatures below freezing. "These birds were probably not subject to any thing like this in a hundred years," Ms. Jaques said. Dan Anderson, an avian ecologist at the University of California, Davis, said that once exposed to snow and extreme cold, the birds have a "tough time drying off" if soaked. "They get wet and cold, and that's the end of them," Mr. Anderson said.

Other potential causes of the pelicans' distress are still being considered, pending necropsy results on some birds; initial tests have shown several birds with elevated levels of domoic acid. But the cold seems the most likely explanation.

Brown Pelicans have made a strong recovery after a near-extinction of the species in the 1970s, when pesticides, particularly DDT, weakened the shells of the birds' eggs. In recent years, however, the species has been thriving, with hundreds of birds seen perching on cliffs like Pelican Point in Pismo Beach on California's central coast. The species' recovery has been so successful that the federal government is considering removing it from the endangered-species list.

Inaugural USGS National Climate Change and Wildlife Science Center Workshop

On December 3-4, 2008, the first National Climate Change and Wildlife Science Center (NCCWSC) Workshop was held at the National Conference Center in Lansdowne, Virginia. Representing the AAWV at the workshop were Pat Klein and AAWV President Jonathan Sleeman. There was broad representation from within the three participant criteria groups established by the Interim Steering Committee: agency or organization representation with leadership responsibilities for climate change science, wildlife management or policy activities; land and natural resource managers with responsibilities for national or regional approaches for wildlife management; and scientists with expertise at global, national or regional scales on priority approaches including adaptation, risk assessment, up- and down-scaling, vulnerability analysis, predictive models and forecasting, ecosystems services analyses, and adaptive management.

Lynn Scarlett, the Deputy Secretary of the Interior, gave the keynote address and provided participants with an overview of the Department of the Interior's interest and responsibilities regarding wildlife adaptation to climate change. The three plenary speakers, Dr. Steve Williams of the Wildlife Management Institute, Dr. Katharine Hayhoe of Texas Tech, and Dr. Virginia Burkett of the USGS, presented the challenges that wildlife managers meet in managing for adaptation to climate change, the complexities and current state of down-scaling efforts of global climate models for natural resource applications, and examples of current active projects, respectively. Secretary of the Interior Dirk Kempthorne made an appearance to announce the Department of the Interior's release of the three climate change task force draft subcommittee reports (available for review online at www.usgs.gov/global_change/doi_taskforce.asp). At the same time he announced the establishment of a Climate Change Coordinator Position and Climate Change Advisory Council within the Department.

Participants of the Workshop were there to work; twelve break-out groups provided a host of recommendations to refine the NCCWSC objectives and facilitate collaboration:

- Focus on top priority science information for biological managers designing response to climate change.
- Link physical climate models and ecological/biological response at temporal and spatial scales useful in management decision-making and policy development.
- Make system, habitat, species and land use shifts priority end-points
- Integrate public and private land management strategies
- Focus at national and regional scales
- Work with fish and wildlife managers for scenario building and forecasting to inform local adaptive management
- Create and assess models and tools needed for decision-making:
    - Down-scaled climate models
    - Ecological response models
    - Biological response models
    - Vulnerability assessments
    - Risk assessments
- Define the NCCWSC's role in monitoring strategies:
    - National monitoring strategy with protocol development
    - Early warning system with management options
    - Local/regional/biome approach
    - Genetic approaches
- Use a true partnership model in designing the center, including science and resource management partnerships
- Provide timely turn around of current information for resource planning
- Serve as a convener and partnership developer among scientists and modelers across agencies and organizations to address management needs
- Provide information transfer, feedback and discussion loops to managers.

Another exciting advance was the frequent mention of the NCCWSC at the National Council on Science and the Environment (NCSE) conference Biodiversity in a Rapidly Changing World. Recommendations from that conference will be released in January, and they include many recommendations for the NCCWSC. Updates, videos and Powerpoint presentations will be online at www.ncseonline.org/conference/biodiversity. For more information about the NCCWSC, go to http://nccw.usgs.gov.

OPPORTUNITIES

2009 ACZM Short Course

The 2009 zoological medicine short course for the American College of Zoological Medicine (ACZM) board preparation will be hosted by the University of California, Davis School of Veterinary Medicine from May 31 - June 4. The five-day didactic course provides intensive in-depth information on important issues in zoological medicine, and is designed to help participants prepare to take ACZM boards by including discussions on studying, test taking strategies, and practice examinations (essay, multiple choice, practical, and slide identifications). Instructors include Scott Larsen, Kirsten Gilardi, Joanne Paul-Murphy, and Ray Wack, in addition to other ACZM diplomates.

The course will begin at 8 am on May 31 and run through 5 pm on June 4. Attendees who are flying should plan to arrive the evening of May 30 and should not schedule departing flights any earlier than 7 pm on June 4. Cost is $600 for five full days of instruction. Registration is limited to 30 people, and registration deadline is May 1, 2009. Please direct inquires to Dr. Scott Larsen at slarsen@ucdavis.edu; (530) 979-0704; (530) 754-2259

Marine Species Histopathology Workshop

The 4th Annual CL Davis DVM Foundation Marine Species Histopathology Workshop will be held at the Radisson Hill Country Resort and Spa, San Antonio, TX on Saturday May 2nd, in association with the Annual Conference of the International Association of Aquatic Animal Medicine. The keynote address will be given by Dr. Mike Rinaldi (Professor of Pathology, Microbiology, Medicine, and Clinical Laboratory Sciences and Director of the Fungus Testing Laboratory, Department of Pathology, University of Texas Health Science Center at San Antonio) on the subject of fungal infections. The keynote address will be followed by case presentations by conference attendees throughout the rest of the day. Case subjects may include marine mammals, birds, reptiles, and fishes.

Registration is $75 per participant, and covers food and beverages during breaks. All conference participants will receive a DVD containing digital images of representative areas from scanned glass slides of each participant case presentation. For further information, please contact Dr. Judy St. Leger at (619) 225-4259 or at judy.st.leger@seaworld.com.

Postdoctoral Research Associate Hubbs-SeaWorld Research Institute

The Hubbs-SeaWorld Research Institute (HSWRI) is looking for a post-doctoral associate to join their ocean health and marine vertebrate ecology programs in addressing potential impacts of environmental change and human development on marine and coastal wildlife along the eastern central Florida coast and Indian River Lagoon. Species of interest include marine mammals, sea turtles, seabirds and fish, with an eye toward understanding potential links between human health and the state of marine and coastal ecosystems.

The HSWRI seeks a veterinarian with an interest in wildlife ecology and ecosystem health and training or experience in epidemiology, disease ecology or related discipline. The successful candidate will work under the direct supervision of two HSWRI senior scientists, one of which is an aquatic animal veterinarian. The position will involve interdisciplinary research in wildlife ecology and epidemiology of infectious and non-infectious diseases, including the evaluation of multi-decadal and multi-disciplinary databases. Production of at least one collaborative manuscript suitable for peer-reviewed publication related to work done at HSWRI, and presentation of findings in an HSWRI seminar are expected. Limited clinical oversight of experimental animals (fish) is expected, and the candidate will become a member of the HSWRI Institutional Animal Care and Use Committee. Demonstrated research experience is required, and a track record in publication of research results is preferred. Must have a DVM or equivalent degree. An MS or PhD in epidemiology, disease ecology or related discipline is desired.

For more information and to download an application form, go to www.hswri.org/getInvolved/careers.cfm.

UPCOMING MEETINGS

March 23-24, 2009

International Sirenian Conservation Conference.
Georgia Aquarium, Atlanta, Georgia. Sessions include current field and laboratory research, management perspectives and veterinary aspects of rehabilitation and release.
For more info: www.georgiaaquarium.org/sirenian.aspx.

April 24-26

WDA Nordic Section Annual Meeting.
Krogbækgård Kursus- & Feriecenter, Denmark. This year's meeting includes a special workshop on Roe Deer mortality. Click *here* for more information.

May 2-6

40th Annual Conference of the International Association of Aquatic Animal Medicine.
San Antonio, Texas. Click *here* for more info.

July 11-14

146th Annual Conference of the American Veterinary Medical Association.
Seattle, WA.
See http://avmaconvention.org/ for more info.

July 11-16

23rd Annual Meeting of the Society for Conservation Biology.
Beijing, China.
Click *here* for more information.

July 21-23

3rd International Carcass Disposal Symposium
UC Davis.
For more information click here or contact Mark Hutchinson by email at markh@umext.maine.edu or by phone at (207) 832-0343

July 22-24

Third International Chronic Wasting Disease Symposium.
Park City, Utah.
For more info contact Mary Conner, Utah State University, at mary.conner@usu.edu.

August 2-6

WDA Annual Conference.
Blaine, WA.
More info: www.wildlifedisease.org/meetings.htm

September 20-24

The Wildlife Society 16th Annual Conference.
Monterey, CA.
Click *here* for more info.

October 7-14

United States Animal Health Association Annual Meeting.
San Diego, CA.
For more info, www.usaha.org/meetings.

October 12-16

Society for Marine Mammalogy 18th Biennial Conference on the Biology of Marine Mammals.
Quebec Conference Centre, Quebec City, Canada. Abstracts for oral and poster presentations due by April 19. For more info: www.marinemammalogy.org

October 24-30

AAWV/AAZV Joint Conference.
Tulsa, OK.
For more info, www.aawv.net.