Patuxent Science Symposium
75th Anniversary
October 13-14, 2011

This transcript is Part 3 of 4 and features the speakers listed below for the 75th Anniversary of the Patuxent Research Center. They talk about their work and experiences while working at Patuxent.

Patuxent Wildlife Symposium
Thursday
Session Moderator: David Trauger

David Trauger introductory: Dr. Donald Sparling

David Trauger:
Our last speaker this afternoon is going to be Dr. Donald Sparling.

Don has studied at Patuxent from 1987 through 2004, where he worked on amphibians. And this resulted in national awareness on the sensitivity of thin-skinned water obligate species.

Don, you know, left Patuxent and is now at Southern Illinois University. Don.

Dr. Donald Sparling:
Thank you. You've heard a lot of talks today about studies that go back many, many years; some of them going back 75 years, other going back to World War II.

With regards to amphibian ecotoxicology, it's a relatively new science. There's been studies that go back to the late '70s, and that's about where it begins. And it wasn't really until about the mid-1990s that it really became important, as people became aware that populations of amphibians were truly declining around the world.

So we don't have quite as much of a history as some of the other areas that have been presented today.

This is something you should never do, give a slide that's filled as this one is, but I wanted to do this for a purpose. This is what I would guess..., I guess I would call the early publications of Patuxent dealing with amphibian toxicology. And this goes back before the period where it really became..., oh, widely used and interesting to folks back in the mid-1990s.

The interesting thing about this is not so much the titles of the papers, but if you look at a couple of things that are highlighted you see that there's been several names that have been raised. But there's one person whose name comes up much more often than others, and that's Russ Hall.

Russ truly was an early pioneer in the area of working with contaminants on amphibians.

But some of the things that were (unclear: 06:30) early, just in the yellow; various types of tests, looking at the effects of these compounds including lead and parathion, toxaphene, some of the organophosphorous pesticides and so forth.

So there's again, it's the... the literature is not extensive, but the important thing here is that Patuxent was an early start with regards to toxicology studies, and especially the affects of contaminants on wildlife, on amphibians.

The same type of thing can be... Okay, seeing even more publications with reptiles. And that's even interesting, because if we take a look at the history of publications of amphibians and reptiles, reptiles by far are greatly under numbered or under represented as far as toxicology is concerned. And yet again, Patuxent comes up as an early pioneer, looking at the, not the effects so much, but on residues of, of persistent organic compounds.

One name that comes up here quite often is Steve Fritz. Steve was also the Section Leader for the Endangered Species Program when I started here at Patuxent. But his early work was on oil and gas. Again, Russ Hall shows up and Gary Heinz shows up; so going all the way back, again to the 1980s.

In the mid-1990s to 2005, which would be my period, and some of the stuff that Paula has presented, I'm just going to touch bases on just a few studies that we have done over the years.

I think probably the one that's been most persistent, the area that has at least for me been most persistent, is the effects of contaminants, particularly pesticides, on amphibians in the Sierra Nevadas and California.

Several species of frogs and toads are experiencing severe population declines in California, and have been for several years. The populations most severely impacted are in pristine national parks like Sequoia National Park and Yosemite National Park. And most of these areas lie downwind of the San Joaquin Valley of California, one of the most extensive and heavily agricultural sites in the country; they have year-round crops there and lots and lots of pesticides are applied. These pesticides volatize and have been shown to go up into the air and eventually get up into the mountains, where they come down as either wet or dry precipitation.

Here are just some of the species that are, in fact, have severely declined over the years. Some of these guys are just remnant populations now like, for example, the Mountain

Red-legged frog in Southern California is just about gone. And it's considered to be a federally endangered species.

There are several other species which have been proposed for listing, but we've got a problem here in California, and because there are so many species of concern that the U.S. Fish and Wildlife Service Endangered Species Office there can't keep pace with listing. And then various non-government organizations sue them for not listing in time. And the amount of money they're spending defending in courts could go to the listing process, but it's being spent on lawyers instead. So, it's kind of a catch-22 out there.

The critter that we've worked with a lot is the Pacific Tree Frog (*Pseudacris regilla*), and it is one species which is still fairly abundant out there, which is why we've been using it. It spends, of all the ones that we've seen in the (unclear: 11:13) before that, tree frogs spend the least amount of time in water. It spends most of its adult life in trees, and maybe that's why it's still around.

During early on we did a study where on California where we collected a number of frogs in water. And at that time Pseudacris was called Hyla. Someone was mentioning about the change in toxonomy for birds, you should be an amphibian person if you really want to get some toxonomy changes.

Well, we did find that, especially in the Yosemite and Sequoia, certain compounds like chlorpyrifos, diazinon, malathion, and later endosulfan were much more, had a much higher concentration than other sites that we sampled.

This led to both laboratory studies and to field studies, particularly Deborah Kelemen, who was here for a few years around 2000-2001, and conducted her doctoral studies out there in the national parks.

Some of the lab studies we found were that lethal concentrations of endosulfan were incredibly low, at least in the Foothills Yellow-Legged frog 3.3 part per billion was the LC50. The concentrations of the LC50s for a couple of other species of frogs were around 16 parts per billion. But less than one part per billion wiped out more than half of the frogs that we tested. Every one that died had concentrations greater than .8 part per billion.

Lethal concentrations of chloripyrifos, the most commonly used pesticide out there, were quite higher, quite a bit higher. But there were many sublethal effects seen, including reduced growth and development, severe malformations with endosulfan, and cholinesterase suppression with chlorphyrifos.

In the field they were pulling basically the same types of studies, things that we'd been finding in the laboratory.

We did determine that a given tadpole could have up to ten different pesticides in its body at one time. We found 18 different pesticides in tissues of amphibians in some survey work that we did.

Sequoia, mortality at Sequoia National Park was up to 96% of frogs that we had in enclosures. Whereas mortality was only 23% to maybe 50% at last time in the Yosemite National Parks.

Substantial sublethal effects included depressed cholinesterace, reduced growth, delayed development, malformations, the same types of things that we were seeing in the laboratory.

Another study that we've done with the effects of perchlorate; this is using Grey Tree Frogs. And this was under commission with the, oh..., Department of Air Force.

Oh, I wanted to mention; Sue had asked about taking home messages. The studies that we've done in California accomplished at least two different things. Endosulfan has been banned and the manufacturer, Bayer, has an agreement with EPA, about the same time said, "Well, we're going to go ahead and take it off the market.

Our data has been, we know, was useful in banning that particular pesticide.

And the other thing is that our studies have been cited as one of the causes for the decline of the Mountain Yellow-legged Frog when it was officially listed as an endangered species.

So, having some effects.

So anyway, perchlorate is a potent oxidizer that's been used in jet and rocket fuels. And it's because it has very similar molecular size and weight to iodine it is a very potent thyroid inhibitor, it's taken up instead of iodine and prevents the formation of thyroxine.

We did a study where we took a look at the effects of perchlorate on amphibians, and percent metamorphin declined sharply at concentrations above 2.2 parts per million. Environmental concentrations go up to about 3.5 parts per million.

If you add iodine we found, hey listen, you get a lot metamorphosis. Great, maybe we

can go ahead and use it in areas that are contaminated by perchlorate around military bases, maybe we can go ahead and add iodine to the waters and prevent them in having normal metamorphosis. Not, it doesn't work, they all die.

So another study, we talked about lead poisoning with regards to waterfowl earlier, we did a study with Sherry Krest with the Fish and Wildlife Service, looking at the effects of lead.

Prime Hook National Wildlife Refuge in Delaware was founded in 1962. At about the same time a gun club on the borders of the refuge was also founded. And after 40 years of shooting into, across the refuge border into a wetland, they found concentrations of lead shot as high 5700 parts per million.

Sherry also found that there were adult frogs there but she, after two years, could find no single tadpole of any species in this wetland.

The whiteness that you see here, that's not sunlight, that's lead.

We looked, again exposed into laboratory concentrations, and we found that the rate of malformations greatly accelerated in concentrations above 120 parts per, actually above 360 parts per million.

So the concentrations in the sediment were as high as 50..., 700 parts. We had no survivals above 3,200; 3,240 parts per million. So, that's why she wasn't finding any tadpoles.

I've had a little bit of arthritis, but I've got to tell you that when I look at these pictures I don't have any problems with my arthritis.

This is a normal frog with normal skeletal structures. This guy is at 120 parts per million, and you're beginning to see some problems with the digits and some scoliosis. This guy is at 1,080 parts per million, and you can really see some severe malformations in the skeleton and the legs and so forth.

And if you've got arthritis think about this poor little guy, how he must've felt, okay, at 3,280 parts per million.

This is what this guy looks, looked like with his skin still on. So, they definitely had some severe malformations with lead.

Mortality increased in concentrations above 120 parts per million.

And going on now in some of the studies that Paula has done. Oh, I should say by the way that wetland was in fact covered over. The gun club had to go ahead and pay for remediation of that wetland.

Paula has done, actually I'd like to have, I was thinking about having her come up here but I'll taking responsibility of presenting some of the neat things that she has done.

Relative sensitivity of amphibians to agricultural pesticides; a variety of different pesticides including parathion, with bithion, carbofuran, furadan. I was going to pronounce that one but I wasn't able to do so very quickly. LC50s and the spotted salamander larvae were determined, and then she exposed grey tree frog, American toad, green frog, and bullfrog larvae to the LC50 and found that (let's try this) carbophenothion, okay, it was most toxic with the spotted salamander, it was the most toxic. The spotted salamander was more sensitive than the bullfrog, but less sensitive than the other species.

That's one of the things that's very interesting with toxicology is that you'd expect that pretty much a species would fall into the same ballpark as sensitivity. It doesn't always happen.

Paula was also taking a look at the effects of isogenic chemical in embryotic of diamondback terrapins. She's used PCBs, 17beta-estradiol and ethinol, which is a control at... One of the things about turtles is that they temperature-dependent sex determination. You raise them at one temperature you get all females, you raise them at a slightly lower temperature you get all males. And so she incubated them at male producing temperatures and found out that estradiol 100% of them came out to be female, even though they were raised at male temperatures. And that's pretty much what you accepted. And that would be a positive control.

However, PCBs were also resulting in the expression of many female like structures or development, showing that they do have an endocrine disrupting effect.

Another study that Paula has done was the use of nonviable alligator eggs to monitor mercury levels. This is again one of the things that we found consistent in these, is that if you look at the literature within, and this even goes back to my first slides, literature dealing with reptiles has been very much residue-based rather than effects-based. But this goes along with it. This is not the egg that she used by the way.

Eggs collected throughout Florida were analyzed for total mercury. And she found that mercury was higher in the Everglades than northern Florida, but below reported effects levels.

Okay, the other thing we've done in addition to our original research is that we've been fairly productive in publication of major references. *Ecotoxicology of Amphibians and Reptiles* was published in 2000 through SETAC Press, the second edition of this book came out in 2010.

Working with Greg Linder, Sharry Krest, and some others we developed an *Amphibian Decline* book, also published by SETAC Press, which was the result of a postint type of conference in Wisconsin.

And then working with ASTM, again with Greg Linder from Oregon, Fish and Wildlife..., excuse me USGS; *Multiple Stressor Effects in Relation to Declining Amphibian Populations*.

And those books have had some, all three of those books have had a fair amount of impact in getting and encouraging people to do some additional work with amphibians and reptiles.

In no particular order, a whole bunch of people have been involved with the studies since, over the last 10 or 15 years. And I'm not going to go through all of those, but those are some of the people that have cooperated with the work that

we've been able to do.

Any questions?

David Trauger:
Any questions? Here's one.

Audience:
In your sampling of organisms, what was the source of your frogs? And if they were wild source, were they screened for Batrachochytrium?

Dr. Donald Sparling:
A very good question. The..., we got eggs, okay, from California. And initially we were, it was before the chytrid situation was really well known. But we feel very comfortable that chytrid was not present because chytrid inhabits or feeds on keratin, and studies have

shown repeatedly that eggs don't carry chytrid to any great extent. If we were using tadpoles it would have been a different situation possibly, certainly if we'd been using adults it would have been even different.

We've had other studies when I..., through Southern Illinois University, now a part of Patuxent, where we had a study with Eastern newts. And we had to try, and we got these from commercial vendors, we had to try three different sources before we could find a chytrid-free group that we could work with.
Somebody had a question over here?

Audience:
What is it about lead exactly that causes deformities?

Dr. Donald Sparling:
I don't really know, does anybody know what the? I know that, you know, lead binds with many, interferes with many enzyme reactions. Lead is not divanant like calcium, so it would not be picked up as calcium, I don't think. It would be much heavier. I don't think the body would respond to lead as it would to calcium.

Any of the folks that have been working with waterfowl lead, anybody have any suggestions?

Audience:
The classic reason is that you can treat lead poisoning with calcium versenate.

Dr. Donald Sparling:
Can you? Okay, so.

Audience:
In the mechanism of storage the calcium and lead is the same, it all goes to the bone. So it gets it out of the system.

Dr. Donald Sparling:
Okay, so I guess I have to eat my own words here. It is a calcium substitute. Okay.

Audience:
How is remediation conducted in an area that's been contaminated with lead?

Dr. Donald Sparling:
The best way is probably if you're going to do it would be with either covering the lead over. The wetland that was over in Prime Hook was eventually just filled in. There are... If you have an area that you want to maintain with water and if there's a variety of different water called geotextiles that you could use, which provides an impervious layer over the lead and eventually the lead will works its way further into the sediment and not be available to organisms. Putting upon the species, if you're working with frogs, you can get it below, a couple of inches below into the mud, away from the surface, that's probably going to be fine. For waterfowl, you'd have to go much deeper because they will feed and sift through the mud. But geotextiles, I mean they're very expensive, so it could only really be used in areas that you really want it to protect.

Thank you.

Patuxent Science Symposium
Friday
Session Moderator: David Trauger

David Trauger introductory: Dr. Glenn Smart

David Trauger:
We are going to continue this morning, looking back at the history and the legacy of Patuxent. And we're going to talk about endangered species this morning, which is very exciting for me because I came into the federal service fulltime during what I call 'An age of enlightenment,' which was 1978. And President Carter had signed an executive order, directing all the federal agencies to survey their lands for endangered species. And somehow they selected me to come to Wyoming and look for bald eagles, and I had to look over my shoulder one more time in my life to figure out was it really me.

But we have this morning three speakers before break, and I would like to introduce Mr. Glenn Smart, our first speaker.

And Glenn was Patuxent's first avian propagator for endangered, the Endangered Species Program from 1965 to 1972. And he worked very closely with Dr. Ray Erickson to establish the captive colonies at Patuxent. Glenn, please.

Glenn Smart:
For many years I've done a little woodcarving as many of you know. Those of you who know me know that I carved birds for probably 40 years now. And I did a bird that I

would like to present to the Center. A Whooping Crane [applause]... to use for your office, I guess, in the Center here.

David Trauger:
Thank you, and I'd just like everyone to know this won't be going in my office, as much as I'd like to put it there. But we've now set up some very nice displays in our lobby, our new design, and this will be displayed prominently and with great appreciation. Thank you, Glenn.

Glenn Smart:
Thank you.

In the late '50s and '60s, early '60s, we became more and more aware of the plight of a lot of the species of which we are familiar here. A lot of things were becoming more rare and we were losing a lot of species. Apparently, the rate of extinction skyrocketed during that period and we knew that we had to do something. Congress enacted a number of Endangered Species Acts during the early '60s and on up until the one that we use now in 1971.

With that awareness, the federal government became more and more aware of the need to work on endangered species and do what we could to preserve these things as long as we could.

This was championed in the Washington office by Dr. Ray Erickson. Ray began to talk among his colleagues in Washington and to see if we couldn't put together a program. Ray had in the back of his mind a three-pronged project that would..., for endangered species. And he began to talk this up and all.

Eventually in the early '60s a gift of, or not a gift, $350,000 was awarded by Congress through the offices of the Senator from South Dakota. And it was decided that Center would be housed here at Patuxent Wildlife Research Center.

So Dr. Erickson began to put this together and all and he worked with the people here at Patuxent and they agreed on a location for it and began to gather some things together.

Gene Milder, a biologist with Fish and Wildlife stationed at Monte Vista, was working with a captive population of Sandhill Cranes and those cranes were moved to Patuxent. And throughout the program, whenever possible, we worked with a surrogate species rather than with the endangered one itself. Sandhill Crane being very closely related, of course, with the Whooping Crane was one of our target species, so we began to work on

Sandhill Cranes.

Then a young bird, a young Whooping Crane was found in Canada with an injured wing. That bird was captured and taken to Monte Vista. But then when the birds were all moved to Patuxent, this bird came along. With that, it was the first Whooping Crane that we had here at the Center. This bird we named *Canus*, in recognition of a joint effort between the governments of Canada and the United States.

We worked with Sandhill Cranes and then early in the '60's, '64; I guess in '64 or '65, we formulated a policy with the government of Canada whereon any year in which there were at least 25 Whooping Cranes that went north toward the breeding grounds, we would be allowed to go in and take one egg from each two- egg clutch in order to build a population of breeding birds here, hopefully to produce birds that could then be released back into the wild.

Dr. Erickson and I went to Canada the first time in June of 1967, where we met with Ernie Kuyt, Canadian Wildlife Service biologist up there. And Ernie was our, he was the only person who was allowed on the ground in the nesting grounds. We would go out in a helicopter, one person, either Ray or myself with Ernie, and Ernie would then go to the nest, select an egg and bring the egg back. Of course, we had to get permits.

And the breeding grounds for the Whooping Crane were on the Wood Buffalo National Park in Northern Alberta and southern Northwest Territories.

So we had to go get our permits; and there we're receiving them. And this is what the nesting grounds look like. A nest and this, at the time that we went the first year, there were..., there were six known nests. I think population at that time was about 27 birds.

Ernie... We had developed; if you know Ray Erickson, you know he is super, super cautious, and he had developed..., we..., along with Ray and myself and several others we developed a cubic foot container of Styrofoam, with a cutout in the middle where this egg would fit. And we would put this egg in this cube of Styrofoam where if we dropped it, it would float and all this sort of thing.

So Ernie came out, and the helicopter's quite small, and he said, "There's no way that I'm going to carry that thing out into the marsh." And also he said, "I'll take care of it." So as far as I know, every egg that was ever brought out of Wood Buffalo National Park got a ride in his woolen sock.

After we collected our first, our six eggs, Ray and I were coming back the first year. We

had a jet by the Royal Air Force that was going to bring us back, Royal Canadian Air Force, and that was the year of the Six-Day War over in the Mid-East. And the secretary general to the U.N. usurped our airplane and we had to come back commercial. But thereafter, we did get the royal treatment by being flown back home in an executive jet to deliver these precious eggs. And that's the result of what we were all trying to do.

This is a first year bird. This is probably taken in November or December, and the bird had molted. It now has a white body but has a dark, has a brown neck and his back wings and tail are still brown. That molt progresses until by late spring the bird is totally white except for the brown head.

The next program or next species that we were working with was the Aleutian Canada Goose. This is a small bird that was at one time rather widespread throughout the Aleutian Islands, but with the introduction of foxes to those islands for the fur trade (somebody decided they could take the foxes up there and release them on these islands). They would go on about their business and raise their young and he'd go back at the appropriate time and harvest the furs and it would work out well. Well, it did undoubtedly. But these islands then were full of foxes. And they had destroyed a lot of the ground nesting species that were present, including the Aleutian Canada Goose.

Fortunately, there was one small island in the outer Aleutians called Buldir; a small pinnacle of rock about eight miles by five miles, very precipitous cliffs surrounding around most of it all. And they did, could not land there on a regular basis, so no foxes were put there. A refuge manager, Bob Jones, from the Aleutian National Wildlife Refuge (and he's a story himself, sometime I'll tell you), Bob, on one of his excursions, found a breeding colony of Aleutian Canada Geese on Buldir Island. The estimated population was probably 100 to 150 birds.

In 1972, we went out to Buldir and collected goslings; I think we got 22 goslings on that trip. But you can see the kind of terrain that most of the island was. Fortunately, on one side there was a fairly level spot that you could get into on occasion. And we were able to get ashore and capture the birds at that point.

And these birds then were brought back to Patuxent and bred. And we bred them quite readily; we raised quite a lot of them. Released, we'd take them back up and release them in certain areas after the areas had been cleared of foxes.

And that did not work well because the eagles were still there, and eagles like goose as well. So that did not work out as well.

What they finally did with Aleutian Canada Geese was they found that they could take these foxes off the islands. And once the island was clear of foxes, they would go to Buldir and capture a family of geese. They would try to get the adult, at least one adult and the young, take them to this island and turn them loose on the island so they grew up as wild birds on that island. That worked very well.

And they have now cleared most of the islands and the Aleutian Canada Geese are doing quite well. I believe the number has risen to, from around 150 birds to something over 200,000 now. So they've done very well.

The Laboratory Sciences Section was developed with a nutritionist, a veterinarian, a physiologist, and others as time went by I'm sure. But the first three were those three; a veterinarian, a physiologist, and a nutritionist. And they worked with the birds in developing diets and learning as much about them as we could, and was seeing to their welfare throughout that whole period.

And now the field arm of the Center, of the program, Ray wanted a field biologist studying individual species on the ground where they lived. And we had, initially we had six biologists; Roy Tomlinson working with the Masked Bobwhite Quail in Arizona. This is a Desert Bobwhite, that was fairly common in Sonora, Mexico, but it would also come up into some of the valleys of southern Arizona.

But with the development of railheads in and around Tucson and all, the people would bring their herds of cattle north to the railroad and ship them out. And as a result, they virtually destroyed the grasslands in those valleys where the quail were found in Arizona. So they were, they were practically gone in Arizona. A few still in, Sonora. So Roy was studying those birds.

One of the things that he was doing here, he would find a Cactus Wren nest and he could open that Cactus Wren nest up (and they'd line their nest with feathers) and he was looking for bobwhite feathers. And this is how he, one of the survey techniques that he used, to find the bobwhites.

Here too we tried just to raise a bird. The first birds that we had in captivity were some of the birds that the Levy brothers, Jim and Seymour Levy in Tucson, Arizona, had been working some with this species and they had a few birds in captivity. They gave us three or four pairs of them and we began trying to do something with them, but they were so inbred that we got practically nothing out of it. They would lay a few eggs, those, the fertility was so low and even the chicks that hatched were quite weak. So as a result, there was practically nothing coming from that.

So we went with Roy down to Sonora and captured some birds and brought them back to Patuxent and raised them. And again, they were as easy to raise as any bobwhite, so we could raise them literally by the thousands if we wanted to.

But they would take those back and release them back into selected areas where Roy thought they had a pretty good chance in Arizona making it a suitable habitat and all. Through cooperation he had with ranchers and all there, they were fairly well protected. But then, again the hawks and all took a heavy toll on them; and trapping.

And this is where we put a group of half-grown bobwhite in a pen like this and we would take care of them for a period of time until they became acclimated. And then remotely we would open the door (you see a rope over there on the left side), we'd open the door and allow the birds to find their way out, hoping that they would stay in the area and all. But again, heavy predation and all took a toll on the nestlings (and the birds were leaving the pen).

One of the things that they decided to try was that they would get Texas Bobwhite Quail, which is very similar, and they would just use the females. They would neuter those females, pair them up with a male bobwhite, a male Masked Bobwhite, which they accept very readily, and then when the chicks hatched put 12 to 15 chicks with this pair of birds and they would adopt them almost immediately. Those could then be released, and that was the best way of releasing the quail that we found. And we had a greater success with that than any other way.

Unfortunately, there just was inadequate habitat. And a habitat out there is so, so fragile and slow to recover and all, that there just is an inadequate habitat in the area for the birds.

So I don't think the population is much better now than it was when we first began working with them.

Dave Mech works with the wolves and was working with wolves in Minnesota. Dave had worked wolves on Isle Royale and was a very good biologist, and worked on the population in Minnesota.

The California condor was another species that we wanted to work with. And the first biologist for the California Condor Project was Fred Sibley. And Fred went out and began with the condors. And there was a lot of hostility in the area; one of the things that some people wanted to do is take them all into captivity, others fought back vehemently. And it was some big catfights resulted on that.

And through the cooperation with the State of California and all, it was finally decided that we would capture all those birds and bring them into captivity and put them at the Los Angeles Zoo and the San Diego Zoo. The State of California would not permit any of those birds to be taken out of the State of California.

In preparation of working with the condors, or with the California Condors, we began working Andean Condors. And we found that by removing eggs as they were laid we could get these birds to recycle and lay multiple clutches. Condor's clutch is one egg; they would lay multiple eggs in a given year. And I think the most we ever got was like nine. But this would help us to, you know, get more chicks and affect the recovery perhaps a lot more quickly.

The Black-footed Ferret was another animal that was in dire trouble. And Don Fortenberry was the first biologist on that program. We did work with them here a bit, mostly after I left the program, so I'm not that familiar with that part of it. But I know it did not work well, and I think the state has taken that program over now and they're doing quite well.

In Hawaii there were problems all over. Mainly a lot of the forest birds were in trouble over there. And John Sincock was the first biologist with our program who worked over there, and he and Mike Scott. But Win Banko, who was with the area office in Hawaii, also did a lot of work with endangered species and some of the habitat that...

Again, you know, some of those things have, we've done better with some of them than we have with others. I think we're still having major problems in that area.

A Puerto Rican parrot; it's down to, what, no less than 20 birds or perhaps when you went down there? Dr. Noel Snyder was the first biologist working with the Puerto Rican parrot, and one of the things that he found is one of the major nest predators there was a song bird called the Pearly-Eyed Thrasher. And they would get in and destroy the nest and remove the eggs and all.

Paul Sykes began working in Florida on the Everglades Kite and on the Seaside Sparrows. (unclear: 30:27) or the Snail Kite, as his name implies, feeds almost exclusively on snails. Seaside, Seaside Sparrows.

And that's all of my slides.

I'd like to close my program with a couple of personal notes. A couple of years ago a biologist from the state of Missouri and I drove over to an isolated farm field near

Paducah, Kentucky. And where very shortly before our arrival an ultralight plane had circled and landed along with 14 juvenile Whooping Cranes on their annual migration from there, where they were being bred in Wisconsin down to the area where we were trying to establish them in Florida. So we got to see those birds in migration, if you will. And those, all 14 of those birds did arrive safely in Florida.

The other thing is a couple of years, or several years ago, my two sons, Michael and Philip, went to the Grand Canyon on vacation. Michael called me one day and he said, "Dad," he said, "I'm standing on the rim of the Grand Canyon and there are 23 California Condors soaring overhead. I want you to know how much, what a thrill that is and to thank you and all of your friends for what you are doing to help further this species."

Ladies and gentleman, that is why we do this, it is not for ourselves or for the birds but, well for the birds certainly, but for the people that are coming behind us. And that they will have an opportunity to see some of these things as we have.

So with that, thank you very much.

Patuxent Science Symposium
Friday
Session Moderator: David Trauger

David Trauger introductory: Roddy Gabel presentation by Kathy O'Malley

David Trauger:
Thank you for setting the stage for the rest of this morning's talks and we thank you for really an insightful beginning to all of this.

Our next speaker or actually next presentation was prepared by Roddy Gabel of the Fish and Wildlife Service. And he's currently the Division Chief in International Affairs in the International Affairs Program for the Fish and Wildlife Service.

He actually was here at Patuxent as an Endangered Species Aviculturist and Biological Technician in the Endangered Species Program from 1980 to 1989.

And so here to give Roddy's presentation is Kathy O'Malley, who when I arrived was an icon Whooping Crane Program, and probably knows more about all of this stuff then I ever could've understood.

And she now has gone to USDA and is writing for them but would like to come home. So, with no further adieu, I'd like to introduce Kathy O'Malley to present Roddy Gabel's presentation.

Katherine O'Malley:
That's great to know. I had the pleasure of meeting Dr. Erickson once back in the, I guess it was in the late '80s.

Obviously, I am not Roddy Gabel, who is somehow suffering in Europe right now, working for Fish and Wildlife Service. It's a dirty job but somebody's got to do it.

I worked with Roddy for years at Patuxent, and I'm happy to say we're still close friends, which is how he conned me into doing this.

Okay, Roddy and I both worked with the Eagle Project at Patuxent. And when I first came to work at Patuxent I had left a job I really liked, and I wasn't 100% sure I'd made the best decision. And while I was trying to decide if I had made an error to change my entire career to come here and work with an animal, animals I never worked with before. While I was driving around one day, just a few days after I got here, a pair of bald eagles, and I had never seen bald eagles in the wild, flushed out of the trees while I was driving around the pond and hovered over my truck, basically at driver's level. And so I figured okay, that was a clue and that it was probably a good thing that I had come here. Because as you all know, birds of prey are cool, and I think that probably eagles are the coolest.

Alright, let's talk about some eagle facts. The bald eagle was selected as our national symbol in 1782. They live 30 to 35 years in captivity. We don't know what their lifespan is in the wild, but it probably exceeds 25 years. They breed at the youngest age of 4 years, but most of them probably start breeding at 6 or 7 (years). When they start breeding can depend on the density of local breeding population and nest site availability. If there aren't good nest sites, they will postpone breeding and breed at a later age.

They usually nest less than 2 miles from open water feeding areas. Their primary food source is fish, but they are opportunistic feeders and will eat other animals and even carrion.

In the 1600s there were 25,000 to 75,000 birds across the continental United States. In the 1970s, fewer than 3,000 remained in the "Lower 48." In the 1980s there were over 4,500 birds, but they were endangered in 43 of the 48 lower states.

Their legal status: In 1967 bald eagles were listed under the Endangered Species Act. In

2007, they were de-listed, subject to a monitoring plan. When de-listed, the population had nearly 10,000 breeding pairs in the "Lower 48," were growing at 8% a year.

Bald eagles are protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

And in 1977, they were listed in Appendix I, which is the highest level of protection, under the Convention on International Trade and Endangered Species of Wild Fauna and Flora, otherwise known as CITES. In 2005, they were down-listed to Appendix II.

Okay, this is where Patuxent gets into it, bald eagle reproduction. The picture is of one of the nesting platforms in one of the flight pens at Patuxent. These pens are now, have now been removed, but when I was working here they were very active.

Egg laying usually begins at different times a year in different parts of the country. In Florida it starts around November and December, and in the mid-Atlantic region it starts in February to March, up in Maine it starts in April.

They usually lay one to three eggs, very rarely four per clutch. They will lay a second and possibly a third clutch if the eggs are removed soon after they have laid. The incubation period is about 34 to 45 days. The chicks fledge about 12 weeks after hatching, and become independent two weeks to two months, though this is extremely rare, after fledging.

Okay, the history of Patuxent; Patuxent's breeding colony was first established in the 1970s for contaminant research. Breeding birds were typically animals that had physical or behavioral abnormalities and could not be released.

In 1973, Patuxent had their first successful breeding. In '77, Patuxent provided the first birds for reintroduction to the wild in New York State.

In the 1980s, the birds were transferred to the Endangered Species Research Branch. The intent now was to use the colony to produce birds for reintroduction and not for contaminant research.

Patuxent eventually provided a total of 115 birds to 11 states; Delaware, Georgia, Maine, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, and Virginia. So that would look like that.

Okay, there were a variety of methods. One of the most important things, of course, is

always facilities when it comes to animals. The facilities were placed in an area that was isolated, it was away from the major roads and major activities, and access to the colony was limited. All of this was to minimize disturbance.

The pens were large enough to allow free flight and had multiple perches so males and females could get apart from each other if they were not getting along that well. There were mirrors mounted over the nest platform to allow the caretakers to monitor the nests. And this is a picture of one of the interiors of the flight pen. You can see the nest, you can see the mirror over there, there were multiple perches throughout. And this pen, you can see the eagle on it, this pen had a flightless bird in it, it had a damaged wing, it didn't fly well and so there was a ladder available to it.

Okay, once you get them breeding you got to figure out how to incubate those eggs. The parents would incubate eggs until their clutch was complete. The first clutch would be removed early to get them to lay a second clutch. Usually the parents were allowed to keep the second clutch, though occasionally we would try for a third clutch, depending on the reproduction history of the pair.

Chickens were used to incubate the eggs we were pulling, and this improved the hatching rate of eggs over mechanical incubation.

Patuxent Science Symposium
Friday

Dr. Ray Erickson's daughter:
Pardon me for a second, if I may just interact, interject something for just a second. I just want to let you all know I'm Dr. Ray Erickson's daughter.

He couldn't be here today, but he wanted to tell all of you how excited and delighted and proud he is at everything this program has done.

I bet you all heard me without this.
{Those of us behind you couldn't hear}
Okay, anyway... How proud and delighted and amazed he is by your, the progress the program has made since he retired. He still keeps up with a lot of the news and believe it or not, my 93-year-old dad has a computer and email. So, if any of you would like to get in touch with him, he would be delighted to hear from you. See me after this and I'll be glad to give you the email address, his phone number, and so forth.

Anyway, I just wanted to let you know.

Patuxent Science Symposium
Friday

Noel Snyder:
In 1984, we got our first case of lead poisoning, which was (you see the bird here)... the bird had a little fragment in its gut. And that's not enough yet to say you know the major cause of decline, just a sample size of one. But within a year and a half we had two more cases of condors dying of lead poisoning, one of them again with a bullet fragment in its gut, still in its gut. And over the winter of 1984-1985, we lost 40% of the condors in just a few months.

This was clearly a crisis. We went from 15 birds down to nine; the population was collapsing on us. The number of breeding birds, breeding pairs went from five to one in a space of a few months.

And the conclusions that the California Fish and Game Commission came to was, it looks probably like a situation with lead poison as the important factor. And they called for putting all the birds into captivity. By the end of the year the Fish and Wildlife Service agreed, and then the birds finally did come into captivity. And the basic reason was it looked like there was evidence accumulating for lead poisoning.

And I'll finish by saying that this had been amply confirmed by the releases that have been taking place from the captive population, which was also being established at this time.

The major problem in the releases has been lead poisoning. In many cases, it's not lead poisoning that leads to death because they're very closely monitoring lead levels in blood of the released birds. And it's a continuant, you might say round trip back to captivity, to be chelated, returned to the wild, and it's going on at a phenomenal rate.

Just to give you some idea: The release is just going on in Arizona, the Grand Canyon area now. They have, since they started releases, which was 1996, they have chelated more than 150 times birds in the wild. And they're still losing birds. It's not enough to even stop the mortality from lead poisoning. But these rescues efforts are demoralizing to people involved in release programs because they never end.

And we haven't seen in the release program viable populations. And the general consensus of most people working in the program is unless this lead problem gets solved, we're not likely to ever see viable wild populations.

And I'll call it quits at that point and take questions.

David Trauger:
Any questions before the break?

Audience:
I know there's a lot opposition in the hunting community to banning lead in these areas. Has there been any effort to invite any of the critics along with your team to see the impacts up close?

Noel Snyder:
Well, first off, I'm no longer in the program. And I'm reporting here with results in the recent years from all of the various release programs that are going on.

There've been a lot of efforts at hunter education. There has been a bill passed by the California Legislature, outlining the use of lead ammunitions in condor range. This was in 2007. But, it's just there. And the condors are still dying of lead poisoning.

Evidently, because of lack of effective enforcement in this law and the fact that lead ammunitions are still freely available anywhere in this country, including those places in California, it looks very much like you're not going to get an effective reduction in this problem unless you enact some sort of mechanism that hits the supply of lead ammunitions. Nothing has been done to hit the supply of lead ammunitions. There are alternative ammunitions that are nontoxic coming on strong, and there are various sorts that are good for hunting.

You would think this is a very soluble problem except for the political aspects of getting certain groups, interest groups, to accept this transition. Hunters like these new ammunitions, they're good ammunitions.

So I don't think it's a problem with hunters, it's a problem with some organizations. And we all know who they are.

David Trauger:
Thank you, Noel.

Patuxent Science Symposium
Friday; DVD #2 (24:57)
Session Moderator: David Trauger

David Trauger introductory: Dr. James Wiley

David Trauger:
Good morning again, we'd like to get started and stay pretty close to time so that you actually have time to eat your lunch, digest a little bit, and not fall asleep this afternoon. Okay, we'll talk later, alright.

Our next speaker is Dr. James Wiley.

And Jim spent most of his career at Patuxent, between 1975 and 1990, as a research biologist at Puerto Rican and California field stations.

He's going to talk to us today about his experience in the Caribbean with the parrots and the population changes due to a major hurricane in 1987.

So with that, Jim, it's yours, thank you.

Dr. James Wiley:
Wildlife populations in islands are especially sensitive to environmental change. Puerto Rico is the smallest and eastern most of the Greater Antilles in the West Indies, and has undergone some dramatic environmental changes.

One of the species that suffered from those environmental changes has been the endemic Puerto Rican Parrot, which at one time numbered perhaps a million and was found throughout the island when the island was completely forested and wooded.

But, by the time of Juan Gundlach, a German born Cuban naturalist, visited the island in 1870, and 40 years thereafter Alexander Wetmore visited, they found the parrot was only partially distributed and far fewer than a million individuals, very small populations by that time. But not as small as when Rodriguez Vidal was there. Rodriguez Vidal, the first person who really undertook a study of the parrot itself began looking for parrots. Finding them only in one small part of the island, in the eastern part, and could only account for 200 parrots by that time, which was 19..., the mid-1950s.

Fortunately, even at 200, the parrot had fared much better than the West Indies Macaw, all of which were 100 years or more ago.

But, the parrot was found on a small island in Puerto Rico, which is only 200 kilometers long and 100, or 75 kilometers wide. And the island had undergone considerable habitat degradation, beginning with some agricultural conversions and extending right on up to the modern era. At the same, this very small, this very small island has a large population of humans, over 4 million as of now, which makes it one of the most densely populated islands in the world.

Fortunately, one area was conserved as Crown Lands, but this only part of the one, less than 1% of the original forest that was on Puerto Rico. It was in this area, the Sierra de Luquillo that the Puerto Rican Parrot was able to survive into the '50s, when Rodriguez Vidal found it there. This area is now a national forest, called either The Caribbean National Forest or El Yunque National Forest, consisting of about 11 hectares. But still a relatively small area of Puerto Rico, of what was originally there.

Frank Wadsworth got together with Ray Erickson of Patuxent; Frank from the U.S. Forest Service Institute of Tropical Forestry in Puerto Rico, and found funding from their very respective agencies to start an endangered species program in Puerto Rico; it's also funded by World Wildlife Fund. This was a couple of years after the passage of the 1966 Endangered Species Act and a year after the Puerto Rican Parrot was listed as federally endangered in 1967.

The station was established in 1968. Cam Kepler was the first biologist to be stationed at the Patuxent Facility, he and his wife Kay stayed from 1969 to 1971. And one of the things that Cam did was try to determine how many parrots there were using more reliable population estimates than were used in the past.

Rather than finding the 200 birds that Rodriquez Vidal had reported back in the 1950s, mid-1950s, Cam could only come up with a solid number of about 26 individuals left. And that was the end of the decline.

Following Cam and Kay, Noel and Helen Snyder took over as the biologists; they're staying from 1972 through 1976. Beth and I were at the station, overlapping with Noel and Helen for a couple of years, from 1975 through 1986. Followed by Gerald Lindsey, who was there for a couple of years before coming out to California, following me out there, the California condor. And he overlapped with (oops, back there) Marcia Wilson, who unfortunately had the task of, the difficult task of trying to assess the population of parrots following Hurricane Hugo in 1989, which was the first major hurricane to directly hit the Luquillo Forests in more than 50 years.

Overlapping Marcia, Wylie Barrow, who was there for a couple years, overlapped with Joel Meyers, who was the last Patuxent biologist; he turned out the lights in the field station as Patuxent pulled out of the program in 1995.

There were also a whole bunch of collaborators, cooperators, volunteers, students, family members who helped out during all of these years of the Patuxent program. You'll see some of their pictures as we go along.

Puerto Rico was severely affected early on by, first by small conuco or (oops, I do this a lot don't I?) clearing of lands for essentially truck crops. This fragment of the forest you see here, fragmentation of the Dominican Republic forest before plantations came in and really wiped out large areas of the forest.

Timber stand improvement actually occurred in the Caribbean National Forest right up through the 1970s. So there still was some habitat loss during that time.

Hurricanes have always been an issue in the West Indies, and Puerto Rico is hit often enough. This wasn't a problem when the entire island was covered with forest. But once this forest was fragmented and those species that depended, like the parrot, on these forests were restricted within those small parcels of land. When you have a hurricane sweep through (this is Hurricane Hugo that hit the Sierra de Luquillo in 1989, having a 10 to 25 kilometer swath), this could essentially wipe out considerable proportion of those habitats. And there's no other place for these animals, which are living in islands of habitat within an island, to go to get food and other necessities.

As you scroll, even though I can't really scroll through the Caribbean National Forest, but as you move through this unbroken canopy of tropical rainforests, you're not impressed that there is a lack of cavities in the forests. There are cavities that seem to be fairly frequent.

It wasn't until Noel Snyder began climbing some of these trees that it was found that most of these cavities are inadequate for parrots to nest in. They don't have bottoms, they're bottomless or they're open to the sky, allowing rain in. Or they have other deficiencies that just didn't allow parrots to successfully brood, breed.

One of the reasons is that these nests were, that were successful nests that had parrots, were harvested by parrot trade marketers who came in, cut into those cavities and took out the chicks. Or if the tree was just too difficult to climb, they'd cut down the tree.

That selectively eliminated that very important complement to habitat that is the best

nesting habitat. Your years and centuries, the habitat, even though you look at the forest and canopies complete and there are a lot of cavities, there are not a lot of cavities that parrots can use.

Also, a lot of natural competitors and predators, some of which were not too important for the parrot, but others, like the Red-tailed Hawk, that has perhaps the most densely, has the most densely populated areas in the Luquillo Forest and throughout all of this fringe in the Americas. That is a very significant predator of parrots.

Also, several exotic predators and competitors including exotic rats, mongoose, and most particularly European honeybees, which are severe competitors for nest cavities with parrots.

Parasites have always been a problem for birds; these are warble flies and soldier fly infestations of parrots. Sharp-shinned Hawk and a Pearly-eyed Thrasher chick.

When there were deep cavities that parrots could use this was not an issue. But now that parrots are beginning to have to use shallower cavities, these warble flies and soldier flies became more of an issue because they're more prevalent and parasitizing birds in shallower cavities and in open nests.

Noel began a program of as complete as possible, watching parrot nests and free-flying birds above canopy from platforms and from blinds nearby nests to determine what some of the issues were with the parrot.

The number one issue turned out to be the Pearly-eyed Thrasher, which during Wetmore's visit a hundred years before wasn't really a common species in the Luquillo Forest. But, by the time Noel and we began our projects in the forest, this was very common and a serious competitor for nest sites with parrots. In addition, they will depredate eggs and young parrot chicks in searching for nest sites.

Noel devised a series of experiments to address perhaps a possibility that thrashers might require a different kind of nest than parrots. And what was found indeed they did, they preferred a nest site that was shallower than parrots; parrots liking as deep as possible a nest, whereas thrashers liked something that was about that depth, about a meter.

Thrasher boxes were constructed that were optimal for Pearly-eyed Thrasher use and a thrasher box or two was placed nearby a parrot nest (this is a parrot nest over here with a parrot in the entrance). So that effectively the thrasher, which is a very aggressive territorial bird, would exclude other pioneering or prospecting pairs of thrashers coming

in to look for a site that might stumble onto the Puerto Rican Parrot nest, enter it and destroy the eggs or chicks.

In addition to this, nest sites were improved. Natural nest sites were improved through sealing them against moisture entry, enlarging them or lengthening them. In this case with a PVC tube serving as a space between the bottom and a facade that goes on top. Or a complete site that includes some features that discourage thrashers, including depth, a crook so they can't see the bottom to see the eggs of the parrot.

As you heard from Glen this morning, a captive program began early with the interest of Patuxent with parrots, but eventually was transferred to the Puerto Rico field station. First in the Snyder's living room, but later in this building, it was an abandoned CCC-era camp. And this was to serve as a home for parrots that were brought in from the wild. And these four birds were kept in cavities
as a hedge against possible extinction of the species, but also to do certain things that we couldn't do on free-flying parrots, such as experiment with marking techniques.

In addition, it served as a weigh station for things like damaged eggs that we could repair, soiled eggs that had been damaged by wet nests, or to extract some of the parasitic larvae of the chicks. In this case, we had to surgically replace all of the feathers, flight feathers of a parrot chick when they had gotten cemented in a wet nest together and they would not be able to fledge.

But this resulted in a lot of movement from nests to the aviary during periods of endangerments, such as if there was a thrasher issue, then replacement of the chicks in time for them to fledge from the nest in the wild, when we weren't trying to maximize the fledging rate of chicks into the wild. At the same time, if there were birds that had to be salvaged, they would go into the captive flock to build up the captive flock.

Captive flock also served to produce captive-produced chicks. And this is the first one, which was produced in 1979. As often as we could we'd foster these chicks into nests to maximize the brood size and get those chicks to fledge into the wild under the best of conditions. That is with an adult around so they could go through that post nesting period, they could associate with adults.

We also had a flock of Hispaniola Parrots. Hispaniola Parrots are not endangered, and they were attractable in cavity. And we found we could use those to do a better job of incubating eggs and chicks of Puerto Rican Parrots so we used them as foster parents in captivity. We could also produce cheap Puerto Rican Parrots by a few dabs of paint to disguise the Puerto Rican Parrots. Substitute those into the nests that were endangered

during those periods of thrasher threat or whatever. And then at the last minute, when it was time to put the Puerto Ricans back in, we would substitute them out and bring the Hispaniola ones back into captivity.

Captive-produced Hispaniola Parrots were also used in experimental releases in Hispaniola to develop the techniques that eventually were used in Puerto Rico in Sierra de Luquillo for the original initial releases of captive produced chicks into Luquillo. In both of those experiments the results were encouraging. They might not sound encouraging when you say that only one out of three on average chicks survived. But that's about what we were getting from the wild populations as well, from the fledgling rate of wild population.

Here is the culprit of most of those losses, the Red-tailed Hawk. Again, a very dense population there and it's a victim, one of the chicks that succumbed to hawk depredations.

Radio tracking became a major emphasis in developing techniques for marking parrots in the late years of the program. And these are still used in the parrot program that continues today in another part of the island as well as other countries.

In 1995, Patuxent closed the field station in Puerto Rico. The wild population there at that time stood at about 44 birds. That was up from a low of 13 individuals, two nesting pairs in 1975. But there was a slight blip where the population was reduced by about half in 1989, by the passage of Hurricane Hugo. Captive population then stood at about at 81 birds.

And at that point U.S. Fish and Wildlife Service Region 4, U.S. Forest Service, and the Commonwealth of Puerto Rico Department of Natural Resources assumed responsibilities for the captives and the wild population.

Just to bring you up to date in what's happened since Patuxent left, there are now two separated populations; two distinct populations. One in the Luquillo, the original Sierra de Luquillo population, which is still struggling to maintain 18 to 24 birds in the wild. Whereas the new population on the western part of the island, a more favorable environment for parrots, in just five years the population has, through releases, in the wild has 25 to 55 birds. And most encouraging, this year, for the first time, there's been breeding, seven breeding pairs in the Rio Abajo area.

There are two separate captive populations, one is still in Luquillo, but at a new site, and another at Rio Abajo with a total of about 300 birds.

In addition to parrot work, I want to mention some of the other projects that Patuxent scientists have been involved in beginning with Cam Kepler, who worked with seabirds, and several others I should mention, there are a couple other things that Cam did. Discovered a new species of warbler in Puerto Rico, and his wife did a major project on the endemic family of todies.

We looked at a lot of raptors, some of which are now considered endangered through the status work that we did, two species of pigeons. Puerto Rican Plain Pigeons down to 120, it's now up to several thousand throughout the island, White-crowned Pigeons, another species of concern; both of those pigeon species because of habitat loss and unregulated hunting.

Brood parasitism by the Shiny Cowbird; the Shiny Cowbird arrived from South America in Puerto Rico 15 years before the Patuxent Field Station opened up. And during that time, it already became a major pest as a brood parasite for the endangered endemic Yellow-shouldered Blackbird.

Developed means of controlling cowbirds, developed strategies for improving nest habitat for the Yellow-shouldered Blackbird, looked at several herps that were victims of mongoose depredation.

Went beyond just working with endangered species, but wanted to bring back some of the original ecosystems that had been lost in Puerto Rico. Now that Puerto Rico has gone through a period of changing the economic base from an agrarian society, one based more on tourism and industry, the island has really recovered from that low point of all of the forest being cut. And the island actually is covered by about 40% forest, albeit second growth.

So some species that had been extirpated from Puerto Rico, like the White-necked Crow, there's a possibility of bringing them back.

We looked at a lot of different parrots on other islands, both to compare what was going on with Puerto Rican Parrots, but also to help those other species that are themselves endangered. Doing that, we trained a lot of people, both in their own countries and in Puerto Rico during extended periods of their stay.

And we had a lot of good people come through the project as technicians. And so if I'd just mention a couple; Fernando Nuñez was a technician who went on to lead the project as the Fish and Wildlife Project leader. You know a couple of people here, I guess I missed her, she was here yesterday, Monica was here at Patuxent and (unclear: 46:17) is

here now.

We'll never know whether Patuxent really saved the parrot and other species I've mentioned from extinction. But we do know that through some of the techniques that were developed, the parrot was stopped from its headlong decline towards extinction, and that trend towards extinction was reversed.

Its population, as well as the other species I've mentioned, has gone through severe genetic bottlenecks. And it remains to be seen whether some of these problems will manifest themselves, whether any kind of genetic problems from inbreeding that otherwise might manifest themselves in the future.

But it does look like several of these species are on the road to recovery. And we can all be hopeful that that is where this, these efforts, end up.

Thank you.

Patuxent Science Symposium
Friday; DVD #2 (47:23)
Session Moderator: David Trauger

David Trauger introductory: Dr. Michael Scott

David Trauger:
In order to keep us on time, I'm going to introduce our next speaker, Dr. Michael Scott.

And Michael worked at Patuxent Field Station at Hawaii from 1974 to 1983 as a field biologist on the island of Hawaii, where he conducted the Hawaiian Forest Bird Survey.

From 1984 to 1986, he was the biologist in charge of the California Condor Research Station. And he retired in June, 2011 as the leader of the Idaho Cooperative Research Unit.

So I'd like to invite Michael to the podium and we'll move to our next talk. Thank you.

Dr. Michael Scott:
Thank you. I think the talks, the two talks that preceded me, give you an indication of the effort required to save a species on the brink of extinction. It is the intensive care ward, and it requires a lot of money and a lot of people focused on one species.

When I went to the Hawaiian Islands, I had, I was a freshly minted PhD student out of Oregon State University. And I had just read a paper by Robert McArthur about niche segregation in warblers, you know, looking at how warblers spend their time during a given day in terms of where they spend their time, how much time foraging, etcetera.

And so, at least at first glance, that was my question. I mean, the biggest challenge I had going out to Hawaii was, 'What's the question?'

And so when I got out on the islands, this is where I was headed. Fortunately, within a couple of weeks of arriving in the island, I ran into the Fish and Wildlife service manager in the islands. Not only a Fish and Wildlife service manager, he was the only Fish and Wildlife employee in the islands working on the operation side of things. He was a refuge manager; he was the biologist for the Pacific Region. And that individual's name was Gene Kridler. Some of you may have known Gene.

And we were sitting at dinner, I'm the new kid on the block and we chatted a bit and he asked me what I planned to do. And I told him with a fair amount of excitement in terms of I was going to work on niche segregation in the Hawaiian Honeycreepers. He said, "Well, that's interesting." He said, "When you get done with that you might send me a paper, maybe I'll read it."

But it was clear that that was not the type of information he thought was important. So, we started talking about what was the important question. And for Gene the important question was pretty fundamental. It was, 'Are the birds still extant?' If so, 'How many of them are there?' And 'Where are they?' And 'What's the conservation status of those lands?'

We simply did not know for the 25% of the species on the Endangered Species List, because in 1974, twenty-five percent of species on the list, all vertebrates, were endangered Hawaiian species. But we didn't know if they were still around. And if they were, how many of them were there.

And so Gene and I set out to frame that question. And an individual who played a huge role in the identification of framing that question was John Sincock, who pioneered work in the Hawaiian Islands, and I think was the first biologist; Glenn said he was the first biologist assigned to the islands. And he developed techniques for estimating the number of the Laysan Duck and the passerine birds on the Leeward Islands.

And that is a common theme of the endangered species work that was conducted out of

Patuxent.

Noel told you about one of his big challenges when he first arrived in California, was developing a more accurate method for estimating numbers of California Condors.

A similar challenge was faced in Puerto Rico in terms of how to come up with an accurate estimate of the number of Puerto Rican Parrots.

Over and over again, biologists from Patuxent were developing new techniques for a very fundamental account of very fundamental questions, how many of the species that they were studying are there out there?

And I think that that work absolutely made a huge difference in the conduct, not only of research on an endangered species, but also other birds.

And one thing that came out of it for us in Hawaii was we collaborated with C.J. Ralph from the U.S. Forest Service and held a conference at Asilomar on estimating number of terrestrial birds. To find out better ways to estimate bird numbers and better ways to train the people who were doing those studies, because that turns out to be a huge variable, observer variability.

But I'd like to say from the beginning, that the work in Hawaii was only possible because of the cooperators. People like Gene Kridler from the Fish and Wildlife Service. Although I worked for the Fish and Wildlife Service, he was in management and we were in research. And I think we overlooked that partnership too many times in our work.

The partnership that we have with the managers is absolutely crucial to our ability to ask the management and policy relevant questions. Get that information and provide it to the managers so they can make better informed management decisions about the fate of these species.

Ernie Kosaka from Hawaii Department of Land and Natural Resources, Ron Walker from Hawaii Department of Land and Natural Resources, and (Kavika: 54:02) with Dave Woodside from that same group. All were critical partners. And Kelvin Taketa from the Nature Conservancy; all played a role in helping us to conduct the research that we did out on the Hawaiian Islands.

So, we talked about what, what the manager's questions were. And we spent the next six years answering, trying to answer those questions. And we did so by taking a systematic survey of all the Hawaiian Islands absent of Oahu. And that work was being done by

another individual, another group, Department of Defense because of the large holdings of DOD on Oahu.

But we surveyed all of the large Hawaiian Islands to determine what the distribution, abundance and habitat associations were of the endangered birds out there.

And we had over 1,200 kilometers of transects; 9,000 stations; 20,000 count periods and made a quarter of a million bird observations for 4..., for 57 different species.

And that took a large number of individuals to conduct that work. We would frequently have as many as 18 or 20 summer employees in the field to do those surveys. And we spent three weeks each year training those individuals in the proper identification of the endangered forest birds of Hawaii.

And so what we obtained was population and density estimates by island, area and habit..., area habitat by island area, habitat, and elevation. And some of the results that we came out with were pretty outstanding; Apapane and Common Amakihi were the two most common birds in the island, they're both native to the Hawaiian Islands. They occur at densities of 3,200 birds per kilometer square. Some of the highest densities of passerines ever observed.

The rarest birds occurred with densities of less than one per kilometer square, and as many as 800 birds per kilometer square.

To give you an idea of the abundance of Apapane, we observed an evening flight of Apapane (the Apapane are nectarivorous bird), and we saw evening flights, they're moving from one feeding area to roosting sites of 42,000 birds, making an elevational adjustment.

And we not only recorded the birds we saw, we also made observations and estimates of whether or not the birds we didn't see were still out there. But we estimated the probability of detecting at least one bird from populations of ten, five and..., ten, fifty, and a hundred birds. And we did that for 27 species that were putatively thought to be extinct. And we did that in 70 different areas of historical occurrences of species.

And what we found was the probability that those species that were still extant ranged from less than 5% to about 50%, 45%, depending on the number of individuals that we presumed to be out there. If there was a population of 100 birds out there, we felt fairly confident that we would have detected at least one.

And additionally, we not only relied on the observer counts at the regular station areas, but we also had thousands of hours of observations outside the formal sampling period. And not a single one of the birds in the islands did we fail, did we find outside the observational period. In other words, if the bird was out there, we found it during our formal count periods.

Okay, the birds seen; these are population estimates for the birds seen. The Hawaiian Hawk; we really didn't have a good method for estimating abundance of the Hawaiian Hawk. Raptors are tough birds to get population estimates on. Noel's method that he developed in California was really a clever method for getting a good population estimate for a large raptor-like bird (condor's a carrion feeder), but. And it really works well if you've got a vanishingly small population to work with. If we'd had 50,000 birds, I'm not sure, perhaps Noel can answer that question, but I don't think it would have worked nearly as well.

But it was really a clever way to get at the populations of the birds we were working with, incredibly small populations.

So, the takeaway message here obviously is the number given is our population estimate for the numbers. And some of them, we're talking about a population estimate of less than 50 individuals in the case of large Kawai Thrush. And the O'o on Maui was estimated at fewer than... Well actually, the O'o did not occur on Maui. That should have been the big island Oahu was estimated at fewer than three birds. Okay, the birds in red are now extinct.

So eight of the species we worked with on the Hawaiian Islands are now extinct. Okay. We never had the opportunity to do the intensive species-specific work that was necessary to secure populations of those individuals for future generations. And we can have a long discussion of why that was true. Okay.

The Ghost Species, these are the number of stations required to get a 95% confidence interval for a pocket to detect, have a 95% probability of detecting this species. And you can see with the Lesser 'Akialoa, for example, over 300,000 point counts are required.

You know, think about that with respect to the effort that was recently put in on determining the presence or absence of the Ivory-billed Woodpecker.

But anyway, if you're going to... It's tough to say a species is not out there. But none of these birds have been observed since we conducted our survey. So we feel very confident we got them.

Okay, again pointing out that it takes a big effort, but it's only possible with partnerships. Here is Jim Jacobi, who is still working out in the islands; John Sincock, who is an early mentor for me, and really pioneered estimates of bird numbers out in the Hawaiian Islands. When Banko worked out there he focused primarily on gathering together the literature, doing a synthesis of the literature to find, to provide us with a foundation for future efforts.

Products were the traditional products; I talked about the symposium we had on estimating numbers of terrestrial birds. We had a large monograph on the forest bird communities of the Hawaiian Islands published by the Cooper Ornithological Society. And, of course, a lot of us were involved in putting together recovery plans, which are blueprints for recovery.

But perhaps the most important product that came out of our work in Hawaii was this postcard. Because we had lots of formal reprints in the scientific literature, but the managers needed to know what they were going to do, and they didn't find the answer in the papers that we wrote. So a colleague of mine and high school friend, Jack Estes, who happened to be in the Department of Geography at U.C. Santa Barbara, was visiting. And I told him we had all this information and we weren't putting it together in a way that seemed to provide the answer that the managers needed. He said, "Well, what this is, you have a GIS problem." I didn't have a clue what GIS was; Geographical Information Systems.

So we used an incredibly sophisticated approach to GIS work on the Hawaiian Islands. We took single-sided Mylar and crayons and filled in the blanks. We.., one layer was we showed the distribution of a species, we colored in the distribution. We did that for each endangered bird. And we had one Mylar sheet that showed the protected areas and then we laid the birds distribution over the top of the protected areas, and we were able to identify the gaps in protection afforded these species by secure habitat. Okay.

Here's the distribution of the birds, here's the protected areas. There's about a 95% lack of overlap between those distributions. And when I made that presentation, I did it in sequence. And I had all the managers in the islands gathered together including Libert Landgraf from the Hawaii Department of Land and Natural Resources, who said he would never set aside another acre for conservation.

So I took the Hawaii Akepa, showed its distribution on top of the protected areas, no..., very little overlap. Took the O'u and laid it over the top of the protected areas, very little overlap. Then I took the O'u and the Akepa together, laid them over the top; same story.

Finally picked a third species to lay over the top, and Libert, from the back of the room, goes, "Alright, alright Mike, I got the message." Okay.

But that one slide was taken by Kelvin Taketa, the Nature Conservancy colleague to Washington. At the same time that we gave that same information to the Fish and Wildlife Service and our other collaborators to use in making decisions about whether to acquire new lands in Hawaii. Kelvin had a head start on everybody else. Kelvin took it back to D.C. and talked to the congressional delegation from Hawaii and gained an instant audience. And why did he gain an instant audience? Because Daniel Inouye is Kelvin Taketa's godfather. And I'm here to tell you that relationships count whey you're conveying information to people.

And as a result, we had, as I said, we had a lot of papers on a... maybe only one. Damn, much less productive than I thought we were. That was an entire career, folks.

Okay, the real payoffs in Hawaii were the protected areas that were established; the first step in recovering a species, securing the habitat, okay. And that's, I think, the thing that we're really proud of, proudest of. Is the fact that we were able to make a connection between the results we produced. And, you know, the managers, the managers saw that as information they needed to make decisions. And they did.

And Hakalau Forest National Wildlife Refuge is now the only area in Hawaii where endangered Hawaiian forest birds are either stable or increasing...

END of DVD #2;DVD #3

... those are the protected areas. And I think..., I talked about the biggest regret, the fact we didn't have the opportunity to conduct those types of intensive studies that would lead to, you know, a positive population response on the species.

But the lesson learned; ask management and policy relevant questions, involve the product users, and identifying the questions and assessing the results. Information transferred has to be transparent, and a referred journal article is probably not going to do it. We need to find better ways to communicate with managers. Make sure all interested parties receive results and the implication of your work.

One of the biggest challenges we had in conducting our work in Hawaii, and Noel alluded to this in the California Condor Program, was gaining access to private property. I spent a lot of time my first three years in the island getting to know the land owners, talking story with them, getting out on the landscape, you know, on horseback and other

and by jeep, etcetera. Just getting to know the terrain, but more importantly, getting to know the people.

And the promise we made for them as part of our contract, if you will, to gain access to their property is that we would share the information with them when we obtained it. And that we would make the information available to all parties, regardless of their particular political persuasion or interest in the property.

As a result, the first person that came into my office after we completed the Hawaiian Forest Bird survey was a forester who was interested in developing a sawmill to harvest old growth core, which is a really critical habitat for the Hawaiian Honeycreepers. And I gave him a map of the, a vegetation map that we had developed, largely the result of efforts by Jim Jacobi, the first botanist that we hired in the islands. And he may have been the first botanist that Patuxent ever hired. Well, I guess Fred Mueller was a botanist, wasn't he?

Audience:
Yes [combined positive response].

Dr. Michael Scott:
Yeah, yeah. Anyway, but he was certainly the first one in the islands. But we gave that money to the developer, at the same we gave it to the Nature Conservancy in the Hawaii Island Society.

And publish and peer-reviewed journal articles, because increasingly we need that to be credible.

Okay, what remains to be done; 63% percent of vertebrates had, of listed vertebrates in the islands, had less than 25% of recovery tasks accomplished last year, the last time that the Service reported out on this. A similar figure for plants, oh even greater, 100% of plants had surveyed. Endangered plants in Hawaii had less than 25% of recovery tasks accomplished.

How can we, as researchers, be more effective at communicating the results of our research that will lead to an increase in the number of recovery actions taken out there? I think that's one of our biggest challenges.

Thank you.

Patuxent Science Symposium
Friday
Session Moderator: Judd Howell

Judd Howell introductory: Dr. David Mech, via Matt Perry

Judd Howell:
In the interest of time I'm going to have questions held to the end of the session. And our next presentation was prepared by Dr. David Mech, and for those of you in observance, he's not here.

But Dave worked for Patuxent on wolves from 1986 to '94. And his period of studying wolves for Patuxent, however, was complemented with long periods with the Fish and Wildlife Service and USGS Laboratories.

The presenter needs no introduction, I'm sure. So Matt Perry is going to give Dave's talk. And he said before he was going to give it, he said, "I know a lot about dogs, so I can probably do this presentation."

Matt Perry [for David Mech]:
Thanks, thanks, Judd. I asked ten people to give this talk, at least ten people. And so this is what you have.

But it's a pleasure for me to talk for Dave Mech because I have admired this man for many years. And I'll give you two quick stories about Dave Mech and my relationship with him, which doesn't give me credibility as far as giving the talk, but at least it gives a little history.

I started my master's research on free-running dogs back in 1968 to '70. I was at Virginia Tech, and at that time I was started out with radio telemetry to track dogs chasing deer. And the State of Virginia was sure that they had feral dogs in Virginia. I determined they were free running; they were domestic dogs coming from different houses.

But anyhow, the point is, at that time telemetry was just coming in. Bill Cochran was the leader in radio telemetry, VHF telemetry, and I was dealing with him and also a man in Virginia. And that led me to Dave Mech, who had started in 1968, the same year I did, he was putting collars on wolves.

So it was a nice connection, we had communication; we never really got that friendly. But that was one of the connections that we had, we were both dealing with predators

dealing with big game.

The other connection we had with him was when we built the Visitor's Center here and I was involved with the exhibits. And if you haven't seen the wolf exhibit, I strongly recommend you take a look at it, because Dave Mech was a major collaborator on the Visitor's Center in regard to the wolf exhibit.

So it's an interesting relationship Patuxent has had with this premier scientist. And I personally had a very small part with him, but I'm happy to give his talk.

He mentions it starts out with two people at the top, Ray Erickson and Randy Perry that were over the program initially. And there's a picture of Dave Mech, of course, right here with his, with fur-lined hat.

So I'm going to give a short talk on some of his work. But we're going to start with this, I think, is an incredible group picture that reflects some of the greatest scientists ever assembled by Patuxent in any problem. And a lot of credit, of course, goes to Ray Erickson (right here). Joanne's here and mentioned her dad. I have fairly constant, not constant but regular contact, with Ray Erickson. He and I have been friends for many, many years. But, he assembled this group, and it's a lot to his credit to have that large group of scientists that were together at one time.

So let me just run through the names fairly rapidly here: You've got Randy Perry here; the great Paul Sykes, who worked on the Ivory-billed Woodpecker and others species; , of course, Mike Scott, who just talked; John Serafin, who was a nutritionist on the Whooping Crane Project here. He was on my committee when I did my work with canvasbacks for my PhD; we heard from Glen Smart earlier, a great talk and great history from Glen we received; John Sincock has been referred to. Check the shirt here, he really was flamboyant and got a lot of the women excited when he ran through Patuxent here; Noel Snyder here; Sandy Wilbur [I'm having trouble seeing this.]; Scott Derrickson; the great Dave Ellis. You want to have some controversy you've got to talk to Dave Ellis; and here's the man that did this paper here; and Jim Jacobi was mentioned here, is a botanist; Barbara Nichols, deceased now, no longer with us, but she was a secretary for the program; and also Sharon; and up there is the great Jim Wiley; Conrad Hillman, great stories; and Cam Kepler (his wife is now my timekeeper).

So that's the group that was assembled by Ray Erickson and it's a pretty impressive group. I think you'll agree to that.

So getting to wolves a bit, this is a talk about 40 years of the wolf population data that he

dealt with in Central Superior National Park. And, of course, Dave is internationally famous for his work on wolves throughout North America, but also in Europe and other countries. He is highly respected and has, I always think, has a rare opportunity for one person to work with one species that long. I mean Jeff Spendelow has been with the Rosy Tern for a long time, but there's not too many other people that can claim one species for a career.

Here's what was remaining of the wolves in the "lower 48" back when he got involved and when the Endangered Species Act was actually, when it was first listed in the '60s. And then later he got more concerned with the Endangered Species Act. And it was fortuitous, like he says here, because of the fact that some money was put into this so he could get the studies that he had done.

You remember he published *The Wolves of Isle Royale* in 1966 from some of his previous work. And so that's what first got him established as a wolf biologist that we could have on our program.

He did some unbelievable collaboration with Dr. Seal, Ulysses Seal. And he was at the Veteran's Administration Hospital, expert physiologist and anesthesia and also in, in blood parameters. And so Dave Mech had the foresight to collaborate with him and they've got many publications that they put over their projects together.

And, of course, the other person I mentioned earlier was Bill Cochran. Bill had just come up with this whole technique of radio telemetry, which revolutionized our whole work with wildlife. One of the first birds he dealt with was the thrush, and the Wood Thrush made a migration that got everybody excited, but he also worked with small mammals with collars. And that's what got us going with dogs and deer and other people, of course, wolves and a lot of other projects that were using collars on animals.

Here's an aerial view of the Superior National Forest. Here's a picture of Mech in the upper left there. I believe that's a, that's a wolf that's in a trap, a padded steel trap. The same type I was using to catch free running dogs in the wild with scent posts. And used the same techniques that he's doing. You get a noose around their neck and then push them to the ground. Of course, he's dealing with a wild animal. Once I got the dog out of the trap I didn't have any trouble with the animal because they were pretty tame and domestic. But then he was also taking blood samples and then putting the collar on (the lower left there), putting the collar on the wolf and then tracking them in the wild.

So, at the same..., he started that work earlier in the project. But then about five years later he started instrumenting deer. And, of course, on Presque Isle he was dealing with

moose, but in the Superior National Forest he was dealing with whitetail deer. So a lot of the interesting relationships that he was dealing with, with predation, dealt with those two species, but then also beaver. Beaver was the other species that was of importance to the wolves.

A lot of aerial tracking that he started in 1968, up to the present time; 800 wolves were radioed, 760 deer. So that's a huge sample size for one person to be involved with over a long time.

Here are the wolf pack territories that he got. This is the minimum convex polygons, a term he developed and..., well, I'm not sure if actually he developed that. But I always find it interesting, the initials for this minimum convex polygon is MCP, which happens to be my initials. Some people refer to it also as male chauvinist pig, but I try to avoid that connection as much as I can because I do have five sisters and I try to think of myself as being a fairly objective person.

Anyhow, these are incredible territories when you think about this, over probably 80 miles long and 50 miles wide. These are the pack territories that he was able to work out through his telemetry work.

The other thing he came up with, though, is this buffer zone between these territories. And the interesting thing here is he found out that the deer were actually safer in these buffer areas. Where the, where the polygons came together there was a buffer zone in there, where if the wolves were in that area, instead of fighting, or instead of killing the deer, chasing the deer, they were fighting with each other. So they were maintaining their territories over chasing food. So it was an interesting concept he came up with. And when the population went down, he found out that that's where the deer were located. When they wanted to survive, they'd be in between the territories of the wolves; pretty neat concept that he came up with.

Of course, he dealt with pack size of the wolves. And, of course, I think you all know it only takes two wolves to make a pack. And that's where the highest frequency was, with the two-pack wolves. But you can see that up until about nine, nine wolves is where most of them were. And then after that, it drops off precipitously.

The dispersal is an important factor in regards to wolf biology and with a lot of mammals that you see. When those yearlings are chased away, just like I had to kick my three teenage boys out of the house, you know, when they finally stay around too long, the same thing happens in the wild with wolves being pushed out. And then they start dispersing, looking for a mate, finding a new territory. And, of course, it's a beautiful

concept that we have in our wildlife studies that this occurs.

He tracked two unique cases (and you can see the distance here they travel). This is trying to find a new territory and a new mate. This is the dispersal concept that the wolves were dealing with.

And, of course, the pairing; they eventually find a mate and then they've got a territory that they can establish and other animals might come into it.

Pack formation is important for, of course, for killing their prey. And they have the ability to help each other out when a larger pack, by going through the snow, just like their prey use the same technique. But, of course, snow is a major problem for deer and the wolves use it to their advantage.

Here's some problems with mortality are starvation. He was heavily with parvovirus and also with mange as a mortality factor from starvation. But then also prey-killed. Human..., wolves are caused..., wolves are killed by humans, of course, and then sometimes wolves kill each other.

And by the way, you might..., I might mention that all of the wolves in the display in the back here that we got for the exhibit were, none of those were killed for the exhibit. They all came from either agriculture problems that wolves had to be killed, or other road kills or other areas; so none of them were killed for the exhibit.

Here's a typical pack; you have mortality that occurs on an annual basis and you have some dispersal. And so over a year you have a 50% annual turnover of the wolf pack.

And, of course, a lot of the communication that goes into keeping the pack together, some of it is howling and, of course, scenting that goes on. And it's the same thing we see with our other canines, the dogs and other animals.

Here's the wolf pack, wolf population trajectory that he was dealing with in the forest. You see a maximum up around 90, and the lower one down around 35. He plotted this over the deer population, and you can see the relationship there. The figures on the Y-Axis represent the deer population, not the wolf population, of course. So you can see the interesting relationship that goes into the two.

So, I mentioned the parvovirus. This was something that he dealt with and he realized it was an important thing because of the fact that it was a new problem. So he [excuse me], he showed the change from 1972 in this virus within the populations of wolves, and got a

publication on that and the fact that it was a periodicity of around 7.3 years.

He's showing the..., a relationship with the virus and the pups; you see that period right there was important, but from a population point of view on, for the whole wolf population it was only significant for that one period when he was studying this. So, the conclusion that the virus only affected changes in that one period during his study.

Here's another graph of the wolf population, and this is where the virus occurred during that time. So, you can see it looks like something that's existing in the population, but not having major impacts on putting the population down.

So, in summary: The 40 years of this research enabled the description of the only long-term change in a mainland wolf population, which is pretty unique for what he's done here; a wide variety of complementary studies of wolf natural history and predation and ecology; and detailing effects of the virus on a wolf population since the disease inception through endemic phase and development of the host resistance.

And acknowledgements, of course, to Ray Erickson, which was a major part of the program here with the Endangered Species, Lucille Stickel, Randy Perry, Dave Trauger, Hal O'Connor and the whole Patuxent staff, and then, of course, the other people.

I might mention that Mike Nelson and Steve Fritts were key people on his program. Steve was a graduate student of his and I'll never forget the day in Gabrielson Conference Room when Steve Fritts introduced Dave Mech to give a seminar. And the first thing he said, he says, "You know," he says, "that's the reason you're always good to your graduate student, because some day you might be working for them." And I sort of take that to heart sometimes personally.

Thank you. And I'm probably not prepared to answer any questions, but I'm happy to give this presentation for Dave Mech.

Patuxent Science Symposium
Friday

Dr. Gregory Smith:
Thank you, Matt. Judd, I'm going to take a few minutes here.

Judd Howell:
I'm sorry, but we're out of time.

Dr. Gregory Smith:
Okay, lunch is postponed! I was really pleased that Matt was able to give that presentation. And the reason was is that about 1970, as a high school student that was born and raised on the shores of Lake Superior, I started backpacking on Isle Royale. My first trip, I bought *The Wolves of Isle Royale,* I read it. Yep, it made me a biologist.

It was Dave Mech that was my inspiration. In 1974, Dave brought four wolves from Minnesota to Michigan. It was the first wolf translocation. And I had the honor to carry those wolves and to release them in Upper Michigan. And it failed, they were all dead by November, and you can guess why. But, that didn't stop Dave Mech. And he persisted.

And when we do our campfire tonight, which may or may not be inside, I don't know yet, I'm going to share some real stories about Dave Mech. Dave was a real character, still is. And I'm in contact with him occasionally.

But, I'll share two stories. One was in 1975, I worked for Dave. I trapped about 28 wolves with a famous trapper by the name of Glen Reilly. Anybody here ever meet Glen Reilly? He's from Texas. The man cannot smell. The reason I learned that is because we had a bushel basket of dead rabbits that we drove around with for about a month and a half. And it was warm that year. And I was an intern and we don't say anything, we just do the work. And when I finally alerted..., actually, the garage in Ely, Minnesota, where we had to get the truck repaired, is, "We're not working on this truck until you come and get those old dead rabbits out." That was a great day! I mean, it was just brutal.

Anyway, related to that truck, Dave Mech could take a roll of duct tape and some, what else do we use as biologists? Twine and wire, bailing wire, and he could build a 30-year program.

We had this old green Forest Service surplus truck, it was a Suburban. It was about minus 40. Of course, that was a pretty good day in December in northern Minnesota. And I'm driving from the Kawishiwi Field Lab to Ely to go fly with Wilderness Wings.

And that truck, I mean it was just amazing Dave could keep that thing going. But the hood opened up. Now I was, I wasn't a, you know, greatly experienced driver. But I knew enough that when the hood opens up and you can't see anything on the road and you're going 50 miles an hour, you better do something. So I rolled down the window. That's when I learned about wind chill.

Anyway, Dave is just a true inspiration to a lot of us that started off in the field.

John Thompson, you know John? RGE? He was one of the interns. Steve Knick, he was an intern.

And I'm going to tell one other quick story because..., I'm not going to share this person's name; I think he still works for the federal government. Wasn't in research, but.

In 1975, when I worked for Dave, we were at the old Kawishiwi Field Station, an old Forest Service log, literally a log cabin. We had a guy by the name there of, let's just call him 'Trapper Bill.' But we had a bit of a Peromyscus problem in the camp, and Trapper Bill, I guess about his third week living with us. He was normally up at Red Lake, and he came down to live with us to remove some problem wolves. And Bill eliminated one of the Peromyscus one night too. It was a pretty loud shot. He carried a 22 with him everywhere. And so when we ran out of mousetraps, we had Trapper Bill.

But, the interesting conversation I overheard was Dave was down in the Twin Cities and Bill was sitting there at Kawishiwi Lab on the phone. And it was Bill's job to remove those problem wolves. Because what we were trying to do was make sure that the human-wolf conflict was not accelerated, so we could basically keep public support for the wolf program.

It went something like this, Dave said, "Bill, we got a phone call, it came into headquarters, and there's a problem wolf up at Bass Lake (let's say)." Bill said, "Okay, I can go and get that wolf." He said, Dave said, "Well, here's the situation, this woman called in and she was looking out her front window and her little son was, you know, crawling around, a toddler in the front yard, playing with the dog. And this wolf comes sweeping through, picks up the dog and goes." Bill said, "Okay, we'll go and check the house." And Dave says, "Well, we've got to get that wolf. And if he comes back for the kid, we're going to bring in some more folks." He had a real perspective.

So, at any rate, Matt, thank you for sharing Dave's experiences with us. And Judd, do you want to close us out here?

Judd Howell:
I don't know that I really need to after that.

Actually, I would like to thank all of our speakers this morning for, you know, sharing their knowledge and their experience, and the joys that they experienced doing the work that they did. And I think that is really what makes the people here do what they do for the long time and the long periods that they do it.

Patuxent Science Symposium
Friday
Dr. Glenn Smart Slide Presentation

Dr. Glenn Smart:
In the late 1950s and early 1960s, we as a nation became more and more aware of declining populations of birds and animals. And we needed to do something to reverse this trend. It appeared that the rates of extinction were skyrocketing and things were becoming critical.

The federal government began to show more and more interest and knowledge that they needed to get involved in this on a hands-on basis. And the Washington office part of the Fish and Wild Service, championed by Dr. Ray Erickson, began to talk up a program whereby we could work with captive birds and animals. And learn more about them and what they represented in captivity and what we needed to do to enhance their populations in the wild. We needed to be able to raise birds and animals that could not only be..., to save the species, but to release these back into the wild, to augment the wild populations.

So Dr. Erickson envisioned a three-pronged attack. What he saw was a section of laboratory investigations, a section of propagation, whereby we would maintain these captive populations of animals, and then the field stations, where field biologists would study the populations as they existed in the wild. Defining, if we could, eliminating factors and things that we needed to place our emphasis on to reverse the declining trends of these populations.

Gene Knoder, a biologist with the Fish and Wild Service stationed in Monte Vista Refuge in Colorado, began working with a captive population of Sandhill Cranes. Ray envisioned where we could, because most of these species were, had never been bred in captivity, or very rarely bred in captivity, we needed to work with a closely related species, but much more abundant form. To develop our techniques rather than to involve the endangered forms in our hit and miss technique, etc., until we could come up with

something that had a good chance of being successful in the wild.

So we started working with Sandhill Cranes instead of the Whooping Cranes. Whooping Crane was a very rare species at that time. And to the best of our knowledge, had got down to probably 14 or 15 birds, there's some controversy as to the actual numbers. Some people say it had gone down to three birds, but I'm not sure of that. I think it was probably 12 to 15 birds. And most of these were in, wintered in the, along the Gulf Coast of Texas and migrated to an unknown part of Northern Canada, where they disappeared and we knew nothing about them. It was in the early '50s, I guess, that coming back from a forest fire that a biologist found, saw a Whooping Crane with a young on the ground in Wood Buffalo National Park.

So then we knew where the birds were. So through a cooperative effort with the Canadian Wildlife Service, the U.S. Fish and Wildlife Service developed this program whereby we could take one egg from each two-egg clutch and bring that into captivity where the chick could be hatched and reared in captivity and develop a captive breeding population.

Let me explain just a little bit here; cranes normally lay two eggs, but there's a lot of sibling rivalry so that the normal thing is only a single chick is reared. So what we were doing is, is salvaging that egg that would theoretically be lost to natural predation, if you will.

So, beginning in 1967 we, Ray and I, went to Wood Buffalo National Park and met with a biologist up there. And the fellow on the ground in Canada that was our stand in there was Ernie Kuyt. Ernie emigrated from the Netherlands in apparently World War II and lived in Canada. And he was a delight to be around, and he knew that area like the back of his hand. So, Ernie was our stand in up there. And Ernie's responsibility, he was the only one authorized to leave the helicopters once we landed at a nest.

So we had developed a cubic foot case of Styrofoam with a cavity in the middle where an egg would fit, then we'd fit this thing back together. And I'm not sure if we taped it now or we used the Velcro or whatever. But anyway, we'd put this thing back together. And Ernie could put this egg in this cubic foot of Styrofoam and carry it out and if he dropped it then it wouldn't break or anything like that. Well, Ernie just looked at that and he said, "There's no way that I'm going to carry that thing back and forth." So from thereon, I guess every egg that was carried out of the Wood Buffalo National Park, Ernie carried it out.

Now, before we could go into the park, of course, we had to have permits just like

everybody else. So Ray and I got, were issued permits to go into the Wood Buffalo National Park and collect these eggs and bring them out. This is a view of the nesting areas, the type of habitat where they nest. As you can see, it's probably 80% water, small ponds, most of them very shallow, most of them with a little..., no..., very little fishes, fishes and all. I think they probably froze solid every winter; some invertebrates and all. But this is the general area where the cranes would nest.

This is a view of a nest as we're coming down on the nest. And if you look you can see the two eggs in the nest and the attentive parent. Quite often the birds were very reluctant to leave the nest as we came down. And even on occasion would challenge the helicopter, which in itself was quite exciting.

Since Ernie said he wasn't going to use that Styrofoam container, he said, 'I'll take care of the eggs. Don't worry about it, they'll be fine." So as far as I know, every egg that ever came out of Wood Buffalo National Park got a ride in Ernie's woolen sock. And to my knowledge, he never dropped an egg. He would go out there, examine the nest, take the egg that he felt was least reliable to hatch, photograph the nest, select the egg, and then make his way back to the helicopter, where he'd turn the egg over to us.

We maintained them in this laboratory in an incubator that we had taken up there, until such time as we were due to leave.

The first year we were going to be brought out by the Canadian Wildlife Service, or by the Canadian Air Force in an executive jet. But that was the year of the Six-Day War in the Middle East. And U Thant, who was the Secretary General of the United Nations, took our plane that year and we had to come back commercial. But thereafter, we came back in first class accommodations with an executive jet each year. And this is the party as we collect..., the egg collection party that participated in that. And as we're getting ready to get on the plane and come back to, to Patuxent.

A chick lying on its side (photo of). This is a view of the chick soon after they hatch. An immature bird, this bird is probably, this picture was taken I would imagine in about November or December. It, as you can see, it has molted it's feathers now from the mid-neck down through most of the body, but it still has a brown neck and brown wings, which is indicative of that, at that time of the year.

Now this bird, this is a continuous molt. And those birds will continue to molt throughout the winter so that by the time they are going north in the spring, that bird would be completely white except for the brown head.

The Aleutian Canada Goose (photo of). Another of the species that we worked with was a small race of Canada Geese found only in the Aleutian, breeding only in the Aleutian Islands off the coast of Alaska. They had declined to the point where we thought they were extinct. And then a refuge manager, Bob Jones, was on one of his lengthy trips into the outer Aleutians in an open dory. Was on Buldir Island one time, which is a small pinnacle of rock probably 5 x 8 miles in size, very precipitous cliffs and all, and he found a population of probably 100 to 150 Aleutian Geese breeding there.

Now the Aleutian Geese were very common throughout the Aleutians originally. But with the interest in fur coats and this sort of thing, the arctic fox furs were very, very valuable and very, very desirable. And they put foxes on a lot of these islands. And someone found out that they could put those foxes on the islands and they would go ahead and breed and do their thing, they could come back at the appropriate times and harvest the furs. And it was almost like a captive fur population there.

But this was very detrimental, of course, to the ground nesting species of birds and, and animals that were there. The Aleutian Canada Goose was one of the most obvious of, of the birds and it was one of, one of the first to go.

Fortunately, there were no foxes put on Buldir Island because of its precipitous cliffs and it was, it was, it was spared that population of foxes. Fortunately, there's one little area on the north side of Buldir that is flatter and it permitted people to get ashore there on occasion.

So we went up there and, and went ashore in this..., in late spring and collected I think it was 22 goslings that were fairly newly hatched and brought them back to Patuxent for our breeding population.

And Canada goose nest very similarly to the other Canada Geese. We raised a lot of these birds, but the problem was how are we going to release them back into the wild? Now they were actively trying to destroy the foxes off of island. And as an island would be cleared of foxes, we would take some of these captive-reared geese up and release them, hoping that they would disperse and hopefully repopulate the island. Unfortunately, although the foxes were gone, there were still lots of eagles around, and the eagles like geese as a dinner item. So that did not work too well.

We tried a number a number of things. And what we found that worked about as well as anything is once these islands were cleared of foxes, we would go out to Buldir, collect eggs, capture an adult and the goslings that were with that adult, take them to this island

and release there as a family unit. And they would then go about their business and all, and would home back to that island, repopulate it in that way. Well, that worked very well.

As I said, in the early, I guess it was probably in the mid '50s, when he found most of this population and estimated the population to be around 100 to 150 birds. That population has now skyrocketed, to the point where there are over 200,000 Aleutian Canada Geese alive today.

The Laboratory Investigations Program was professionals in selected areas. We had..., the first people we hired, Ray hired was a nutritionist, a physiologist, and a veterinarian to care for the birds in captivity and to see to their every need.

The Field Arm of the program was staffed originally with six biologists. Ray, or Roy Tomlinson, went to Arizona to study the Masked Bobwhite Quail, which is a desert form of bobwhite that was destroyed. It was also found, it's found mostly in Sonora. There are a few valleys that came up into southern Arizona where they were found as well.

Well, with the traveling of the cattle herds from Mexico, back up north to Tucson to the railheads, where they were shipped out, they destroyed most of these grasslands. And, as you know, in the southwest, grasslands are very, very fragile; they're easily destroyed and very slow to recover. As a result, we destroyed the habitats for the Masked Bobwhite Quail in the U.S.

We... So, Roy went to..., most of his work was done in Sonora. And he developed a technique here where he would go into the desert and find a Cactus Wren nest, which Cactus Wrens were very common and their nests were very obvious. So he'd take the Cactus Wren nest (and they'd line their nest with feathers they picked up off the desert floor), so Roy would look through this nest and identify bird species from the feathers that he found in the nest. And if there were Bobwhite Quail feathers in there, of course, that was indicative that there were Bobwhites in the area.

I went..., we got, the first Bobwhite Quails that we had were from two brothers in Tucson, Jim and Seymour Levy, who had been studying the birds on their own and they had a few birds in captivity. They let us have three or four pairs and we brought them to Patuxent and began to try to breed them. And we got a number of eggs. The fertility was quite low, the chicks were weak, they were so inbred that the production was practically nil. So we knew we had to go and get some new birds in order to bolster that breeding population.

So I went to Arizona, or went to northern Mexico with Roy and we trapped 20 or so birds and brought them back to Patuxent, where they proved very easy to breed and we could literally breed them by the hundreds.

We had no idea how to release them. So we began by just taking them out and putting them in a pen like this and letting them stay there for a few days, feeding and taking care of them, then open the door and let them walk out. This..., unfortunately, there were a lot of hawks and that sort of thing in there, in the area. As a result, and these birds were quite dumb, if you will, in the ways of the wild. And as a result, that did not work very well at all.

The next thing we tried, we took the females from a Texas Bobwhite Quail. They were all neutered so they would hybridize with the Masked Bobwhite, paired that bird with a male Masked Bobwhite Quail. Then as chicks hatched in the incubator, we would put 12 to 15 with one of these pairs of quail and then take them to the desert and release them. Again, similar to the way that you saw before but with the exception, the mesh on the pens were large enough that the babies could get out and begin to forage a little on their own, but the parents would always call them back. And they would keep them there for a week or so, until they became familiar with the area and then release, and they... We did build a fairly good population for awhile, but because of the just inadequate habitat, I don't think that population has ever done very much. There's still a few found I think in Arizona and a few still found down in Sonora.

California condor had gotten down to 12 or 13 birds. And it was very controversial out there. One faction felt very strongly that we should leave the birds alone to die in dignity and not bring them into captivity, where they're no longer condors at all, they're just a captive chicken. The other form, other way, of course, was the faction that felt that in order to save them, we needed to bring them into captivity and breed them, where we could release them back into the wild and so on.

Well, the population began to crash and the State of California indicated that we could catch all of the birds and bring them into captivity, although they would not let any of the California condors out of the State of California. So we couldn't bring them back to Patuxent.

We worked out a deal with the San Diego Zoo and the Los Angeles Zoo, where they built facilities that are off exhibit and they began to raise California condors. And we were doing some work (there's a California condor), we were doing some work with the closely related Andean condor. And one of the things that we found is that by removing eggs as they were laid, we could get multiple clutches, a clutch being one egg in condors.

We could get multiple clutches in a given year. Usually, we would get three or four from a female, I think one time we got as many as nine. So, by removing eggs like that, we can greatly increase the productivity of a given pair or population.

Black-footed Ferret is another animal that was worked with very shortly. We did not have much luck with that animal. And they were very, very rare and we kind of backed off from that one a bit and it was taken over by the states of I think Wyoming and Colorado and so are now breeding them and are doing very well with them. They're breeding quite large numbers of them and releasing them into wild. And they're even, I'm sure they have a population down in, all the way down into New Mexico and all now. So that animal seems to be doing much better.

In Hawaii there's a multitude of endangered species, many of them forest birds. This is the Hawaiian Crow (photo of), which is also very, very rare. Most of the birds are forest birds. John Sincock was the first biologist that was hired to go into that program. And he began working on this and a variety of species.

A little overview of the kind of habitat that they are considering (photo of).

Noel Snyder was the first biologist to work on the Puerto Rican Parrot, and it too was a very low population number, down below 20. But now we worked with it very briefly at Patuxent. And then the Region 4 and the Fish and Wildlife Service and the Commonwealth of Puerto Rico decided they wanted to become involved with this, and they have set up captive breeding population, or facilities down in Puerto Rico now. And they're doing quite well with them; I think they have probably in the neighborhood of 500 birds now, either in captivity or in two wild populations down there.

One of the first things that we found, one of the limiting factors was a songbird. This is a Curve-bill Thrasher (photo of). And those birds would go into the nesting cavities, pierce the eggs, remove them and throw them out, and then go ahead and use the nest site itself.

Paul Sykes worked on the Everglades Kite and on Seaside Sparrows in Florida. Everglade Kites feed almost exclusively on snails. And that population is doing much better now, doing quite well. Unfortunately, the Seaside Sparrows did not fare as well. The Dusky Seaside Sparrow, which was one that Paul was working on, was very limited numbers and I think actually became extinct during the period that he was working on them. This is one of the latter, last pictures of that species. I think that's all.

Oh..., Dr. David Mech (I can't even say that), David Mech studied wolves in northern Minnesota. Dave was a student at Purdue, I believe. He studied wolves on Isle Royale.

And as a result, became very well known for his work with wolves and was hired as the field biologist to work on this population in northern Minnesota. And Dave has been working with those animals since the early '60s, and continues to this day to work on wolves in that area.

And that's all my slides.

Audience Member:
Question Glenn...

Dr. Glenn Smart:
Yes, sir?

Audience Member:
You just happen to be one of the, maybe two or three who has crossed as many species lines with some influence or work with or knowledge of... Now, you're modest and so I'll say it, but I would like to know what the impact was of the field, refuge field managers; Wayne Shifflett with the Masked Bobwhite and on and on, Burkett Neely, (Unclear: 1:02:04). And then there are the Larry Woods and the Frank Messerschmitt, who's over at the University of Maryland, who know the species and what happened. What was their (unclear: 1:02:18) impact. And I'm subjective, but that had to be taking a whole village or a whole country to help out.

Dr. Glenn Smart:
Yeah, I'm not sure what...

Audience Member:
I'm just saying that that had to be a big factor in the....