CONSERVATION AND RECOVERY: QUESTIONS AND DISCUSSIONS

Rich Seigel - Question for Goran Nilson... is the road mortality on Milos concentrated on males or on females, or is the sex ratio about equal?

Göran Nilson - We haven't seen any difference in sex ratios... it seems to be about equal. In terms of age classes, we haven't found any newborns on the road, only two-year olds and up.

Rich Seigel - They're not found on the road during the day... it's strictly nocturnal?

Göran Nilson - They are found on the roads for a few days during the spring, yes. But in the summer they become totally nocturnal.

Rich Seigel - It seems like there's a whole huge number of subspecies in these complexes... do you think those are real entities or do you think those are species that just haven't been recognised?

Göran Nilson - In my opinion they are species, most of them...

Michel Villeneuve - I have a question for Rich - In your population model, do you include differences resulting from annual versus biannual breeding?

Rich Seigel - We have modelled that and relatively small changes don't make a big difference. For our model we used 60% as our average at Squaw Creek. If you start getting really high reproductive frequencies like 90% that certainly increases your population size, given the same mortality rates - or if you want to turn it around, even higher mortality rates will then give you a stable population. I don't think there's going to be that much variance among populations. The 60% at Squaw Creek over the years is similar to the 50% Killbear data. I think most massasauga populations are going to fall somewhere in the range of 40-60%. But it's not likely to be a big influence on the models, unless there are populations out there that are triannual. If you had a population breed every third year that would have a relatively major impact on the model.

Michel Villeneuve - I wonder if even small differences in net immigration and net emigration for the population would tend to make significant differences in viability?

Rich Seigel - Exactly - and if you remember when I talked about constraints, that's one of the reasons that people are arguing that you have to know dispersal habits in order to understand this. In fact there are some really sophisticated models out there that are designed to model metapopulations. But in order to use those more sophisticated models you have to know how many animals are entering your population and how many are leaving every year, and of course for most massasauga populations we don't know that. But you're absolutely correct; immigration and emigration will have a big impact on the model. And that's an area where we really need more information about what the snakes are actually doing.

Justin Quirouette - Was the PVA done using a custom designed application or did you used an available package like RAMAS?

Rich Seigel - I actually used three different models to generate all this. I used RAMAS, VORTEX and a program called POPDYN. POPDYN was the one that I used most extensively because it's the simplest of the three models and there's a lure in doing these model where you have these really complex programs, and that's what Beissinger was arguing against - that the really sophisticated models require much better and more complete data. Their argument is that you're better off with a simple model with better data than a sophisticated model with lousy data.

Bruce Kingsbury - Some of your populations in your possibility of extinction analysis, even at the lower population sizes seemed to hold up fairly well... can you comment on what degree of stochasticity you put in there?

Rich Seigel - We didn't model catastrophic events because we felt that was such a radically high variance that we'd really throw the models off. I think that that's a really tricky question, because predictions of extinction are probably very model-dependent and I know in RAMAS you're really susceptible to how large the coefficient variation of your model is. There's several different ways of modelling this in RAMAS; some of those will give you 100% extinction for equal population sizes of 50, some of those will give you very low extinction rates. That's one of the reasons you have to be very careful with that information. Intuitively, if a population is small it has a higher probability of extinction. The first question you should have with small populations is "Why is it small?" Is it small because of some chronic effect, or is it small because of some recent alteration in the population? Populations shouldn't be small for very long periods of time. Stochastically, expecting a population to stay at 25 for a long period of time is not very intuitive. If a population is small it's probably because something's going wrong. There's been an alteration of the habitat, there's been a recent catastrophe, there's been poaching... and I was looking for that as sort of my first rationale as to why our population was at that size.

Bruce Kingsbury - I guess what I would suggest here is that your stochasticity problem is on the conservative side, and it's evident that if you added catastrophic or near-catastrophic events you would change your outcome quite a bit. We need to be even more careful than you're suggesting.

Rich Seigel - I would say that's likely true, but again, you would hate to see that information misused. You don't want someone saying there's some threshold number below which we're not interested in protecting that population. And I think that's the danger in that kind of exercise... because we don't know what the probability of extinction actually is, all we know is the prediction of the model.

Bruce Kingsbury - I agree with you, I'm just trying to say we need to strive for even bigger populations because of this danger.

Rich Seigel - Yes. I would agree with that.

Thomas Wilson - At what point do you actually know that a population is small? How much information do you have to have?

Rich Seigel - Tricky question...based on what the model is saying, 50 is getting to the small end. If I was forced to make a categorization, anything under 50 I would consider small. The three populations in Missouri that I've worked with, one of them is very large, the total population size is probably somewhere between 700 and 1000; the other two, we don't have good estimates, but we're guesstimating at this point somewhere between 50 and 200. But I would say 50 is where I would start to have some concern about what is going on.

Ron Black - How important is it to measure random events? You have information on the flood; we have an opportunity in Ontario to measure the impact of construction of a major highway on a rattlesnake population.

Rich Seigel - It's critical to have that information. You need to know what these sudden, unpredictable events do to your population. I've heard something from Bob about the road construction, it's very important that you monitor that. The difficulty is that you don't have the 'beforehand'. So you can't really tell what the road construction has done; you know what's there after the road construction, and that's still very important. No, you're not going to be able to tell what the road construction did to your population, unless you were there before the road construction began.

Bob Johnson - If you're trying to mitigate impacts, and the mitigative alternatives that you implement actually provide a sink for a population that's stable, how do you defend yourself against those charges that you in fact may have been the cause of that declining population, when in fact that may have been the only alternative you had? What opportunities for a learning curve do you have with a small population? I think you're implying that a small population isn't necessarily going to meet with extinction, but can you recognize negative impacts of experimental mitigation programmes? Is there feedback that demonstrates a once stable population is now declining?

Rich Seigel - Well, I guess I would answer that in two ways. First of all I would say that what works is protecting the entire species. If what you learn from that exercise is going to be critical for future protection of other populations, and that population was small to begin with, then that exercise is probably worthwhile, if that information is going to be incorporated into future management activities so we know what not to do. Secondly, in terms of the time constraint, I modelled this after a hundred years, and what you notice is that a lot of these populations that decrease still persist after a hundred years. The flip-side of the coin for a long-lived organism is that things don't decline really fast. And that's a double-edged sword, because it means you do have time to recover. You can have four, five or six bad years in a row, or create a sink for a while, and that population's not going to go extinct in five years. Long-lived organisms are going to hang around for a long time. The downside of that (and it's tough to tell people what to do in terms of management) is because these things decline relatively slowly, it's not an obvious change. So people will sit there and say, "Well, this species is doing fine." I have a population of turtles I work with in southwestern Mississippi and people are saying, "They were there twenty years ago, and I still see them there today." Well, all of our population viability models based on the data we've collected show the population's going to go extinct in about 120 years. But over a twenty-year period, if you just go out and look, you see lots of turtles. And I think the same is true of massasaugas - that slow decline is what characterizes these long-lived species, rather than going off the edge of a cliff like you see in frog populations.