

**THE PARLIAMENTARY STANDING COMMITTEE OF PUBLIC ACCOUNTS  
MET IN COMMITTEE ROOM 2, PARLIAMENT HOUSE, HOBART, ON  
7 OCTOBER 2009.**

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**FOX ERADICATION PROGRAM**

**Dr SARAH JENNINGS**, SCHOOL OF ECONOMICS AND FINANCE, UNIVERSITY OF TASMANIA, WAS CALLED, MADE THE STATUTORY DECLARATION AND WAS EXAMINED.

**CHAIR** (Mr Wilkinson) - Sarah, thanks for coming along and giving us your time. As you know, we are looking into the efficiency and effectiveness of the Fox Eradication Task Force. We were looking at the cost to Tasmania if the foxes took over. We understand you are the expert in relation to that - or one of the experts, if not the expert. It is an informal setting, so we open it up to you to talk to your paper and then we will ask you questions in relation to it.

**Dr JENNINGS** - Sure. I am happy to be here to talk about this very brief, informal paper that I have submitted to you folks. I am not sure about being the expert in the area of the cost of foxes but it is an area, I guess, of personal plus professional interest. This short paper really contributes no original work to the debate. It was a short paper that I prepared having done some reading around the issue. I passed it by Alan Johnston in the Fox Eradication Branch and he suggested that it might be of interest to this committee.

Having read around the issue a bit, part of my decision to write something up was that I am head of school at the moment and saw this as potentially an area where it would be great to get some research funding and perhaps a PhD scholarship going and actually get some serious empirical work happening. So it was a useful exercise just to put down where my thinking was at the time as perhaps a platform to get some funding, as I say, for some ongoing research in the school. We have been quite strapped in the last couple of years for resources to do any original work ourselves in this area. I am a natural resource economist but as head of school I basically have spare time to do little things like this. We are expanding in that area, generally natural resources but specifically fisheries, but we will have some more capacity in the next couple of years to both supervise students and get a research agenda going in areas such as this. In fact today we just appointed a chair of natural resource economics to the school who is going to start next year. We are building this area up so that we will have more capacity to contribute directly to debates such as this one.

This little paper, as I say, contributes nothing in terms of new work. Regarding the number that is bandied around in Saunders et al 2006 of the potential cost of the fox to the Tasmanian economy should the fox become established at carrying capacity, there has been quite a bit of debate about that number, I guess, so it would be nice to set up a project that did some original work in that area. But I just essentially had a read of the Australia-wide studies that have been done on the cost of pests to the Australian economy, in particular the fox, and had a look at some associated literature in the non-market valuation area which relates to the value of loss of biodiversity and gave, I guess,

what I considered to be an informed opinion as to whether or not when you looked at that general literature the \$20-odd million cited in that Saunders report was perhaps a reasonable estimate. My reading of it was that despite the fact that the \$20 million was added up wrongly in the first place - it was more in the vicinity of \$15 million to \$19 million when you added up the bits - it is probably not an unreasonable estimate but, as I say, based purely on a very high level reading of some of the research that has been done at the Australian level and also non-market valuation studies of where species have been lost in other jurisdictions. A lot of the non-market valuation research is highly contextual and there are obviously problems with taking estimates relating to circumstances in other jurisdictions and transferring them to other problems. But, as I say, it did not seem that unreasonable.

I guess to me that is perhaps not the most important question to be asking. I doubt that you would find many people who would argue that if the fox was established at carrying capacity in Tasmania, there would not be substantial costs to the Tasmanian economy. I don't think you will find many people arguing against that, and whether it is \$10 million, \$20 million or \$30 million, I do not see it at this point as being necessarily a particularly useful focus for a lot of research effort. To me the important questions as an economist are that there is evidence, which I have absolutely no reason to doubt - but that is not my area of expertise - that there are foxes established in Tasmania, and from an economic perspective, the more interesting question is what mixture of policy levers do we have in order to, I guess, optimally manage that species that causes damage and spend money on prevention and control? What is the optimal level and mix of those two levers, given the biology of the population, given the relationship between foxes and the level of damage that has occurred, and given the initial population, where we are today, not where we might be if they do become established, because we are not there? From an economic perspective and theory it is quite simple that you get the balance of the prevention and the control expenditures right, but keep on spending so long as the extra benefit of an extra dollar spent on control and prevention exceeds the extra cost. But in practice, of course, giving an estimate on those marginal benefits and marginal costs is not a trivial exercise and is one that in my mind is the subject of a fairly complex research project.

**CHAIR** - In relation to the effectiveness and efficiency of it, obviously you look at the dollars and you ask whether the dollars are spent wisely. You have to accept, it would seem to me, the evidence of the experts in relation to that as to whether they are spent wisely or not, because we are not experts in relation to the eradication of foxes. How do you come to a conclusion on whether the money that is being spent is spent wisely?

**Dr JENNINGS** - Well, that's, I guess, a cost-effectiveness sort of question really, and, to be honest, I haven't looked at that end of it. I know there are a number of control mechanisms that are available to the branch and that, once again, with an extra dollar spent on baiting or education programs or whatever the suite is, make sure that on the margin an extra dollar spent on each of those controls is equated because otherwise you could take a dollar out of education and put it into direct control measures and increase the level of effectiveness of control.

Regarding the sort of data that is required to make those assessments of how effective an extra dollar spent on different control mechanisms is, my bigger-picture issue behind that is that of course with every dollar you spend, you want to make sure you spend it in the most cost-effective manner. But the sort of information that would be required to do that

would be the knowledge of what an extra dollar spent achieves in terms of actual outcomes in terms of containing the fox population and including prevention in that as well because, of course, not only are you trying to spend it on containment of the existing population but there's always the threat of new entrants as well, so you have to get that balance right. It's detailed cost information, I suspect, for that particular question and I think that was the terms of reference of this committee more, wasn't it, in terms of the effectiveness of the current budget on containment. So you want the biggest bang for your buck.

**Ms FORREST** - On that topic, you mentioned prevention. That's the area that's so difficult to measure and to put a figure on because if you prevent something, how do you measure your outcomes? That's one of the challenges here, I guess, in that with the dollar you put in to prevention, if it's effective then you don't really know that it's effective or you can't measure that effectiveness in a dollar sense. Is that a fair comment?

**Dr JENNINGS** - Well, I guess in terms of effectiveness, for the sort of exercise I was talking about in the second part of the paper you need to know what increasing the prevention budget would do on the probability of a new entrant. So if you know, at the current level of expenditure on prevention, that you can expect a new entrant into the population from outside the State once every 10 years, if you were to increase that budget by 10 per cent what happens to that probability?

**Ms FORREST** - So you can put a numerical factor around that, you're saying?

**Dr JENNINGS** - That's right. You have this population that creates the damage and there are two sources of inflow to that. One is new foxes coming from interstate and the other is natural growth rate. So which one of those things do you target? As I say, we haven't had the resources to do more than a very broad-brush look at what's there but that sort of information about the growth rates and the biology of foxes I think is available in other jurisdictions. I don't know that anyone has tried to translate that to the Tasmanian context.

**Mr DEAN** - A measure of effectiveness is to look at where they were, I think it was in 2002 it started, 2002-03, and look at now, 2009, to see whether or not we are in a better position now than we were in 2002 when this first started. I think that would be a measure, wouldn't it, of the effectiveness and good expenditure, or not?

**Dr JENNINGS** - But there is the counter-factual, if you hadn't spent anything. That's the difficult part in how effective it was. I guess you can either treat it by setting a target in that we want to contain the population at a particular level and what's the minimum cost of doing that or, given a particular budget, we want to get the maximum outcome from it. But you're right in a sense. Given that you've made a level of expenditure, the effectiveness would be measured against the counter-factual of where we would be had that expenditure not taken place.

**CHAIR** - We were in a situation where there was evidence that foxes were in Tasmania by doing nothing, so they were introduced into Tasmania, and one can argue that was because no money was spent on it other than probably normal security that goes with TT-Line perhaps. Now it would seem that there are a number of foxes, between five and eight or around that figure, within Tasmania, from the evidence that we have, and

therefore using the formula that you have just stated, no money was spent, we now have five or eight here, and we are now spending a significant amount of money. There is no evidence really to know how many there are here now at this stage other than still the five to eight. So nothing was spent and we have foxes. Now we have foxes, the money is spent and we still really do not know how many we have. We know we have them but how many, nobody knows. We go round and round in circles.

**Ms FORREST** - They should declare themselves, shouldn't they? 'Here I am!'

*Laughter.*

**Dr JENNINGS** - From a practical perspective, there are foxes in Tasmania. The question is really how do we most effectively contain them, I would say, at the optimal level, which is the subject of the sort of research that I would like to get going in, because it may not be optimal to eradicate the fox. In fact it probably isn't because the dollar cost of getting rid of the last fox would use up the whole of the State's product.

**CHAIR** - Budget.

**Dr JENNINGS** - Yes. So, given that the fox is already here, I suspect eradication is not the optimal control strategy. It is an empirical question, it depends upon the shapes of those functions as to how damage changes with fox density, how costs control change, because of course the more foxes you have the cheaper it is to catch a fox.

**Mr HIDDING** - Of course, per fox.

**Dr JENNINGS** - That's right, so there is some optimal strategy. It may well be - and I shouldn't say, 'Don't quote me on this' because obviously -

**Mr HIDDING** - You'll be quoted.

**CHAIR** - You can have it in camera if you want to. Do you want this comment to be in camera?

**Dr JENNINGS** - No, this is theoretical. I am putting something theoretical up there. For some invasive species it may well be that the optimal strategy involves letting the population grow to a higher level and containing it at a higher level than it is now because the costs of containment will be lower.

**Mr HIDDING** - Have you seen the report done by the invasive species people from New Zealand recently on the review of the Fox Task Force - New Zealand Landcare?

**Dr JENNINGS** - No.

That is a theoretical statement, and what the optimal strategy is for any invasive species depends upon the nature of the damage function, so how damage changes as the population grows, and the relationship between population density and the cost of containment. I don't know what those functions look like. I suspect that in the case of the fox - my gut feeling, and this is purely based on the fact that I do believe that the

potential for the fox to do damage to particularly the biodiversity, which I do believe is the greatest threat, and then the associated costs -

**Mr HIDDING** - To farmers and all that.

**Dr JENNINGS** - To tourism and branding, more so necessarily than to the agricultural cost. I believe that those would grow quickly as the fox population grew, and so my feeling is that the optimal strategy would be to contain it at a very low level, which perhaps locks us into high-containment expenditures without politically very obvious results because it is not an attractive way to spend money when people are still arguing whether the fox is there. But from a precautionary perspective, on which a lot of environmental policy should be based now, with things like climate change on the horizon, the susceptibility of our native flora and fauna is going to be so much higher to stresses and to me that suggests an even more precautionary approach to this sort of thing. And so while it is a sizeable expenditure with, as I say, no particularly visible results, to me the fact that people are still arguing about whether the fox is here or not maybe suggests that that expenditure has been actually quite worthwhile.

**Ms FORREST** - There are no votes in it, though.

**Dr JENNINGS** - I know, but that is not my concern, I guess.

**Mr HIDDING** - Thank heavens it is not.

**CHAIR** - It shouldn't be ours either.

**Mr KONS** - I take on board the precautionary principle, and basically now we have two streams. One is trying to avoid new incursions and the other one is trying to catch and kill. Shouldn't we have a time frame on that catch and kill so that if we do not within five years or 10 years as an outer limit find anything then we shift to the new incursions? Otherwise it is open-ended forever and the opportunity cost of spending all that money is difficult to explain to the public. It is like us spending money on a tsunami hitting us.

**Dr JENNINGS** - I think I can see the focus of this committee, a sensible one in a sense, is really looking at how we're spending this money; it is not that we don't necessarily think that it is a good investment because we recognise that the downside of not containing the population is so high but we want to make sure we are spending it in the most cost-effective way. This comes back, I know, to the central question of the committee as to what the most effective containment measures are because of the lack of direct results in the Tasmanian context. We can't demonstrate that any of the containment measures have been successful because I don't think they have actually produced a fox. I think that is right, isn't it?

**Mr HIDDING** - There have been carcasses here.

**Ms FORREST** - There has been live footage in Burnie. That was some years ago, and the video cameras actually saw it getting off the boat.

**Dr JENNINGS** - Yes, but in terms of spending money on containing the population, has there been any evidence of effectiveness?

**Mr HIDDING** - No. They have not found a carcass of an animal that has been killed by 1080 poison, but it is a massive area they are baiting, and one little animal in there -

**Dr JENNINGS** - Sure, there could be lots of carcasses out there that we are not aware of.

**CHAIR** - Their argument is, especially if they are baited, they take the bait, then they go back to their burrow and they die in the burrow.

**Dr JENNINGS** - That is right, so we are not likely to find them. But I guess you can validate that sort of argument by evidence from other jurisdictions where they do have a history of more visible outcomes perhaps.

**Mr KONS** - But my point is should we at least have a time frame in there of five years or 10 years? Otherwise it ends up like some of the planning decisions in the State. They are never ending; they just go on and on.

**Dr JENNINGS** - I agree with that. I think it needs to be constantly reviewed to make sure that the money is being spent in an effective way. It is a very difficult task, though, as you say, to measure effectiveness, given what Rene was just saying about the evidence, which suggests that the outcomes are not likely to be visible. I guess it is a risky game to play, but I cannot disagree that any public policy measure needs to be subject to continuous and ongoing scrutiny.

**Mr KONS** - I agree with you there, but as an economist you need an end point in time to say, if there isn't any documented proof, 'We've been spending that money, it has been wisely spent, effectively spent, but do we just keep on going?' That is the dilemma I have. Do we just say it will be as a precautionary principle? We could be hit by a tsunami, all that sort of stuff. Do we cover off on everything and just keep spending that money, or do we say that if by 2020 we haven't found a carcass or full-on evidence that there is an incursion on a widespread basis, we stop this and refocus our attention on preventing new incursions, putting more money into TT-Line and planes coming in?

**Dr JENNINGS** - I think that has to be built into the allocation of taxpayers' money across all the uses continuously. I guess it would be more setting out a timetable of monitoring and review. You would want to re-evaluate it in 2020 and see whether or not it should be ongoing, but I would have thought that was -

**Mr KONS** - Or if we set some parameters and say that by 2020 if an identifiable population has been found - scats and actual carcasses, these sorts of things - we can make a decision then.

**Dr JENNINGS** - You don't allocate money to anything in perpetuity, so I guess -

**Mr KONS** - Well, we have here virtually.

**Mr HIDDING** - Except that the Public Accounts Committee is now looking at it, and it might do it again in five years' time. That is the point.

**CHAIR** - I think that is the important thing, isn't it - the review. There should be a consistent review of it to ensure that everything is still being done the way it should be.

**Ms FORREST** - A built-in review process?

**CHAIR** - Yes.

**Mr HIDDING** - That's what members of parliament are for, to do that all the time with every annual expenditure.

The concern I have had for a long time is that too much money is being spent on trying to prove to the public that foxes are here. It is highly likely that foxes are here, and on a scientific basis you have to take a public policy position that they are here. Therefore you should spend part of an allocation, whatever your allocation is, whatever you choose it to be, on preventing new incursions - so it is not an either/or - declare a line in the sand, no more foxes come into Tasmania, and the rest of the money goes straight to killing the ones that we have identified we have. What we are now talking about, if you were to adopt that, is how much money is a worthwhile expenditure on no new ones and killing those. That takes us back to this how long is a piece of string? What would we lose if we had a full, successful incursion of red foxes into Tasmania? I don't think anybody has done that as a genuine job. I have heard that the cost to the State of Victoria of the red fox, to primary industry, to this and to that and to everything else, is about \$30 million a year. That tends to come from primary industry sources who are saying to the Government, 'Do more eradication to protect our stocks', so either way it is twisted.

Surely in Tasmania we have an entirely different focus because of the brand and because of this unique biomass that we have. Regarding our own tourism catchment area, why would a person come to Tasmania instead of Victoria, South Australia, New South Wales, other than the obvious Bondi Beach and other things? The huge difference is that we still have our biomass. If you went to Narawntapu National Park and sat there at the green, as they call it, at 7.30 at night, you would see every single species come out and have a nibble on the green grass, and it is just a magnificent thing to see. Clearly that is something that neither Victoria nor South Australia could ever bring about. They can't import them, they can't do anything about it. It is a natural thing that we have. Surely that has to be worth an absolute fortune, whatever that is in economics terms, and therefore regarding the argument about how much we spend, as we are somewhere between suspecting that there might be one fox in Tasmania up to, say, about 10 foxes now, right through to viable incursion, if we have 10 foxes now and they are able to be killed, I would have thought the economic equation is that this is the time you spend big bucks.

**Dr JENNINGS** - That is, I guess, the approach in the second part of this little paper about determining the optimal strategy, given the existing level of fox incursion as opposed to the carrying capacity level that could occur because it is where we are at the moment that will determine the optimal strategy. The example of the brown tree snake that was the most analogous one I could find did suggest both that you wanted to hit hard now, reduce it to a very small population level and then have a combination of containment and prevention measures that kept the population at that level. That, from a theoretical perspective, is quite correct. It is a slightly different question from the one you have in

front of you, though, as to how we tell whether or not the dollars we are spending are being spent in the most cost-effective way. Should we be shifting expenditure from convincing the public that the fox is here into more on the ground measures?

**Mr HIDDING** - The New Zealand report is very useful to us in that. It actually goes there. So we have some good stuff. Your evidence today and your paper are very useful to get our minds right on where we set the effectiveness bar. There are some people who would argue that our position in Tasmania with this uniqueness, and the brand Tasmania, in terms of percentage of our GDP, could be drastic. Why would anyone come to Tasmania? To see hills? Well, you have hills in other places. We have things here.

**Mrs BUTLER** - Because they know how good the east coast is.

**Mr HIDDING** - I would agree with that.

**Mrs BUTLER** - I was wondering how you possibly factor in costs of say losing something like the spotted quoll? How do you work that out economically?

**Dr JENNINGS** - From a conceptual point of view the economist's measure of welfare associated with that is how much we would be willing to pay to avoid that happening. That is these non-market valuation surveys. That is the only way we are going to get a handle on it, by constructing very clever survey mechanisms where we can set up hypothetical situations where people reveal to us what the trade-off would be of preventing that happening. Some of those studies I alluded to in there of the value of losing iconic species suggested it was a sizeable number. The problem is that they are fraught with a lot of design problems. How do you make people answer in a way that has some real context to it, because you do not want people protesting and saying a number lower than they really mean or using it strategically and saying, 'Well if I say I would be willing to pay a million dollars then that will guarantee it will be saved'. Non-market valuation is a useful tool still to estimate the value of losing those biodiversity resources.

There is a little bit of that being done at the moment but not much in Tasmania. It is context-specific but that is the sort of research that I would like to see us move into at the school. It could help put some more empirical estimates around this.

**Mr DEAN** - In looking at the effectiveness of the fox eradication program there has been evidence that if you have a problem there is a strong need to stop it from occurring, in this instance stopping foxes getting into the State. You need to know how you can go about that. I do not know how far you have gone in looking at the cost effectiveness of this whole program and whether or not you believe there ought to be more money spent on programs to stop foxes getting into the State.

**Dr JENNINGS** - I do not know the answer to that. I have asked this question. If you were to spend an extra \$50 000 a year on border control, what would happen to the probability of another fox entry? I do not know the answer. If I knew the answer to that then I am part way to doing the project in the second-half of the study. As with containment, foxes are here and you would never resolve to spend enough money to get rid of all foxes because, as we agree, it would take the whole of the State product. You would never agree to spending enough on border control to prevent another fox entering because,



once again, you would spend most of the State's product on that. You have to acknowledge that there will always be a positive risk of new incursions, however much you spend, and you would never want to contain the level of foxes at zero now that they are here.

**Mr DEAN** - But you can minimise it, can't you, by putting into place all the strategies necessary to try to cut that off. A good analogy here is the siltation in the Tamar River. At long last, after decades and decades, they've decided to look at where the silt is coming from and to stop it getting there in the first place. That is the analogy - to spend the money there now. Is there enough money being spent on trying to cut off all the access points into this State, like container movements?

**Dr JENNINGS** - I don't know the answer to that. It's finding that balance because it's the last dollar you spend on the two activities that will tell you whether you have the mix right. You could say, 'I'm not going to let another fox come into this State' but the cost of getting that probability to zero would be extraordinary. There will always be someone who wants to bring a fox in, so to say we want a policy of prevention of new entrants where we have a probability of new entrants equal to zero, I don't believe is a feasible policy goal. It would be so expensive, any more than we want to spend so much money on the fox that we get rid of the last fox in Tasmania.

**Ms FORREST** - Would you know when you've done that; that's the other question. How do you know?

**Dr JENNINGS** - That's right.

**Mr DEAN** - We'll never know.

**Mr KONS** - I don't know whether we've asked the fox task force to do that split for us. How much is spent on preventing foxes coming in as part of their overall budget?

**Ms FORREST** - Or how much they spend on proving they're here and how much they spend on trying to kill them.

**Mr KONS** - And stopping them coming in.

**Ms FORREST** - Yes. There are three aspects.

**Dr JENNINGS** - I guess they've been forced into that game, perhaps, by the media.

**Mr HIDDING** - Accusations.

**Dr JENNINGS** - Yes, that's right. I guess this is the sort of committee that can put an end to that and say, 'Just forget about the sceptics. Accept that the fox is here and let's get the right mix'.

**Mr DEAN** - Would you agree, though, that it is fairly important to have, if you can, all Tasmanians on side in this argument because if you have all Tasmanians on side then you are more likely to get the necessary support of the public to locate and get rid of foxes?

**Dr JENNINGS** - I suspect you are right, to the extent that relying on public reports of sightings is a valuable part of your suite of control mechanisms. I am not sure there'd be a single issue in Tasmania that all Tasmanians agreed on, so that would be fairly unique. It is about getting that mix right.

**CHAIR** - The status of your paper; is it freely available for quoting?

**DR JENNINGS** - I read around a little bit because it's something that interests me. I'd like to get a research project going related to the second part of the paper. It doesn't contribute any original research. It is my reading of the research out there that this \$20 million is probably -

**Mr HIDDING** - In which case you can ask for it to stay in camera as advice to us.

**Dr JENNINGS** - Yes. I don't feel I have any new empirical information to contribute to public debate at this stage so I think that would be my preference.

**CHAIR** - Reminds me of the old days of matriculation when you had those nutshell books that you looked at because they would give you everything you wanted.

**Dr JENNINGS** - I believe that the debate about the \$20 million is a distraction because we don't have a fox population established at carrying capacity in the State at the moment. From the point of view of deciding how many extra dollars to spend on eradication and containment, that number is irrelevant. It is the damages that are cut around the current fox population level, the value of the damage function and what happens to growth rates around where we are now, that are the ones you need to get a handle on to say whether you should spend more or less, not the carrying capacity one. In that sense it's not a number that I particularly want to do a lot more work on because I hope we never get there.

**CHAIR** - Sarah, thanks very much for coming along to give us your expertise.

**THE WITNESS WITHDREW.**