



## **Recommendations from coyote management study tour with US Department of Agriculture, Wildlife Services, Utah, October 2002.**



- **NSW National Parks and Wildlife Service**
- **Yass Rural Lands Protection Board**
- **S/E NSW & ACT Wild dog project**
- **Brindabella Wee Jasper Wild dog/fox working group**

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## Managing coyotes in Australia are we prepared?

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### Introduction:

To enhance the current management practices relating to wild dogs and foxes within NSW and the adjoining ACT two members of the Brindabella/Wee Jasper Wild Dog/Fox working group visited the United States to observe and learn additional techniques and approaches to predator management from counterparts involved in coyote and wolf management in the state of Utah. The visit was undertaken by a Ranger from NSW National Parks and Wildlife Service and a Field Specialist (trapper) from the Yass Rural Lands Protection Board for a period of 5 weeks over October/November 2002. During this time an extensive range of field and research work was undertaken with the United States Department of Agriculture, Wildlife Services, Salt Lake City, Utah. Field work undertaken during the study tour focussed upon coyote management methods including lethal and non lethal control and current research techniques for the mitigation of coyote impacts upon domestic stock. During the study tour numerous methods of coyote control were observed which have potential for application under Australian conditions. Although research facilities and resources in the US far outweigh current capabilities within Australian pest management agencies, opportunities still exist where effective links between researchers and field staff can be fostered. The opportunity to observe the results of effective field techniques linked with innovative, well resourced and field driven research has provided an opportunity to further enhance wild dog and fox management capabilities in rural NSW and Australia.

### Evaluation of methods:

During the study tour the following methods of coyote control were observed:

- **Aerial gunning** - involved the use of a fixed wing two seater, high wing aircraft (Aviat A-1 Husky or Piper PA-18 Super Cub) to locate and shoot coyotes from the air. Trained gunners use semi-auto shotguns and work in teams with pilots over large areas. The method is very effective and works very well in the semi arid sagebrush country where vegetation is approximately  $\frac{1}{2}$  to 1 metre in height. According to Department of Agriculture figures the fixed wing aircraft requires approximately  $\frac{1}{4}$  of the agency funding but accounts for  $\frac{3}{4}$  of the annual coyotes controlled.





***Suitability for use in Australia:*** due to the vast difference in vegetation structure there exists little opportunity for fixed wing aerial control of wild dogs and foxes in eastern Australia. Opportunities may exist in the western division of NSW however vegetation limits existing aerial programs for wild pigs and goats in some areas. Therefore the current practice of rotary wing aircraft (helicopter) use for aerial pest operations in NSW should be continued.

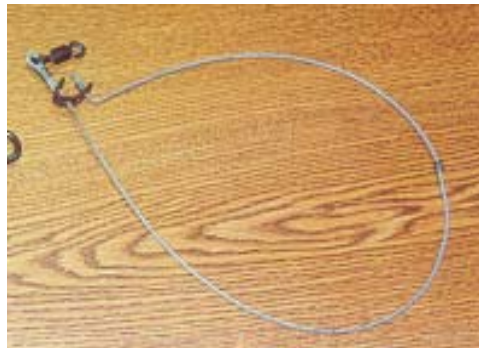
#### **References:**

J. Russell Mason, William C. Pitt and Michael J. Bodenchuck *Factors influencing the efficiency of fixed wing aerial hunting for coyotes in the western United States*. International Biodeterioration & Biodegradation 49 (2002) 189 – 197.

Robert G. Simms and Mark E. Mapston *Calling and Aerial Hunting as tools for predator control*. Texas Wildlife Management Service, PO Box 2162, Kerrville, TX 78029.

Kimberly K. Wagner and Michael R. Conover *Impact of preventative aerial coyote hunting on sheep losses to coyote predation* pp88 Thirteenth Great Plains Wildlife Damage Control Workshop. Kansas State University Agricultural Experiment Station and Cooperative Extension Service.

- **Neck snares** - involved the use of a wire draw string snare or noose set along fence-lines to snare animals by the neck as they pass under the fence. Animals strangulate themselves or are destroyed by field specialists during their patrols.



***Suitability for use in Australia:*** The use of neck snares in Australia is not recommended due to animal ethics considerations and the large number of non target species impacted upon by this method.

- **Softjaw traps** - involve the setting of modified jaw traps along coyote runs or access trails. Traps are buried below the ground and a scent placed to lure the animal to the location. Animals are then destroyed by the field specialist. Dirt hole sets involved the placement of scent within a tube burrow constructed behind the trap.



***Suitability for use in Australia:*** Soft jaw traps are currently used in Australia with steel jawed traps outlawed in many areas due to concerns over trap injuries to target and non target species. Steel jawed traps have been banned in NSW National Parks since 1995.

The use of dirt hole sets may be of benefit and should not be discounted in areas of heavy vegetation cover. Discussions with Utah trappers identified that coyotes investigate dirt hole sets across a range of vegetation types.

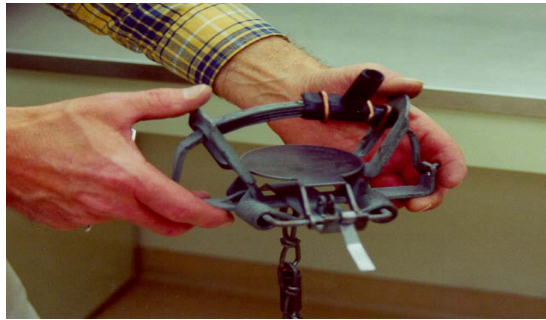
Limitations with Victor soft catch traps were identified during fieldwork. Traps set for extended periods of time or through regular use became slow and have been proven to consistently miss coyotes due to the two springs losing tension over time. Spring kits are available to convert the two spring traps to four springs. ***The purchase of additional spring kits is recommended for all Victor Soft Catch traps to ensure the speed of the jaws is sufficient to capture rather than educate target species.***

#### **References:**

Riley, G and Mapston M. , *Trap and snare use for predator control*. USDA – APHIS – WS internal paper.

Shivik J. and Gruver K *Animal attendance at coyote trap sites in Texas*. Wildlife Society Bulletin 2002, 30 (2) pp 502 – 507.

- **Trap Tranquilizer device** - is a small rubber tube attached to the jaw of the trap which contains a measured dose of tranquilizer solution (Propiopromazine hydrochloride) which, when chewed by the trapped animal results in mild sedation and therefore a decrease in the likelihood of trap injuries.



***Suitability for use in Australia:*** Soft jaw traps are currently in wide scale use throughout Australia. Modifications such as the Trap Tranquilizer device may have some application in areas where tag and release studies are being undertaken or where damage to domestic dogs may be an issue. The tranquilizer device may also have application for the use of lethal dose substances where daily checking of traps is not practical or compromises the effectiveness of the trap. ***Research is required to identify if non target captures chew the device under Australian conditions.***

#### **References:**

Sahr D.P. and Knowlton F. *Evaluation of tranquilizer trap devices (TTDs) for foothold traps used to capture gray wolves*. Wildlife Society Bulletin Volume 28, Number 3, Fall 2000.

Zemlicka D., etal *Development and registration of a practical tranquilizer trap device (TTD) for foot-hold traps*. 13<sup>th</sup> Great Plains Wildlife Damage Control Workshop Proceedings pp42 –45.

- **M-44 device** - involves a plunger device that works by ejecting sodium cyanide powder into the mouth of the predator. The ejection is triggered when the animal pulls on the baited M-44 unit. The sodium cyanide powder reacts with the moisture in the animals mouth, releasing hydrogen cyanide gas. Death occurs from 10 seconds to 2 minutes after the device

is triggered. The M-44 proved to be very effective in the management of coyotes across a range of habitats.



***Suitability for use in Australia:*** The M-44 device is currently in use in some parts of Australia under scientific research conditions. The possible use of 1080 in M-44 devices is being investigated in Victoria (C. Marks pers comm). Additional research is being undertaken to identify non target species ability to trigger the M-44 device (C. Marks pers comm). The M-44 device has very real potential for application under Australian conditions but issues of public and user safety along with non target impacts must be addressed prior to general field implementation of the method. ***Further research is required in this area.***

#### **References:**

F. Busana, F. Gigliotti and C.A. Marks *Modified M-44 cyanide injector for the baiting of red foxes (Vulpes vulpes)* Wildlife Research 1998, 25, 209-215.

Guy Connolly, *Improved sealants for M-44 cyanide capsules* Proceedings 17<sup>th</sup> Vertebrate Pest Conference University of California 1996.

Guy Connolly, *A history of toxicant ejectors in coyote control.* Proceedings 20<sup>th</sup> Vertebrate Pest Conference, Reno , Nevada March 2002 (in press).

Clive A. Marks, Frank Gigliotti and Frank Busana *Estimated 1080 dose rate for the M-44 ejector for the control of red foxes (Vulpes vulpes)* Wildlife Research, 2002, 29, 291-294.

J. Russell Mason, Jerrold Belant, Amy E. Barras and Jerry W. Guthrie *Effectiveness of color as an M-44 attractant for coyotes* Wildlife Society Bulletin Volume 27, Number 1, Spring 1999.

F. Sherman Blom and Guy Connolly (2002) *Inventing and reinventing sodium cyanide ejectors (A technical history of coyote getters and M-44s in predator damage control)* Pocatello Supply Depot, Pocatello Idaho

US Department of Agriculture Wildlife Services *Tech Note M-44 User Tips* October 1996.

- **1080 protection collars** - consist of a small rubber bladder filled with 1080 solution and attached to a goat or sheep's neck. Small herds of sheep or goats are used to lure problem coyotes into an attack which proves lethal to the coyote if it bites the under throat of the animal wearing the collar. This method has proven unreliable and is normally only used when traditionally more effective methods have failed to deal with the coyote attacks.





***Suitability for use in Australia:*** Liaison with Utah field staff identified that the 1080 collars are rarely used but have been effective as a last resort for problem coyotes who have evaded all other forms of control. Landholders are not supportive of the collars due to the associated losses that can occur if the coyote does not bite the throat of the animal wearing the collar. Many lethal attacks upon sheep by wild dogs do not appear to be restricted to the throat area of the sheep therefore a similar approach to the last resort use of the collars in Australia may be justified.

### **References:**

Bovey, Shirley E. (ed) *Applicator Manual for compound 1080 in livestock protection collars*, Texas Agricultural Extension Service undated.

- **Calling and shooting** - many of the coyotes controlled during the field visit were called and shot by field specialists (trappers). Coyotes readily respond to the calls of other coyotes at first and last light. Trappers would also use rabbit distress calls to entice coyotes to within shooting range. Commercial howlers and hand calls are available to the general public with large numbers of recreational hunters targeting coyotes. This can sometimes cause problems for the trappers where educated coyotes will not respond to calls and become difficult to lure into range. Other control methods are then utilised. The semi arid vegetation associated with large uninhabited areas of Utah also make shooting an option due to good fields of vision for extended distances.



***Suitability for use in Australia:*** Fox calling has been popular with recreational and professional hunters in Australia during periods of high return for fox skins. Trappers within the eastern states of Australia utilise calls and howls to identify the presence of wild dogs in an area and opportunistically shoot wild dogs as conditions allow. Recreational hunting of wild dogs in eastern Australia is not popular due to the topography, ground cover and skills required. Calling has been used by trappers to target problem dogs but is not favoured as a primary control method.

- **Dogging coyotes** - the use of trained dogs to lure coyotes into shooting range is very effective during the summer months when coyotes are territorial. A well trained dog will enter the territory of a pack of coyotes and be chased off. The dog will return to the coyote until a number of coyotes join the chase and pursue the dog into the sights of the trapper. Once involved in a territorial dispute with a dog the coyotes do not appear to notice any other threat and were seen on video to come within 2 or 3 metres of the trapper before being

shot. The preferred breed of dog for this control method is a Mountain Cur although many other breeds are used successfully.



***Suitability for use in Australia:*** At the time of writing Cur's were not a registered breed of dog within Australia. The use of dogs to lure wild dogs into shooting range would be severely limited within the eastern states of Australia. The vegetation cover, topography and the size of the wild dog compared to that of a coyote would result in a heavy toll upon trappers dogs for limited effect. ***Further research on this method of control may identify suitable methods for use in Australia but dogging is unlikely to become a major control method.***

#### **References:**

Don Laubach, Merv Griswold and Mark Henckel (2000) *The Coyote Hunter* The Globe Pequot Press, Guilford, Connecticut.

- **Guard Llamas** - entailed the use of Llamas for the protection of sheep from coyote attacks. Research appeared to be very positive with a reduction in stock losses from an average annual loss of 11% to predation prior to the introduction of guard Llamas and a 1% average annual loss after the introduction of guard Llamas (Iowa State University 1994).



***Suitability for use in Australia:*** Guard Llamas and Alpacas are in use in Australia for protection of sheep and goat flocks from wild dog and fox predation. Although little research appears to be available on the success of Llamas for sheep protection the use of Llamas in areas where wild dog abundance and stock attacks are monitored should be encouraged to identify their long term effectiveness under Australian conditions. ***Further research is required.***

#### **References:**

Sandra M.C. Cavalcanti and Frederick F. Knowlton *Evaluation of physical and behavioural traits of Llamas associated with aggressiveness toward sheep-threateneing canids*. Applied Animal Behaviour Science, 61 (1998) 143-158.



William L. Franklin and Kelly J. Powell *Guard Llamas A part of integrated sheep protection* Iowa State University July 1994.

Laurie E. Meadows and Frederick F. Knowlton *Efficacy of guard Llamas to reduce canine predation on domestic sheep*. Wildlife Society Bulletin, Volume 28, Number3, Fall 2000.

Richardson, Bob. *War on foxes – Alpacas meet the challenge*, Town and Country Farmer, Spring 2002.

- **Guard Dogs** - the use of guard dogs is very wide spread within Utah. Common breeds include Great Pyrenees (France), Komondor (Hungary), Akbash dog and Anatolian shepherd (Turkey) and Maremma (Italy). Fact sheets identify the benefits and risks involved in using guard dogs. Liaison with Agriculture field staff identified that many guard dogs limited the effectiveness of coyote control methods where trapping, baiting, neck snares and calling were unsuccessful due to the presence of the guard dogs. In some cases guard dogs were left unfed for long periods of time and turned to the sheep as a food source due to irresponsible management on the part of sheep herders. Cases where guard dogs were effective were clearly identified in written material but received limited support from trappers in the field.



***Suitability for use in Australia:*** Guard dogs are currently used in many areas of Australia. The use of guard dogs will restrict control methods available to trappers within a defined area. The benefits of a well trained and monitored guard dog must be weighed up against the restriction of control methods imposed upon dog trappers. ***Further research is required.***

#### **References:**

US Department of Agriculture Wildlife Services Fact Sheet *Livestock Guarding Dogs*. January 1998.

- **Non lethal methods** - consist of various forms of scaring methods from motion sensor alarms and strobes to hand held radios mounted on fence-posts by landholders. These non lethal methods do not deter predators for a long period but “buy a few days” for other forms of control to be initiated or stock to be moved. A significant increase in non lethal research has been implemented due to animal ethics groups lobbying for the banning of lethal control methods. The pressure upon lethal control methods is likely to increase as the difficulty between balancing native predator populations with their impact upon domestic stock becomes an increasingly political issue in the US.



***Suitability for use in Australia:*** Discussions with landholders and trappers within NSW has identified a high level of interest in non lethal methods of predator control. The interest is focused upon “*buying time*” for the notification of trappers and the establishment of lethal control methods after attacks upon sheep have occurred. As wild dogs and foxes are introduced there is currently little lobbying for the long term development of non lethal methods. Suitable non lethal methods which may be applied include electric fencing, fladry (the use of flags and ribbons attached to fences or string lines), sensor activated lights, strobes or alarms, pocket radios on fence posts, wind chimes or chained dogs. ***Further research support is required to adequately trial these methods in the field.***

#### **References:**

J.R. Mason *Management alternatives relative to predators* US Dept Agriculture undated.

Marco Musiani and Elisabeth Visalberghi, *Effectiveness of fladry on wolves in captivity*, Wildlife Society Bulletin 2001, 29(1), 91-98.

United States Dept Agriculture, Wildlife Service Factsheet, *The Electronic guard: A tool in predation control* January 1998.

United States Dept Agriculture, Wildlife Service *Alternative capture systems and aversive stimulus applications for managing predation*. Internal paper June 2002.

United States Dept Agriculture, Wildlife Service *Low powered lasers: another tool for resolving wildlife damage*. APHIS Factsheet July 2002.

United States Dept Agriculture, Wildlife Service *Developing new capture systems and non lethal solutions for managing predators*, John Shivik undated.

- **Lures and scents** - are commonly used by trappers to attract coyotes to traps. The ingredients/methods used to make up lures is poorly documented. Research by chemists at the Fort Collins Wildlife Research Centre identified three synthetic attractants (Fatty Acid Scent FAS, Monkey pheromone DRC-6220 and Abbreviated Synthetic Fermented Egg DRC-6503) derived from chemically breaking down trappers lures. The synthetic chemical attractants were tested at Millville Research Centre where large outdoor pens enable monitoring of coyote reactions to introduced stimuli.



***Suitability for use in Australia:*** Trappers in Australia have their own concoctions for lures and scents. The ingredients of favourite “brews” are often closely guarded to enable back up scents to be used for problem dogs which are wary of more frequently used lures. The common and widespread use of a favourite scent would compromise many trappers operations and is not considered constructive towards long term liaison between trappers in adjoining areas. The list of chemicals required to produce the synthetic lures was provided as part of the field trip and consultation with the Australian National University Chemistry Department will provide the opportunity to have these scents produced in the near future. The opportunity to trial the scents provided by US trappers should be undertaken in conjunction with pre-baiting trials identified below. ***Further research support is required to adequately trial these scents in the field.***

#### **References:**

Sherm Blom, *A guide to ingredients and formulations used for coyote lures and baits* Denver Wildlife Research Center Colorado July 1989 Revised July 1990.

Sherm Blom, *Ingredients for coyote attractants: Functions and uses* US Dept of Agriculture, Pocatello Supply Depot Idaho September 1994.

Bruce A. Kimball, J. Russell Mason, F. Sherman Blom, John J. Johnston, Doris E. Zemlicka *Development and testing of seven new synthetic coyote attractants*, Journal of Agricultural and Food Chemistry, 2000, Volume 48, Number 5, Pp 1892-1897.

Bruce A. Kimball, J. Russell Mason, F. Sherman Blom, John J. Johnston, Doris E. Zemlicka *Development of chemical coyote attractants for wildlife management applications*, Proceedings 19<sup>th</sup> Vertebrate Pest Conference University of California 2000.

Robert L. Phillips, Sherman Blom and Richard M. Engeman *Responses of captive coyotes to chemical attractants*. Proceedings 14<sup>th</sup> Vertebrate Pest Conference University of California 1990.

- **Pre baiting trials** - liaison with researchers and field staff during the field visit identified the use of pre baiting trials which may have some application in Australia. Pre baiting trials were undertaken using marshmallows scented with fatty acid scent (FAS) and dyed red to contrast with background colouration. In field tests coyotes were attracted to small items coloured to contrast with background vegetation and are also attracted to sweet tastes. Use of the marshmallows resulted in a pull rate of 70% of the M-44 devices set within the pre baited area compared to a rate of only 20% in the area not pre baited. Researchers also expressed interest in the future of genetically pure dingo populations under threat from hybridisation. Discussions were held on the possible use of chemical sterilants during pre baiting operations within areas identified as being populated with hybrid (wild dog) animals in an attempt to limit the impact of hybridisation on adjoining dingo populations.

***Suitability for use in Australia:*** Traditionally, pre baiting of canids in eastern Australia has involved the use of free feed (unpoisoned) baits within bait stations. The use of a broad scale pre baiting operation which targets large areas of wild dog habitat by using marshmallows scented with a synthetic lure could significantly benefit control operations around areas of domestic stock. Wild dog control operations could remain targeted at adjoining bushland surrounding grazing lands but pre bait extensive core areas with free feed marshmallows using synthetic lures. Wild dogs or dingoes in core areas would associate the lure scent with a positive experience once they have consumed the free feed marshmallows. If the wild dog or dingo were to enter control zones where lethal control is being undertaken they would be , as documented by US Department of Agriculture researchers, more likely to investigate a trap or bait station using the same lure or scent. Researchers increased pull rates on M-44 devices from 20% to 70% by using pre baiting. This approach may also assist in areas where aerial baiting with lethal baits is not permissible. ***Further***



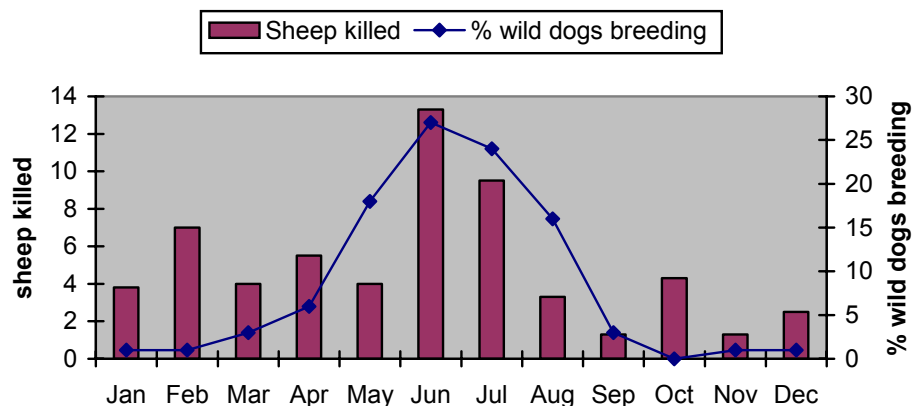
*research support is required to adequately trial the use of synthetically scented free baits in the field.*

## References:

J.R. Mason and M.J Bodencuck *Depredation management outside the box: Logical adaptations of successful practices with other species and situations*. The Role of Predator Control as a Tool in Game Management (Conference Proceedings) 2001, Agricultural Research and Extension Centre, San Angelo, Texas.

- **Sterilisation studies** - Discussions with researchers identified that recent studies on coyotes suggested that reproductive control in coyotes would be effective at reducing depredation (lethal attacks) of sheep. They indicated that many depredation problems caused by coyotes are from territorial adults providing for their young. These adult coyotes switch from feeding on small and medium prey to killing larger species such as sheep and lambs. Researchers assumed that territorial breeders are the principal killers of livestock, and that depredations were linked to the presence of pups. In a field test coyote packs that had undergone tubal ligation and vasectomy maintained territories and preyed on sheep less than unaltered packs. The work identified that the development of reproductive inhibition techniques for coyotes that do not interfere with territorial behaviour would be valuable in reducing predation on sheep. Coyote packs that are non breeding but retain territorial behaviour could in fact be providing some form of protection for sheep flocks from transient coyotes.

Figure 1. Average number of sheep killed per month Brindabella/Wee Jasper valley 1997/2002 (Yass RLPB) with S/E Australia wild dog/dingo breeding data as a percentage of population (Corbett 1995)



The table above identifies a consistent peak in stock losses in the Brindabella Wee Jasper valleys during times of highest percentage of wild dog/dingo breeding in S/E Australia.

***Suitability for use in Australia:*** Trials have been undertaken in Australia using cabergoline for foxes (Marks et al 1996). The use of cabergoline for wild dog management could be trailed to determine impacts upon domestic stock from treated and untreated areas. The impact of cabergoline upon non target species such as tiger quolls would also require investigation however buried baits have been proven to be less likely to be disturbed by quolls. The long term management of genetically pure dingo populations, once identified, may also benefit from sterilisation research which could address the hybridisation impact from wild dogs. Existing stock attack records can be compared to local breeding knowledge of wild dogs to identify whether stock attacks increase when wild dog pups are present. ***Further research is required to identify any benefits to domestic stock and/or pure bred dingoes from the sterilisation of wild dogs.***

## References:

Cassidy Bromley and Eric M. Gese *Effects of sterilisation on territory fidelity and maintenance, pair bonds, and survival rates of free-ranging coyotes*. Canada Journal of Zoology 2001, 79: 386-392.

Corbett L.(1995) *The Dingo in Australia and Asia* University of New South Wales Press Ltd.

Tj. DeLiberto, A. Seglund, W. Jochle and B. Kimball *Assessment of cabergoline as a reproductive inhibitor in coyotes (Canis latrans)* 2002 Society for Reproduction and Fertility 60, p 53-64.

Eric. M Gese *Response of neighbouring coyotes (Canis latrans) to social disruption in an adjacent pack*. Canada Journal of Zoology 1998, 76, 1960-1963.

Clive A. Marks, Michele Nijk, Frank Gigliotti, Frank Busana and Roger V. Short *Preliminary field assessment of a cabergoline baiting campaign for reproductive control of the red fox (Vulpes vulpes)* Wildlife Research 1996, 23, 161-168

J.R. Mason *Management alternatives relative to predators*. US Dept Agriculture undated.

United States Dept Agriculture Fact Sheet. *Protecting livestock through selective coyote sterilisation*. Tom DeLiberto undated.

United States Dept Agriculture Fact Sheet. *Selective identification and removal of dominant coyotes to reduce livestock predation* . Michael Jaeger undated.

- **Satellite tracking collars** - Discussions with researchers at Utah State University, identified that recent studies on coyotes utilising satellite tracking collars had clearly identified pack behaviour which will greatly assist land managers to address the impacts of predators upon domestic stock. The use of satellite tracking collars allowed the identification of home ranges, foraging and hunting behaviour, den sites and dispersal tracks used by coyotes dispersing from the study pack and transient coyotes looking for new territory. Technology is currently under development which will provide real time tracking capabilities. Researchers can then effectively monitor the location of predators and initiate control methods once predators move within a designated zone where domestic stock may be impacted upon. Collars capable of administering a tranquilizer via an injection mechanism within the collar are also being developed. The injection can be initiated by radio signal or by satellite signal from a monitoring lab as the technology allows.

***Suitability for use in Australia:*** Tracking collars have been used extensively within Australia during research on wild dogs and dingoes. The limiting factor with traditional radio collar work is the expense and resources required to manually track an animal. Landholders continually express legitimate concerns that a wild dog tracked from point “A” to point “B” may have been many kilometres away killing sheep during the time between data captures. Satellite tracking addresses this concern by allowing the researcher to nominate the frequency of data capture in time periods of minutes, hours, days, weeks or months. The technology relating to Satellite GPS (Global positioning system) is constantly improving with real time tracking opportunities likely to be available within the next 12 months to 2 years. If pure bred dingo populations were identified within core bushland areas the ability to monitor a population will enhance the future viability of dingoes whilst also monitoring the impacts to domestic stock. Movements of individuals or packs could be monitored to allow a range of control activities to be initiated prior to impacts occurring upon domestic stock. ***Further research is required to investigate the benefits to domestic stock and pure bred dingoes from satellite tracking collars.***

## References:

Lyle R. Walton, H. Dean Cluff, Paul C. Paquet and Malcolm A. Ramsay *Performance of 2 models of satellite collars for wolves*. Wildlife Society Bulletin 2001, 29(1):180-186

- **University/Research links** - The resources available to the US Department of Agriculture for predator research appeared both significant and well structured. Links from Government research centres to local Universities and then through to the field practitioners (trappers) allowed field driven research to be undertaken to enhance the management of predators and their impacts upon domestic stock and native species. Opportunities were made available for field staff to follow through their nominated research projects by assisting researchers. Researchers were also continually encouraged to “get out of the lab” and spend time with the field practitioners to ensure research remained focussed upon assisting field staff to more effectively manage the impacts of predators. Students at Utah State University have the opportunity to study the management of predators as part of their university studies and work with researchers and field staff directly involved in field operations.

***Suitability for use in Australia:*** The issue of wild dogs and their impact upon domestic stock has recently received major media attention in S/E NSW. Research upon the management of impacts of wild dog/dingoes and foxes also appears to have received an increased focus. However the resources required to effectively implement the research and the links required to ensure that the research is effectively addressing knowledge gaps in the field does not appear to have been addressed. There appears to be little opportunity for the sharing of knowledge related to wild dog management by both researchers, land managers (private & public lands) and field operators (trappers). The recent S/E NSW & ACT Wild Dog Project has addressed these issues on a local level but a lack of resources may now see these links lost or at the least left to fend for themselves. ***A central coordination role must be taken by a lead agency to ensure vital links between trappers, researchers, universities, landholders, land managers and adjoining states can be established and fostered.***

- **Trainee trappers** - The issue of training new field practitioners (trappers) is a common one with the US Department of Agriculture. Training new trappers raises issues of resources and educational qualifications that must be recognised to ensure the long term future of the trainee once they have completed their theoretical and field education. It also raises the issue of obtaining access to experienced field staff whose job security allows them the confidence required to share their skills with future fellow employees in predator control rather than operate under the suspicion of possibly training their future replacement. The US Department of Agriculture expressed interest in the trainees employed under the S/E NSW & ACT Wild Dog Project.

***Suitability for use in Australia:*** The S/E NSW & ACT Wild Dog Project effectively met the challenges raised above by training 3 new trappers over the projects term. These 3 trappers now have full time employment with land and pest management agencies. The trainee model established by the project can be utilised by other organisations to ensure the skills required to be an effective trapper are not lost. US Department of Agriculture officers planning an upcoming visit to Australia are particularly keen to discuss the methods used to establish the framework for training field specialists (trappers). The majority of trappers appear happy to share their skills if they have a level of job security which allows them to share and increase their own knowledge base rather than educate the next contractor who may under cut their livelihood. ***A forum for field specialists (trappers) to exchange skills and knowledge should be established but will only be successful when those involved in wild dog/fox control can enjoy long term job security. Short term, ad hoc contract work does not foster skill or information sharing between specialists, nor does it encourage the sharing of information between contractors and the land managers funding the contract.***



## RECOMMENDATIONS:

The recommendations below, if adequately resourced, will provide the land managers of public and private lands across NSW, and the ACT, with the tools required to fully implement proven landscape solutions to what is truly a landscape issue.

1. The appointment of pest animal field coordinators for southern (including the ACT), northern and western NSW under an inter agency agreement between NSW Department of Agriculture, NSW Rural Lands Protection Boards, NSW State Forests, NSW National Parks & Wildlife Service and ACT Parks and Conservation.

The appointment of cross agency pest animal field coordinators would address current information, liaison and research gaps by undertaking the following:

- Promote the effectiveness of the recent NSW Parliamentary Inquiry into Feral Animals process by clearly defining the government's commitment to and subsequent actions for addressing the enquiries recommendations.
- Provide vital links between local/regional pest working groups and the Pest Animal Council as appointed under recommendation 18 of the NSW Parliamentary Inquiry into Feral Animals.
- Facilitate the flow of information across working groups to ensure groups have access to best practice pest animal management methods as demonstrated within NSW, Australia and overseas.
- Facilitate opportunities for field specialist staff (trappers) to meet and exchange ideas on best practice pest animal control whilst also providing field orientation opportunities within neighbouring areas to increase the effectiveness and availability of trappers to respond to issues across regions.
- Provide Pest Animal Council with accurate and timely assessment of the progress of working groups across the state. This information will be vital in the assessment of any funding or resources that may be provided by the Pest Animal Council and the evaluation of the effectiveness of the recommendations of the Parliamentary Pest Inquiry.
- Provide local/regional working groups with feedback from the Pest Animal Council on best practice management, funding opportunities, model plans and mapping assistance.
- Provide a link between field practitioners and researchers by providing opportunities for field driven research to address current research gaps.
- Facilitate training opportunities for field staff and working group members in monitoring techniques, environmental assessment, data collection, reporting, planning and evaluation of pest animal control plans.
- Facilitate in consultation with local working groups funding opportunities for the recruitment, appointment, training and mentoring of additional field specialists (trappers).
- As resources allow, provide mapping assistance for working groups to facilitate the initial stages of the planning process by using the "nil tenure" model adopted by NSW Rural Lands Protection Boards.

***To effectively implement the field coordinator positions adequate resource commitments from the agencies would be required to cover administrative assistance, specialist GIS mapping assistance (if required) and extensive travel periods by the coordinators.***

2. NSW National Parks and Wildlife Service, South West Slopes Region and Yass Rural Lands Protection Board cooperatively trial the implementation of US Department of Agriculture (US Environmental Protection Authority approved) M44 cyanide devices for the control of wild dogs and foxes under the current Brindabella/Wee Jasper wild dog/fox management program. A Review of Environmental Factors report and conditions of use document covering issues of non target species impacts, public and staff safety be produced and assessed (National Registration Authority, Environmental Protection Authority) prior to any trial being undertaken in the field.

3. NSW NPWS, Yass RLPB, the S/E NSW & ACT Wild Dog Project and Department of Agriculture jointly host 3 staff of the United States Department of Agriculture, Field Services, Utah, as an information exchange in 2003/2004.
4. Due to the limited budget required (< \$10,000 each) to undertake the study tour in the US and the significant benefits gained as a result of the tour similar opportunities be made available to staff from NPWS and RLPB. Future study topics may include mustang/wild horse management, non lethal control methods for dingoes, sterility control methods for wild dogs/foxes, bird control, mice/rat control, GPS satellite tracking techniques and pack behaviour and dynamics of canids.
5. Any future study tour to include a field operator and a coordinator level officer. The value of both views being present during consultations with field, research, administrative and executive staff was clearly identified through the range of questions and issues addressed during the study tour.
6. The purchase of additional spring kits is recommended for all Victor Soft Catch traps to ensure the speed of the jaws is sufficient to capture rather than educate target species.
7. Further research to be undertaken on the following:
  - **M-44 device** - involves a plunger device that works by ejecting sodium cyanide powder into the mouth of the predator. The ejection is triggered when the animal pulls on the baited M-44 unit. The sodium cyanide powder reacts with the moisture in the animals mouth, releasing hydrogen cyanide gas. Death occurs from 10 seconds to 2 minutes after the device is triggered. The M-44 proved to be very effective in the management of coyotes across a range of habitats.
  - **Lures and scents** - are commonly used by trappers to attract coyotes to traps. The ingredients used to make up lures is poorly documented. Research by chemists at the Fort Collins Wildlife Research Centre identified three synthetic attractants (Fatty Acid Scent FAS, Monkey pheromone DRC-6220 and Abbreviated Synthetic Fermented Egg DRC-6503) derived from chemically breaking down trappers lures. The synthetic chemical attractants were tested at Millville Research Centre where large outdoor pens enable monitoring of coyote reactions to introduced stimuli.
  - **Pre baiting trials** - liaison with researchers and field staff during the field visit identified the use of pre baiting trials which may have some application in Australia. Pre baiting trials were undertaken using marshmallows scented with fatty acid scent (FAS) and dyed red to contrast with background colouration. In field tests coyotes were attracted to small items coloured to contrast with background vegetation and are also attracted to sweet tastes. Use of the marshmallows resulted in a pull rate of 70% of the M-44 devices set within the pre baited area compared to a rate of only 20% in the area not pre baited.
  - **Guard Llamas** - entailed the use of Llamas for the protection of sheep from coyote attacks. Research appeared to be very positive with a reduction in stock losses from an average annual loss of 11% to predation prior to the introduction of guard Llamas and a 1% average annual loss after the introduction of guard Llamas (Iowa State University 1994).
  - **Guard Dogs** - the use of guard dogs is very wide spread within Utah. Common breeds include Great Pyrenees (France), Komondor (Hungary), Akbash dog and Anatolian shepherd (Turkey) and Maremma (Italy). Fact sheets identify the benefits and risks involved in using guard dogs. Liaison with Agriculture field staff identified that many guard dogs

limited the effectiveness of coyote control methods where trapping, baiting, neck snares and calling were unsuccessful due to the presence of the guard dogs. In some cases guard dogs were left unfed for long periods of time and turned to the sheep as a food source due to irresponsible management on the part of sheep herders. Cases where guard dogs were effective were clearly identified in written material but received limited support from trappers in the field.

- **Non lethal methods** - consist of various forms of scaring methods from motion sensor alarms and strobes to hand held radios mounted on fence-posts by landholders. These non lethal methods do not deter predators for a long period but buy a few days for other forms of control to be initiated or stock to be moved.
- **Trap Tranquilizer device** - is a small rubber tube attached to the jaw of the trap which contains a measured dose of tranquilizer solution (Propiopromazine hydrochloride) which, when chewed by the trapped animal results in mild sedation and therefore a decrease in the likelihood of trap injuries. The tranquilizer device may also have application for the use of lethal dose substances where daily checking of traps is not practical or compromises the effectiveness of the trap. Research is required to identify if non target captures chew the device under Australian conditions.
- **Sterilisation studies** - Discussions with researchers identified that recent studies on coyotes suggested that reproductive control in coyotes would be effective at reducing depredation of sheep. They indicated that many depredation problems caused by coyotes are from territorial adults providing for their young.
- **Dogging coyotes** - the use of trained dogs to lure coyotes into shooting range is very effective during the summer months when coyotes are very territorial. A well trained dog will enter the territory of a pack of coyotes and be chased off. The dog will return to the coyote until a number of coyotes join the chase and purse the dog into the sights of the trapper. Once involved in a territorial dispute with a dog the coyotes do not appear to notice any other threat and were seen on video to come within 2 or 3 metres of the trapper before being shot. The preferred breed of dog for this control method is a Mountain Cur although many other breeds are used successfully.
- **Satellite tracking collars** - Discussions with researchers at Utah State University, identified that recent studies on coyotes utilising satellite tracking collars had clearly identified pack behaviour which will greatly assist land managers to address the impacts of predators upon domestic stock. Further research is required to investigate the benefits to domestic stock and pure bred dingoes from satellite tracking collars.
- **University/Research links** - The resources available to the US Department of Agriculture for predator research appeared both significant and well structured. A central coordination role must be taken by a lead agency to ensure vital links between trappers, researchers, universities, landholders, land managers and adjoining states can be established and fostered.
- **Trainee trappers** - The issue of training new field practitioners (trappers) is a common one with the US Department of Agriculture. A forum for field specialists (trappers) to exchange skills and knowledge should be established but will only be successful when those involved in wild dog/fox control can enjoy long term job security. Short term, ad hoc contract work does not foster skill or information sharing between specialists, nor does it encourage the sharing of information between contractors and the land managers funding the contract.



