

An investigation into the use of sound moderators on firearms for game and feral management in New South Wales

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Report prepared without bias or prejudice

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Executive Summary

This report has been prepared as a summary of the key findings of a study investigating the feasibility of using sound moderators on firearms in New South Wales (NSW) for the purposes of hunting game and feral animals. The study was commissioned by the Game Council for NSW (hereafter referred to as the 'Council') with the intent of identifying any known impediments to the use of sound moderators for hunting purposes. While based largely on secondary data, the investigative panel found no link between sound moderators and their use in petty or organised criminal activity. Further, and based upon a review of other legislative regimes where moderator use is legally permitted, the panel submits that the benefits pertaining to moderator use by the civilian, hunting, law enforcement and military communities points to a need for a more informed debate on legislative change within NSW.

The investigative panel also noted the literal aspects of moderating devices fitted to the fore-end of the barrel and principally designed to reduce the sound signature. A sound moderator does not appear to be a device which of itself can cause harm or injury. This would imply they are similar in principle and no more or less benign than a motor vehicle muffler. In complete contrast however it appears Australian society has elevated the status of sound moderator to a demonic device worthy of fictionalisation and criminalisation. This, compounded by the current perceived regulatory imperative to control (as opposed to relax) all aspects pertaining to firearms and shooting in Australia will see likely opposition to the decriminalisation of sound moderators.

- A number of advantages in the use of moderators have emerged from the study; the most obvious one being hearing loss and tinnitus prevention. Studies prove beyond doubt that un-moderated firearm discharge is of a level capable of causing hearing loss/damage to not only the shooter but persons and animals nearby, and that

moderators mitigate this hazard to a degree predicated by the calibre, muzzle velocity, type of moderator, proximity and angle from the muzzle. Additional benefits from the use of sound moderators include:

- increased accuracy (in many, but not all instances),
- reduced perceived recoil (by up to 40%),
- reduced stock disturbance,
- facilitation of more efficient animal husbandry, and
- animal welfare outcomes -more humane culling.

On a community level moderated firearms introduce the potential benefit of noise pollution reduction, which is increasingly beneficial in situations of growing urbanisation and concern over how noise influences well-being and lifestyle. The use of moderated firearms has the added benefit of increasing firearm safety, by allowing for more efficient communications in the vicinity of the shooter/s and by increasing the overall length of a firearm, making more difficult unintended sweeping of the firearm over objects, animals and people in the shooters vicinity.

Disadvantages of de-criminalising sound moderators pertain to the possibility criminals would purchase (as opposed to manufacture or illegally import) these devices with a view to committing one of two types of crime; illegal hunting and shooting, and indictable offences such as robbery. Statistics gleaned along with the absence of concern in overseas constituencies that permit the use of moderators suggest the likelihood of this occurring in Australia is similarly low, and their misuse is outweighed by the benefits to a degree consistent with the cultural values of these overseas communities. Whether Australian regulatory authorities apply the same weighting to opposing criteria remains to be seen.

Other disadvantages relate to the cost, inevitably borne by the hunter or shooter, of amounts that in some cases are equal to the firearm itself (i.e. doubling the cost), and also the weight and shift in balance-point further away from the firearm user. This makes for a heavier firearm which in some situations is less pleasant to carry.

The findings point to the advantages outweighing the potential disadvantages, made poignantly clear when considering the distinction between two similar societies; that being Australia and New Zealand. New Zealand does not control sound moderation devices of firearms in any way (except in the collection of GST at the retail level), however in all Australian States their importation, use and possession is illegal. The lack of extensive criminal misuse of moderators in New Zealand is highlighted as one of a number of valid reasons why Australian regulatory entities should re-consider whether the very low level of possible detriment, outweighs the benefits of sound moderation in firearms and whether continuing to deny licensed hunters and shooters these benefits?

Glossary of Terms

Air pistol; a handgun designed to eject projectiles using compressed air.

Assault rifle; a firearm specifically designed to be used by the military on the battlefield.

Baffle; flow-directing partition in a moderator designed to channel propellant gasses.

BATF; Bureau of Alcohol, Tobacco and Firearms. The body mandated to administer firearm regulation in the USA.

Bolt; locking device used to contain the rear end of a cartridge in the breech.

Breech; a machined chamber integral to the rear portion of a gun barrel that receives the shell, cartridge, or ammunition.

'Can'; US jargon for sound moderator.

Calibre; descriptive term used to identify both the diameter of the projectile case capacity.

Centrefire; All cartridges with a centered primer initiation system (all calibres .22 magnum and above)

Deflagration; rapid controlled burning propagated by heat.

Detonation; rapid uncontrolled chemical reaction propagated by shock.

Firearm; anything from which any shot, bullet, missile or other projectile can be discharged by force of explosion or gas.

Firepower; a combination of volume and impact energy of firing.

Flash-over; dangerous situation of overpressure caused by a larger than normal surface *are of propellant ignited simultaneously.*

Full-bore; used to denote heavier calibres from lighter calibres.

Hand-load; the manufacturing of ammunition from the main 4 components; cartridge, propellant, primer and projectile.

Hearing Protection; Ear muffs or small individual expanding foam inserts used to protect a person from the damaging sound of a firearm.

High-power; jargon referring to a dichotomy of calibres. High power, all calibres .222 and above. Low-power, all calibres below .222.

IPSC; International Practical Shooting Confederation. Internationally recognised handgun discipline.

Magnum; term referring to boosted performance in either primers or calibres.

Metallic Silhouette; an international discipline of target shooting where shooters compete by hitting silhouettes representing game.

Moderator; or sound moderator. A device affixed to the end of a gun barrel principally designed to lower the sound signature.

Muzzle; the end of the barrel where the projectile exits.

NRAA; National Rifle Association of Australia. Competitive shooting body affiliated with the NRA of England. Historically the Governor General is the patron (current GG excepted).

Over-pressure; gas pressure produced in excess of expectations and/or material specifications.

Primer; small shock-sensitive cap designed to ignite the propellant of a cartridge.

Prone; the position where a shooter lies on the ground.

Propellant; solid fuel filler of a cartridge designed to produce thrust to a projectile.

Receiver; the frame of a firearm used to connect the barrel to the bolt. A critical and for this reason often serialised piece to a firearm.

Run-out; machining jargon used to describe work that is offset to the axis. It is a measure of precision.

SEE; Secondary Explosion Effect, where smouldering propellant detonates, causing a situation of over-pressure.

Semi-automatic; a system of automatic firing where the actions of unlocking, extracting, ejecting, loading and locking can be performed by the energy of a fired cartridge. Semi refers to one shot only per activation of the trigger whereas fully-automatic refers to continuous automated firing until the trigger is released or the magazine is spent.

Re-load; similar to hand-load, referring to a person who collects used cartridge cases and reconstitutes them into rounds. The benefits of re-loading are reduced cost and improved accuracy potential.

Replica firearm; a non-firing copy of a firearm.

Rimfire; cartridge with integral primer initiated by a firing pin strike to the edge (hence the name). This design is typical of the smallest calibres of firearm.

Round; jargon for a single piece of ammunition, comprising the case, primer, powder and projectile.

Silencer; popular misnomer for sound moderator, implying the sound from a gun barrel can be completely silenced (as opposed to moderated).

Single Action; refers to a handgun where activation of the trigger performs only one action, that being the firing of the gun.

Supersonic; where an object of gas exceeds the speed of sound. The speed of sound varies according to pressure and temperature. In dry air at 20 °C this speed is approximately 343 m/s or 1,125 ft/s

Suppressor; alternate name for a sound moderator.

Trajectory; path of a projectile fired from a gun.

Transonic; the band of speed between Mach 0.8 and Mach 1.2 typified by turbulent forces on projectiles.

Trigger; the part of the guns actuating mechanism operated by a finger.

Trigger group; The combination of parts that comprise the initiation mechanism of a gun; including the trigger, hammer, sear, safety catch, and associated pins and springs

1. Specific Aims of the Study

The study has three specific aims:

1. Identify impediments to allowing the use of sound moderators on firearms in NSW for the purposes of hunting, including their current legal status and perceptions of their use within the community.
2. Gather data and examples from Australia and overseas where the use of sound moderators or other firearm attachments or firearms has been allowed and investigate any positive or negative effects of this situation.
3. Make recommendations: based on 1. and 2. Above; of the implementation of the use of sound moderators on firearms in NSW for the purposes of hunting game and feral animals.

Following this statement of specific aims the report will be structured as follows:

1. Firstly, a concise technical review will be presented on the more technical aspects of sound moderators and their use.
2. Secondly, secondary data will be shared on a variety of legislative regimes pertaining to the use of sound moderators. Both positive and negative effects and examples arising from their legal use will be discussed.
3. Thirdly, the report will seek to address the supposed link between moderator use and criminal activity.
4. Fourthly, the report will offer a brief social commentary on the firearms debate as it currently stands in Australia.
5. Fifthly, a concise and objective review of the key benefits and detriments pertaining to moderator use will be presented.
6. Finally, a recommendation will be offered on the issue of legislative change as it relates to sound moderator use for hunting purposes in NSW.

Sound Moderators – A Technical Review

A sound moderator, suppressor, silencer or ‘can’¹ is a device that is either attached to, or an integral part of the barrel of a firearm. Moderators are primarily designed and employed to reduce the volume of noise generated by firing the firearm. There are other secondary benefits which arise for users of moderators as well as bystanders. More precisely moderators may be defined as:

any device for silencing, muffling, or diminishing the report of a portable firearm, including any combination of parts, designed or redesigned, and intended for use in assembling or fabricating a firearm silencer or firearm muffler, and any part intended only for use in such assembly or fabrication. (Title II Weapons, N.D.)

It would also appear that moderators of any description are not in of themselves a major or ‘critical component’ of a firearm. A firearm is able to function regardless of whether a device is fitted to the barrel with the express intention to moderate the firearm’s sound signature. The projectile will exit the barrel with essentially the same velocity (ergo impact energy) regardless of the fitting of a moderator². In further determining the definition of ‘critical component’ the Panel has framed the device similarly to Australian authorities who are well familiar with firearms; namely the Australian Defence Force, Police and Customs services. Critical components of a firearm typically include parts that are deemed vital to the shooting function of a firearm. Examples of which are barrels, trigger parts and groups, receivers, bolts, and removable magazines³. Critical components attract scrutiny by the

¹ These terms are used interchangeably depending on the locale, however all refer to the same device.

² The exception being firearms with a ported barrel designed to bleed gas/pressure into the moderator prior to the projectile’s exit from the muzzle. One notable example is the Heckler and Koch MP5-SD, having integral ports designed to bleed gas and thus lower the muzzle velocity of factory 9mm ammunition to subsonic. Standard 9mm ammunition is typically supersonic 1,100-1,200fps (115grains being the median weight in the ballistic range) so there is much utility for a paramilitary organisation to be able to use any ‘off-the-shelf’ supersonic 9mm ammunition knowing it will be slowed to subsonic before leaving the barrel, and thus maximising the SD’s potential as a sound moderated sub-machine gun.

³ A firearm fitted with a removable magazine (or Obendorf style; e.g. Remington 700 and variants) is capable of being fired without the magazine, however magazines are deemed critical parts by Australian regulatory authorities due to enhanced utility they represent. A firearm’s capability/volume-of-fire is greatly enhanced by the ability to house rounds in the firearm. By deeming magazines ‘critical component’ facilitates the spirit of public-interest regulation by controlling the volume-of-fire potential of firearms in private ownership.

authorities and are subject to controls in importation, sale, possession and usage. Examples of components which are not critical are stocks or 'furniture', sighting devices (telescopic, parallax-free passive reflex, active lasers, iron sights), sighting device fixing parts (scope rings, bases, rails), components related to safety functioning, and ancillary pins, springs and fixing components that are simply too innocuous and ubiquitous to effectively control.

Using the above criteria to test the definition of sound moderators it would appear they are not a critical component. The reason being a moderator is not a critical or even an important component in the functioning of a firearm. Nor will a moderator influence the impact energy of a projectile fired from a firearm with any degree of practical importance. Setting aside the users abilities and intentions, a firearms' destructive potential is the same, with or without a moderator. Moderators influence other aspects of firearm utility including: sound, recoil, muzzle flash, firearm profile, weight, centre-of-gravity and to an extent, accuracy.

There are three main types of moderator;

- over-barrel,
- end barrel, and
- integral.

As the name suggests the over-barrel type extends back along the barrel, being affixed inside the moderator. The advantages of an over-barrel design are that the overall length of the firearm is reduced along with the added support and alignment of the moderator along the barrel, as opposed to the end-threads only. Bringing the moderator closer to the breech also shifts the balance-point/centre-of-gravity closer to the shooter, which is a weightbenefit in itself.

The second type of moderator is an end-barrel design in which the moderator extends beyond the muzzle of the barrel with the moderator-barrel connection being the barrel-end only. While this design does not provide the benefits of an over-barrel design it is dictated in situations where the forward stock or thickness of the barrel precludes an over-barrel device. This design is more commonly seen in 'off-the-shelf' designs whereby the manufacturer has threaded the end of the barrel with a standard thread (e.g. $\frac{1}{2}$ " x 20tpi UNF or $\frac{1}{2}$ " x 28 tpi UNEF with a one moderator 'fits all' approach.

The third design, the integral type, as the name suggests the moderator is not an 'after-market' addition but has been part of the manufacturer's design from the outset.



Figure 1. Over-barrel Moderator (Reflex suppressor, Finland).



Figure 2. End-barrel Moderator (.22 Liberty, USA)



Figure 3. Integral Moderator Design (.308 Steyr SSG 6D)

2.1 Moderators and Subsonic ammunition

For a moderator to operate at maximum efficiency two criteria must be met (Shaw, 1973); Firstly the projectile must travel below the speed of sound (approximately 1100 feet per second – *varies according to ambient pressure and temperature*) on leaving the moderator, and secondly the moderator must contain and slow the exiting gasses to below the speed of sound. Two further factors are relevant here. The fitting of a moderator is likely to increase the muzzle velocity slightly by what is called ‘freebore boost’.

Freebore boost is caused by decelerating propellant gasses within the moderator continuing to impart kinetic energy to the projectile while in the process of slowing. Secondly, the sonic ‘boom’ or supersonic ‘crack’ builds during the transonic phase of the projectile's speed and does not simply occur when the projectile breaks through the sound barrier.

The transonic phase is a band roughly 100fps existing between subsonic and supersonic speed. According to acoustic experiments conducted by Paulson (1996) the supersonic crack of a projectile starts at 92fps below the speed of sound and gradually builds in volume to its peak at 50fps above the speed of sound. The implication of this is that for a moderator to be used at maximum efficiency the engineered velocity of a projectile needs to be at least 100fps below the speed of sound (which in itself varies according to ambient pressure and temperature). 950fps is a reasonable benchmark for ‘suppression’ of exiting projectiles. Paulson’s distinction between a projectile that is merely ‘suppressed’ as opposed to one which is ‘absolute silenced’ is the figure of 90% of the speed of sound. Any projectile that is travelling at 90% or less than the speed of sound (i.e. less than 1100 fps) is considered ‘absolute silenced’.

While it is possible to manufacture or assemble dedicated ammunition that is slower than 950fps or 90% below the speed of sound one needs to consider the possibility that in using cartridge cases designed to achieve supersonic projectile velocity, using reduced weight of smokeless powder to achieve reduced velocity, there exists the dangerous possibility of

both Secondary Explosion Effect (SEE), and 'flash-over'. SEE is caused by smouldering powder which has not fully ignited, releasing un-burnt gasses which finally ignite, as opposed to normal deflagration. The likelihood of incomplete initial deflagration increases with smaller powder volumes, coupled with lower temperature primer flame. Flash-over occurs when a larger than normal surface area of propellant is presented to an initiating flame from the primer, causing an unintended pressure spike. This is caused by low volumes of powder settling in a horizontal attitude inside the cartridge case at the time of firing. The primer flame traverses across a larger than usual surface area of propellant powder which simultaneously ignites with a similar result as SEE. In both cases a firearm can rupture due to pressure exceeding the manufacturer's specifications for the barrel and/or action. This can result in damage to both the firearm and the user.

Shooters using moderators can avoid these low velocity dangers through a number of strategies;

1. Choosing a dedicated subsonic cartridge which has a reduced case capacity designed to ensure that 80%+ of case capacity is filled with propellant powder.
2. For handloaders, by choosing a high-bulk powder suited for low velocity cartridges (not necessarily subsonic).
3. For handloaders, by widening the primer pocket hole in the cartridge case and/or by using magnum primers. Given the lower pressures generated by subsonic ammunition the diameter of brass wall around the primer pocket hole in cartridge cases engineered to withstand supersonic loads is not necessary . Using magnum primers would provide more ignition energy to ignite the reduced load of propellant powder;
4. Ensuring the propellant powder is settled against the rear of the cartridge case, especially when in the horizontal firing position by using a neutral, combustible filling material such as Dacron (synthetic insulation commonly used in sleeping bags). Dacron burns relatively cleanly while leaving little residue behind.
5. For handloaders, when establishing an optimum powder load for a particular firearm starting at a higher velocity load and working down, and opposed to the supersonic method of starting 10% below recommended load and working up.

6. Use commercially manufactured subsonic ammunition in traditionally supersonic calibres.

As for the likely implications of SEE and 'flash-over' if de-criminalising moderators in Australia...with the amount of information available to hand-loaders, who are already competently loading supersonic ammunition, coupled with the more likely effect of bulged breeches and ruptured cartridge cases (as opposed to personal injury) one can arguably conclude the risk of accidental harm due to SEE and 'flash-over' is inconsequentially low.

2.2 Moderators and Supersonic ammunition

Studies by Paakkonen and Kytala (1993 and 1994) with both .308 assault style (Kalashnikov type) and hunting rifles, and .22 calibre pistols give an account of the performance of moderators. Testing equipment immediately adjacent to the shooter and to a distance of 10 metres from the shooter, they discovered that the moderators they used reduced the noise level of the assault rifle by 9-13dB, that of the hunting rifles by 14-28dB and that of the 0.22 handgun by 31-33dB. The bullet-flight noise was 145-148dB at a distance of 2 metres from the bullet path highlighting the inability of a moderator to control the sound emanating from the path of a supersonic projectile. The point being while a moderator is capable of reducing the volume of sound of the muzzle blast, the projectile, once free of the moderator continues through the air producing sound as it travels. If the projectile is travelling at supersonic velocity this sound is the micro equivalent of the sonic boom in a supersonic aircraft. For a supersonic projectile the sound is a distinct crack, in the order of 145dB heard downrange from the firearm.

2.3 Internals and Permutations

The majority of sound moderators follow the same basic design, initiated by Hiram Maxim in 1910⁴. This involves an expansion chamber, followed by a series of baffles. The projectile travels through the expansion chamber first, whereby the majority of initial high pressure gas is immediately trapped in a fixed volume space. This gas, now at a reduced velocity continues to follow in the wake the projectile, filling the void between each baffle

⁴ Hiram P. Maxim the son of Hiram S. Maxim, designer of the modern machine-gun.

and being prevented from passing the projectile. By the time the projectile exits the moderator these gasses have been slowed and trapped to a point whereby they no longer emit a loud sound report.



Figure 4. Internal Components of a Typical Moderator (Sub-Silent, NZ)

In Figure 4 the moderator baffles are cone shaped, with this being a more recent innovation in moderator design. Industry accepted theory is that cones, with the apex pointing in the direction of the breech 'peel' gas away from the wake of a projectile with more efficiency than flat right-angle baffles.

Other designs have a cylinder completely filled with baffles, while others have no baffles and simply a large expansion chamber. There is some evidence in the literature to suggest that there is a limit to the number of baffles a moderator can have before it becomes counter-productive where noise reduction is concerned.

A less common type of moderator is the "wire mesh" design an expansion chamber as with the baffle type, but the baffles are replaced by a column of knitted wire mesh with a central hole for the projectile. The wire mesh acts to disrupt the column of gas as in the baffle design, while at the same time acting as a heat sink to cool the hot gas and so lower the volume of the sound report.



Figure 5. Manufacture of Cone-shaped Baffles.

Yet another more recent innovation is the concept of the 'wet' moderator. This permutation capitalises on the cooling effects of liquids. Water can be used however more commonly it is a non-corrosive liquid such as oil. With this design a smaller-than-'dry' moderator can be built whereby the device not only traps and allows the gas to expand and slow but also simultaneously cooling it. The combination of slowing and cooling the deflagrating gas is what lowers the sound report at the muzzle.



Figure 6. CNC Machined Design with Integral baffles (DeGroat Tactical USA)

Sufficed to say there are a number of types and permutations purporting to lower the muzzle report to a decibel level considered moderated by the user. This is achieved by both cooling and slowing the pyrotechnic gas produced on ignition .

2. Sound Moderators – The Legislative Environment

The situation regarding the legal regulation of sound moderators varies widely around the world; ranging from strictly enforced bans to free and over the counter purchase by the civilian population. Similarly, in certain jurisdictions they may be used legally by law enforcement and military communities but are not legally available to the civilian population. In most cases the debate seems to rest with how sound moderators are viewed by lawmakers; namely: are they perceived as critical firearms components/parts or as an aid to the hunter?

Where they are perceived as critical weapons components or parts this has more often than not led to a complete ban in terms of civilian ownership or at best very tight regulation. The chief argument used by lawmakers in relation to moderator regulation seems to rest with their potential misuse, as critical weapons components, by organised criminals and a belief that in some way or another uncontrolled access to them will lead to an increase in organised and/or petty crime rates.

A comprehensive review of the pertinent literature points to the fact that this perception is largely ill-informed with little, if any, evidence pointing to a clear link between criminal activity and the use of sound moderators. The most complete and informed scientific enquiry to date (Clark, 2007: 44) on the criminal use of “firearms silencers” posits very clearly that the “data indicates that use of silenced firearms in crime is a rare occurrence, and is a minor problem.”

Regardless of the evidence, lawmakers in some countries continue to perceive moderated firearms as more dangerous than ordinary non-moderated firearms and this has led to a plethora of laws and regulations concerning their ownership and use. As indicated previously, this is in direct contrast to a number of countries where moderators are freely available to all members of the civilian, military and law enforcement communities. A brief compilation on the moderator regulations pertaining to developed countries follows:

Australia - State laws govern the possession and use of firearms in Australia. These laws were largely aligned under the 1996 National Agreement on Firearms (<http://www.aph.gov.au/library/pubs/bd/1997-98/98bd048.htm> – retrieved 6/28/2011). Under the terms of this agreement anyone wishing to possess or use a firearm must have a Firearms Licence and, with some exceptions, be over the age of 18. Additionally, owners must have secure storage for their firearms. Before someone can buy a firearm, he or she must:

Obtain a Permit To Acquire. The first permit has a mandatory 28-day delay before it is first issued. In some States (e.g. Queensland, Victoria, and New South Wales), this is waived for second and subsequent firearms of the same class.

For each firearm a 'Genuine Need' must exist, and a Genuine Reason must be given; relating to vermin control, hunting and recreation, competitive target shooting, or collecting. As with the United Kingdom, self-defence is not accepted as a genuine reason for issuing a licence.

Each firearm in Australia must be registered to the owner by serial number. Some States allow an owner to store or borrow another person's registered firearm of the same category. Also, in some States another person with permission of the licensed owner can purchase ammunition on their behalf.

Firearms in Australia are grouped into the following categories with different levels of control. The categories are:

- a. Category A: Rimfire rifles (not semi-automatic), shotguns (not pump-action or semi-automatic), air rifles, and paintball markers. A "Genuine Reason" must be provided for a Category A firearm.
- b. Category B: Centrefire rifles (not semi-automatic), muzzleloading firearms made after 1 January 1901. A 'Genuine Need' must be demonstrated, including why a Category A firearm would not be suitable.
- c. Category C: Semi-automatic rimfire rifles holding 10 or fewer rounds and pump-action or semi-automatic shotguns holding 5 or fewer rounds. Category C firearms

are heavily restricted: only primary producers, occupational shooters, collectors and some clay target shooters can own functional Category C firearms.

- d. Category D: Semi-automatic centrefire rifles, pump-action or semi-automatic shotguns holding more than 5 rounds. Functional Category D firearms are restricted to government agencies and a few occupational shooters. Collectors may own deactivated Category D firearms.
- e. Category H: Handguns including air pistols and deactivated handguns. This class is available to target shooters and in limited circumstances farmers⁵. To be eligible for a Category H firearm a target shooter must serve a probationary period of six months using club handguns, and a minimum number of matches yearly to retain each category of handgun.

Target shooters are limited to handguns of .38 or 9mm calibre or less and magazines may hold a maximum of 10 rounds. Participants in certain "approved" pistol competitions may acquire handguns up to .45" calibre, currently Single Action Shooting and Metallic Silhouette. The International Practical Shooting Confederation (IPSC) shooting is not "approved" for the larger calibre's, for as 9mm/.38/.357 handguns meet the IPSC rules. Category H barrels must be at least 100mm (3.94") long for revolvers, and 120mm (4.72") for semi-automatic pistols unless the pistols are clearly ISSF target pistols: magazines are restricted to 10 rounds. Handguns held as part of a collection are exempted from these limits.

Category R/E: Restricted weapons: machine guns, rocket launchers, assault rifles, flame-throwers, anti-tank guns, Howitzers, artillery, etc. can be owned by collectors in some States provided that these weapons have been rendered permanently inoperable. They are subject to the same storage and licensing requirements as fully functioning firearms.

Certain antique firearms can in some States be legally held without a licence. In other States they are subject to the same requirements as modern firearms.

⁵ In WA handgun licences are only issued to target shooters, with the former use by farmers for animal husbandry prohibited in 2010.

All single-shot muzzleloading firearms manufactured before 1 January 1901 are considered antique firearms. Four States: require a licence for antique percussion revolvers and cartridge repeating firearms, but in Queensland and Victoria a person may possess such a firearm without a license, so long as the firearm is registered.

Australia has very tight restrictions on items which are less controlled in similar societies such as the UK. Air pistols, elsewhere unrestricted, are as difficult to obtain as centrefire and rimfire handguns, and low-powered air rifles are as difficult as cartridge arms to licence. Airsoft guns and replica firearms are banned in most States. Suppressors (or 'silencers') which are legal in the UK and New Zealand, are restricted in Australia to a few government bodies (Sporting Shooters Association of Australia, 2008)..

Canada - In Canada a device or contrivance designed or intended to muffle or stop the sound or report of a firearm is a "prohibited device" under the Canada Criminal Code (CCC) (Part III -- Sections 84-117 Firearms and Other Offensive Weapons). A prohibited device is not inherently illegal in Canada but it does require an uncommon and very specific prohibited device permit for its possession, use, and transport. With the understanding that "Canada's firearms laws help make Canada safer for residents and visitors," (<http://laws-lois.justice.gc.ca/eng/acts/C-46/page-36.html#h-37> - retrieved 6/28/2011) sound moderators cannot be imported into the country. A number of sub-sections of the CCC are worthy of special mention:

Canadian Criminal Code 86.1-3 – Careless Use - any person who uses a silencer carelessly--without ensuring that all safety measures have been taken--has committed a crime punishable by up to two years in prison.

- Canadian Criminal Code 88.1-2 – Dangerous Possession - any person who has a silencer and intends to use it for a dangerous reason has committed a crime that is punishable by up to 10 years in prison. If a person intends to rob a store using a gun that is silenced, but is arrested before the robbery, they could also be charged under this law.

- Canadian Criminal Code 90.2 – Concealed Weapon – any person who conceals a silencer without a permit for a concealed weapon can be punished with up to five years in prison.
- Canadian Criminal Code 91.2 and 92.3 – No Permit – any person found guilty of possession of a silencer without a permit can be sentenced to up to 10 years in prison

While Canadians are no longer able to acquire permits for silencers, those permits that are "grandfathered," meaning they were acquired before the law changed in 1995, are still considered valid.

Finland – Finland has no restriction on the sale and possession of moderators. In Finland only that part of the firearm directly affected by the pressure of the expanding gasses are deemed essential parts, to be licensed. Parts referred to here are chambers, barrels and bolts. All other parts are unrestricted, including moderators.

Hong Kong – Sound moderators are reserved for police and military use only.

New Zealand – New Zealand has no restrictions on the manufacture, sale, possession, or use of sound moderators. Firearms legislation is provided for in the *Arms Act 1983* and its associated regulations (<http://www.police.govt.nz/service/firearms/arms-code.pdf> - retrieved 6/11/2011). The New Zealand firearm regime focuses mainly on vetting firearm owners, rather than registering firearms or banning certain types of firearms and related equipment (http://en.wikipedia.org/wiki/Gun_politics – retrieved 6/11/2011). The *Arms Act 1983* defines a firearm “as anything from which any shot, bullet, missile or other projectile can be discharged by force of explosive. It includes anything that can be adapted so that it can discharge any shot, bullet, missile or other projectile by force of explosive. It also includes anything that for the time being is not capable of discharging any shot, bullet, missile or other projectile by force of explosive, but which by its completion or repair would be capable of doing so.”

According to the *Arms Act 1983* (Section 4b) anyone who possesses or uses a firearm (except under immediate supervision of a licence holder) needs to have a firearms licence.

Accordingly, the *Arms Act 1983* (Section 4a), stipulates that to obtain a firearms licence, an applicant must:

- Apply in person to the Arms Officer at a Police premise, usually their nearest Police station,
- Complete an application form and supply one coloured passport size (4.3mm x 3.5mm) photo of themselves.
- Pay the application fee at a collection agency advised by Police and present the receipt with their application. This fee is non-refundable.

The Police will then determine whether an applicant is a fit and proper person to possess firearms, and ensure they can provide safe storage. They will ask for the names of two people (one of whom can be the applicants spouse, partner or next of kin) who will be interviewed about the applicants suitability.

According to the Act (Section 4a), people who have

- a history of violence or
- repeated involvement with drugs or
- been irresponsible with alcohol or
- a personal or social relationship with people who may be deemed to be unsuitable to obtain access to firearms
- or
- indicates an intent to use firearms for self-defence may find it difficult to satisfy the Police that they are fit and proper to have a firearm.

All applicants are required to study the 'Arms Code' which is detailed under the *Arms Act 1983* and to attend training on firearm safety. This course is given by New Zealand Mountain Safety Council (NZMSC) volunteer instructors acting on behalf of the Police (<http://www.mountainsafety.org.nz/ProductFiles/PMPLTS10.pdf> - retrieved 6/11/2011). There is no fee for the training and test, and anyone may attend, whether or not they wish to obtain a firearms licence. A short multi-choice test is given and applicants must get at least 28 of the 30 questions correct. Seven of the questions are vital, relating to the seven

basic rules of firearm safety, and to answer one of these mandatory questions incorrectly is an automatic fail. Anyone who fails the test may apply to sit again at a later date following further study of the 'Arms Code' and attending subsequent lecture.

If an applicant requires special assistance to sit the test because of any special needs, this is discussed with the local Arms Officer beforehand. Each applicant who passes the test is given a certificate by the firearms instructor. Individuals can also qualify by completing a more extensive course (Course Code – 9131) on firearms legislation and their safe use at the Open Polytechnic of New Zealand.

Phillipines – Sound moderators are available to the public without restriction.

Thailand – Sound moderators are reserved for police and military use only.

United States of America - The United States (US) taxes and strictly regulates the manufacture and sale of sound moderators under the *National Firearms Act (NFA) 1934*. While the NFA was originally enacted to curtail the manufacture, sale and transfer of weapons that Congress deemed a threat to society sound moderators (or silencers as they are more commonly known in the US) were included in this regulatory regime. Many of the sources deem this was because of their 'gangster' related stigma. Of particular note is the following NFA definition of a firearm (Crimes and Criminal Procedure 18 – USC 921). The term "firearm" means (A) any weapon (including a starter gun) which will, or is designed to, or may readily be converted to expel a projectile by the action of an explosive; (B) the frame or receiver of any such weapon; (C) any firearm muffler or firearm silencer; or (D) any destructive device.

While sound moderators are and always have been legal to own under federal law (<http://www.reaperarms.com/SuppressorInfo.aspx> - retrieved 6/28/2011), they are only legal for individuals to possess and use for lawful purposes in thirty-eight of the fifty states in the US. Moderators are legal for private ownership in the following States⁶: AL, AR, AK,

⁶ Full names for US postal acronyms found here; http://www.usps.com/ncsc/lookups/abbr_state.txt

AZ, CO, CT, FL, GA, ID, IN, KY, LA, ME, MD, MS, MT, NE, NV, NH, NM, NC, ND, OH, OK, OR, PA, SC, SD, TN, TX, UT, VA, WA, WV, WI, and WY. Additionally, moderators can be owned by Class 3 dealers and Class 2 manufacturers (but not individuals) in: CA, IA, KS, MA, MO, and MI. Territorial law prohibits possession of moderators in the Territories and Possessions of the United States. There are no known restrictions on governmental ownership of moderators in the US.

To legally purchase a moderator you must be at least 21 years of age, a resident of the United States, have no criminal record, and live in a State that allows private ownership of moderators. However, a prospective owner/user must initiate an application process administered by the Bureau of Alcohol, Tobacco, Firearms and Explosives (BATF), which requires a Federal tax payment of US\$200.00 and a criminal background check. The \$200.00 buys a 'tax stamp', which is the legal document allowing possession of a sound moderator. In order to facilitate the tax regime all moderators must be serialized and the owner's records recorded. The procedure for licensing a moderator in the US is as follows;

- The first step is to locate a Class 3 dealer or Class II manufacturer in a State which either has in stock or will order the required item.
- Once the item is in the hand of the FFL/SOT dealer a Form 4 will be filled out on-line and two complete copies will be printed out.
- The Form 4's must be filled out on both sides, with passport photos of the buyer affixed to the backside of the form.
- The buyer then has the Chief Law Enforcement Officer (CLEO) sign the rear of both Form 4's attesting the purchaser does not possess a criminal record and is not wanted for any criminal reason.
- Two fingerprint cards must be completed and signed by a Law Enforcement agency.
- The completed paperwork is then sent to the Department of the Treasury with a check *sic.* in the amount of \$200.00. The \$200.00 is known as a "transfer tax" because it must be paid whenever ownership of a Class III device is "transferred" (in this case, the dealer to the buyer). As long as ownership remains with the same person, the tax need not be paid again. Only if the device is sold will a new transfer

tax be required. Currently, a lawful owner may bequeath his moderator to a lawful heir with or without being assessed this transfer tax.

- Once the paperwork has been submitted, it normally takes 90 to 120 days to receive the approved, stamped paperwork from the NFA Branch. Upon the return of the approved paperwork the dealer can allow the buyer to take possession of their moderator. A copy of the approved paperwork must accompany the suppressor at all times (the original should be stored in a safe deposit box). Moderators can be transported to other States that allow their ownership, but to transport a moderator into one of the States which prohibit private ownership can subject the owner to serious State felony charges.

Of particular note are the 1968 government sponsored federal gun control provisions – the first major revision to the 1934 National Firearms Act. Under these revisions anyone committing a felony prosecuted in federal court could receive an additional one to ten years if a firearm was used (88 Stat. 1214, 1225, Oct 22, 1968). This was followed in 1986 by the Firearms Owners' Protection Act, which amended the definition of a moderator by adding “any and all parts intended to fabricate a silencer” and adopted a 20-year enhanced sentence for crimes committed with a firearm moderator. This was subsequently increased to 30 years in 1988, however discovery of unregistered parts typically attracts ‘misdemeanour’ type sanctions (e.g. in Washington State, 6 months max imprisonment and/or \$1,000 fine).

Manufacturers of moderators in the USA are exempt from the need to register and pay tax on every replacement part or parts deemed for the use in a moderator due their status as manufacturer's having a Type 07 Federal Firearms License *sic*. (FFL) and having paid a Special Occupational Tax (SOT) exempting them from what would otherwise be an onerous, tedious process.

United Kingdom – in the United Kingdom (UK), sales of what are known as sound suppressors fall into one of four categories; (<http://en.wikipedia.org/wiki/Suppressor> - retrieved 6/28/2011):

- For replica and air weapons – the purchase requires no licence and in most cases no identification requirement.
- For shotguns – if capacity does not exceed two cartridges purchase requires the presentation of the buyer's shotgun certificate only and no record is maintained.
- For shotguns - If capacity exceeds three cartridges the Firearm Certificate (FAC) will need to show permission for the purchase of a moderator.
- For small- and/or full-bore rifles – the FAC will need to show permission for the purchase and the rifle for which it is intended. In all cases all FACs have the firearm and calibre approved by the police and annotated to the document before a moderator may be purchased.

In all cases the regulation conditions pertaining to the purchase, possession, manufacture and sale of moderators are defined under the original *Firearms Act 1920* and its subsequent revisions/amendments in 1937, 1965, 68, 1982, 88 and 1997. Interestingly, the United Nations (2000) identifies the fact that the UK continues to have one of the lowest rates of gun homicides in the world (http://www.unodc.org/pdf/crime/seventh_survey/7pv.pdf - retrieved 6/28/2011). A fact that is corroborated by a subsequent Home Office (2011 – Research Report 54: Exploring the Links between Homicide and Organised Crime) study based on 2006/7 data, reporting that gun crime in England and Wales remains a relatively rare event. It stated that injury caused during a firearm offence was rare with fewer than 3% of cases resulting in a serious or fatal injury (<http://www.homeoffice.gov.uk/publications/science-research-statistics/research-statistics/crime-research/horr54?view=Binary> – retrieved 6/13/2011).

Other European Licensing Regimes – most other European Countries, with the exceptions of Finland, Poland, Norway and Sweden strictly prohibit the purchase or possession of a sound moderator other than by law enforcement and military personnel. In certain cases they are legally available for purchase (Denmark and Germany), but the registration system is such that ownership is nigh on impossible to realise. In all cases they are considered important firearms components/parts and illegal ownership and related

prosecution can bring with it a lengthy custodial sentence. Neither Finland, Norway or Poland classify moderators as important weapons components/parts and they are legal in most, if not all calibres, without formal registration or the need for a permit of ownership. Sweden does permit moderator use on certain calibre firearms for hunting purposes but in all cases a licence is required.

3. Sound Moderators – Crime

The previous section identified a variety of legislative and/or control approaches to the ownership, licensing and/or use of sound moderators globally. These approaches range from uncontrolled use (for example, New Zealand), to controlled use (United Kingdom, USA), to zero tolerance (Australia). Most countries that have controlled licensing/use systems to identify the user while acknowledging/enjoying the wider community benefits pertaining to the use of sound moderators. In the case of zero tolerance regimes however, there remains an emotionally charged and scientifically unsubstantiated perception that sound moderators are critical firearms components, will find their way into the hands of petty and organised criminals and this will ultimately lead to an increase in crime. Further, that this level of crime is given an arbitrary weighting that offsets to the point of dismissing the benefits of sound moderation. This is accompanied by the political inexpediency of lawmakers to acknowledge the dearth of statistical evidence suggesting any correlation between moderators and crime. Further, law makers continue to ignore the reality that in today's virtual world, any criminal would not be hard pressed to construct and/or obtain or improvise⁷ a working moderator given the volume of information readily available on the internet, using material readily available without restriction in Australia - (for example, http://www.youtube.com/watch?v=FmhxJnaZ_0o).

Looking specifically at Australia, a short review of the history of the gun control debate offers some insight as to the current legislative position concerning both gun control and sound moderator use. The debate really only got underway in Australia in the 1980s as previous low levels of violent crime through much of the 20th century kept levels of public concern about firearms low. The last few decades however witnessed a series of high profile murders (Hoddle and Queen Street, Strathfield, Port Arthur and Monash University shootings), which in turn forced the then Australian Government to take a reactionary

⁷ Improvisation can be as simple as a plastic drink container or PVC pipe taped onto the end of a barrel.

stance by enacting more restrictive firearms legislation, which was subsequently enacted by the respective State and Territorial governments. These laws govern the possession and use of firearms in Australia and are aligned under the 1996 National Agreement on Firearms. What is notable in all cases is the lack of statistically proven imperative (with anecdotal sources suggesting firearms related death rates were falling *prior* to introduction of new legislation/restrictions) coupled with the reactionary strategy of the then Federal, State and territorial government response.

How will de-criminalising moderators affect Australian crime in the 21st Century? Given this has been the reason why moderators have been banned in a number of countries, Australia included, it begs the question;

- what crime is being prevented by the continued banning of legal ownership of moderators in these countries?

Related questions are;

- what crimes have been committed by firearms fitted with illegal moderators and,
- why were they chosen as a firearm attachment by the perpetrators?
- What percentage of firearm crime is committed by moderator-fitted firearms both in countries where moderators are legally available, and in countries where they are prohibited?

To answer these questions one key analogue country is examined, the United States. Key for a number of reasons; firstly the sheer population size of 360 million people, secondly its geopolitics and demography as a first-world consumer culture and thirdly its influence on Australian consumer culture by key socialising influences such as the English-speaking media and our penchant for US produced media. Lastly, America has a distinct emphasis cultural or persona where firearms are concerned. It is an accepted statistic that one in four adult US citizens have a firearm (Kohn, 2004a), that there are approximately 225million firearms (BATF, 1995) and that firearms are a central tenet of American Identity (e.g. Hofstadter's 1916-1970 coined phrase when describing the US as a "Gun Culture"). The US

also holds a key position in Australian firearm usage given the high regard held by Australian shooters for US products and ubiquitous and ready availability of firearm products from the US⁸.

It appears from precedent in sentencing and regulation, the United States views the misuse of a firearm with a moderator as more serious than a firearm without a moderator. The Federal penalty for the possession of a silencer during a 'crime of violence' or in drug trafficking is a 30 year mandatory minimum (Clark, 2007). Thirty years imprisonment is a harsh punishment by any country's standards, including the US. The premise behind the sentence relates to the assumption that moderated firearms are more deadly than un-moderated firearms, and that moderated firearms are the domain of professional criminals, who deserve more severe sentences when prosecuted. This has been the case since the onset of the Great Depression the 1930's when the US experienced a spike in violent crime related to poverty, coupled with an increase in poaching incidence. At the time handguns and machine guns were deemed the most dangerous of firearms given criminal preference for weapons that could be concealed or able to deliver maximum firepower. Moderators, along with shotguns, short-barrelled rifles and cane-guns were included in restrictive laws with questionable empirical evidence as to the effects of their control.

There has been some easing of restrictions relating to shotguns and barrel lengths of over 16 inches (Australian authorities adopt a similar concept of 16 inches being considered a minimum for rifle barrel length) however moderators have remained restricted. As the Second Amendment of the Constitution allows US citizens the right to 'keep and bear arms', this confounded the Federal authorities efforts to prohibit moderators at the time and so regulators devised an onerously restrictive system of tax as a 'prohibition by proxy'. A tax of \$200USD was levied on moderators and this has not increased to this day. \$200USD was at the time four times the price of a Thompson machine gun (White, ND) and so in this context, and the Depression, designed to be prohibitively expensive. By today's standards

⁸ Post 9/11 the US State Department has tightened export restrictions of firearms and related equipment to all countries including Australia. The focus of these restrictions is military related however sales of civilian intended products have also been restricted, often as collateral due to the myriad of interpretations by US manufacturers and retailers of these restrictions. Allied with this is the phenomenon of 'fortress America' where firearm retailers and distributors are in some cases less willing to deal with overseas buyers, including Australian.

\$200 is 1/10th the cost of an equivalent legal firearm. Along with the tax came the requirement to serialise all moderators, essentially for audit and administration of the tax. This represents a similar model to the Australian system of serialising all firearms; in order to maintain a modicum of governmental control but also as a necessary component of a revenue-based licensing regime.

As outlined earlier the Federal crime of using a moderator in conjunction with a crime of violence or drugs in the US is a mandatory 30 year prison sentence. For possessing an unregistered or illegal moderator without the association of a crime of violence the Federal sentence allows for up to 10 years, although sentencing guidelines encourage sentences in the range of 27 to 71 months (Clarke, 2007). Until 2005 the maximum sentence of 10 years was mandatory however in a relaxation of US Federal law where moderators are concerned the sentence is now at the discretion of the courts. Prior to this there have been cases where judges have attempted to circumvent the edict in order to provide for a more reasonable and compassionate outcome. In one instance a Federal Court judge noted “possession of unregistered silencers is a victimless crime” (*U. S. v. Ritsema*, 89 F.3d 392, 395 (7th Cir. 1996)). While clearly the judge in this case is questioning whether the definition of a crime has been met, one cannot then assume that all victimless crimes do not represent some threat to society. By definition a crime includes two criminal elements; ‘Actus reus’ and ‘Mens rea’...Latin for ‘guilty act’ and ‘guilty mind’.

A person who knowingly possesses a moderator against the laws of Australia qualifies by both those elements, for it remains arguable (although speculative) that the person could be planning on using a moderator to assist them in committing a crime at some point in the future. In another US case it transpired that a father and son charged with the manufacture of a non-licensed moderator claimed they were conducting an experiment using machine tools available to them and clearly had no intention of using it (*U. S. v. Webb*, 1998 U.S. Dist. LEXIS 4711 (D. Kan. 1998)). In another case a person manufactured a moderator using their own tools and did indeed intend to mount it on a firearm (*U. S. v. Frazier*, 213 F.3d 409 (7th Cir. 2000)). In both cases although imprisonment was an option in sentencing they

received non-custodial sanctions, in consideration of the level of 'Mens rea' when coupled with what is essentially a victimless crime.

Notwithstanding the severe sentencing regime in the US for moderator misuse their use in crime is almost negligible. Out of 1700 reported homicides over a five year period in California only four were reported to involve the use of moderators (ibid). When 25,000 criminal cases in the same State were examined the word 'silencer' (the US legal term for moderator) emerged 18 times. Of those 18, 4 had prior criminal records and 5 defendants actually used the silencer to commit a crime.

When considering the empirical findings of a substantial US Federal study into the use of moderators the results are best summed by one section of Clark's research,

First, use of silencers in crime is rare. Even when silencers are possessed they are even less frequently used. Silencer use is not primarily connected to organised crime. There were a few such cases, but in general, use of silencers appears to be a poor proxy for organised crime. Silencers probably are more threatening to their victims on a psychological level when used in crimes such as armed robbery. There is no evidence to suggest that criminals who possess silencers are more likely to be violent. For example, in the 50 cases of silencers found in drug raids, none of the defendants used a silencer to shoot at police, and in only a few of these cases was there any resistance at all. Whether silencers should be illegal at all is a good question. (ibid. p 54)

Similarly research conducted in the UK by the Home Office into gun crime and the illegal firearms market found low level use of moderators in relation to violent crimes (Hales, Lewis and Silverstone, 2006). Of the offenders convicted of gun related crimes interviewed only 4 of 84 for the study were in possession of moderators. Other reports by the Home Office and British authors do not deem the concept of moderator as worthy of noting (Dodd, Gray, Smith and Charles, 2004; Hales, Lewis and Silverstone, 2006; Home Office, 2006; Povey and Kaiza, 2006; Walker, Kershaw, and Nicholas, 2006).

4. A Social Commentary

Paulson, a US author in the area of moderators begins his largely technical book with the following lament;

Silencers, which have more properly been called sound suppressors since the 1960's are the most maligned and misunderstood aspect of small arms development in the twentieth century. Most Americans view silencers with suspicion or outright contempt. Even an appalling number of law enforcement personnel and members of the National Rifle Association believe that silencers have no place in a civilized society and are properly illegal. Not only are these folks wrong on both counts, they are buying into a bankrupt philosophy that is intrinsically evil - as if the objects were sentient incarnations of evil spirits visited upon the mortal world by Gods of darkness. (1996, p 1.)

And this from Jim Dickson, a British author;

One of the best examples of the effectiveness of brainwashing in this country is the transformation of an innocuous safety and noise reduction device to a sinister assassin's tool in the public's mind. (2011)

Paulson begins his book by venting his perceptions of the American public about a topic dear to his heart. By the same token a portion of the Australian public is likely to have similar attitudes and will seek to stridently exercise their opinions in keeping with the strength they hold attitudes related to firearms. Whether the remaining overwhelming majority of the population think similarly remains to be seen as the concept of decriminalizing sound moderators is yet to be tested in the Australian 'court of public opinion'. What is of no doubt however is the contentious nature of firearms in Australian public ownership (Ablom, 2001; Altmann, 2006; *Anger lingers among those who lost their firearms*. 2006; Chapman, 1998; *C.L.A.S.S. Coalition of law abiding Australian sporting shooters*. 2008; Crook, J., Harding, R. & Abrahams, O, 1996... and at least 20 more in the

reference list)⁹. While civilian firearm ownership remains contentious in all first-world countries in Australia there appears to be a growing community discontent with firearms in private hands, in keeping with the dynamic nature of culture (MacCarthy, 2009a, 2010a, 2010b). Forty years ago high-school school cadet units contained armoury's of .303 rifles, 2 inch mortars and Bren Guns. On the day of the Queen's Medal¹⁰ those travelling with .303 rifles on Western Australian public transport to the competition travelled free of charge. Every Governor General since Federation has been a willing patron of the National Rifle Association of Australia (NRAA), with the exception of Sir William Deane who opted not to do so in the wake of the Port Arthur shooting tragedy in 1986, and the current GG Ms Quentin Bryce. As John Fitzgerald, Chairman of the NRAA was reported as saying (cited in Murphy, 2009) "we have been tarred with a certain brush because we aren't politically correct." Certain supermarkets make a public point of not stocking firearm related 'War Toys'. Examples of stigmatisation, self-stigmatisation as pseudo-marginalisation are numerous. For example, in 1995 Camp Quality, a not-for-profit organisation providing support for children with cancer signalled to Western Australian ballistic clubs that their donations were no longer welcome. Modern cadets de-emphasise the martial aspects of their identity. Abseiling, orienteering and canoeing have replaced shooting, camouflage, and mock platoon skirmishes. Firearm owners, and especially shooting bodies (e.g. SSAA)/disciplines feel the need to de-martial their activities for fear of upsetting the mainstream community.

⁹ The first author discussed at length the possibility of public use of sound moderators with a prominent Australian anti-gun lobby luminary. After a cogent and informed discussion the person subsequently contacted the panel declining to be included in the report, which has been respected in this case.

¹⁰ Australia's premier competition for the Target Rifle discipline since 1913, held once a year over the weekend of the Queen's birthday. HRH Prince Charles is currently the patron of the British NRA, of which the NRAA (National Rifle Association of Australia) is a Commonwealth affiliate.

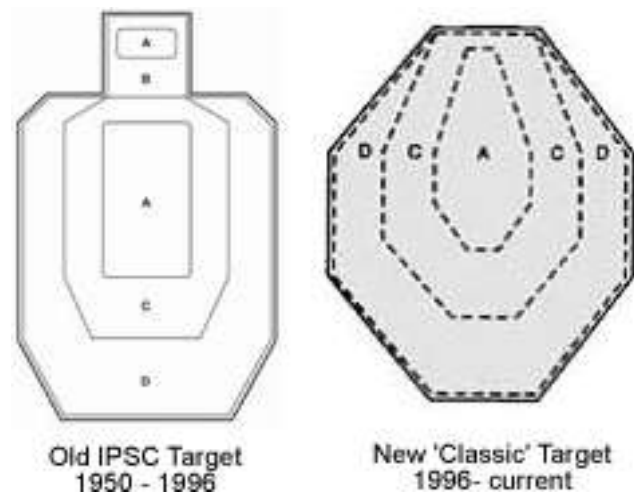


Figure 7. De-martialisation of Australian IPSC Competition Targets

Most forms of Australian shooting have evolved to the status of either a sanitised sport or a semi-covert activity by participants deeming themselves vis-à-vis the wider community as 'semi-deviants' (Celsi, Rose & Leigh, 1992, Schouten & McAlexander, 1995). At odds with this status is growing shooter disenchantment with the benign expectation of contemporary societal attitudes. In Australia, hunting with firearms, while legal is not as readily accepted by the wider, non-shooting community as it once was. Competition shooting has witnessed the de-emphasizing of martial origins in order to conform to societal expectations of benign behaviour and contemporary levels of social responsibility. Arguably, as societal values continue to change this imperative to sanitise firearm usage and meanings increases.

This fickle societal appetite for hunting and competition shooting has waned to the status of concerned suspicion and grudging tolerance in many circles, influencing not only the wider community including licensing and decision-makers, but also the attitudes of the shooters themselves. These influences and attitudes determine the level of commitment, involvement and engagement (Hollebeek, 2009; Bowden 2009; Patterson et al 2006) with firearms, as both a sporting tool and consumable. This in turn reflects the nature of gun ownership in Australia (MacCarthy 2009a; Bryant 1994).

At the centre of this evolving debate is the seminal artefact itself, the firearm. To Australian's there is magic, mystery and meaning residing in firearms and by contamination (Belk et al, 1989) anything associated with rifles, including sound moderators. To aficionados firearms are true marvels of craftsmanship, representing centuries of refinement in precision and their association with the cultural and spiritual side of hunting. -Ordinarily the firearm is a mechanical machine, however its use and misuse has elevated this machine to a special status. The very mention connotes lethal potential, symbolism and zeitgeist. Although used as a tool in hunting and competition firearms have enormous potential for user cathexis (Otnes and Lowrey 2004; Schouten 1991), self-definition (Belk 1988, 2001; Erikson 1955), along with permitting their owners a sense of uniqueness and individuation (Fromkin & Snyder 1980; Jung 1962). They are the ultimate extension of self. They connect us with the past, influence the present, and shape the future. However, for those well familiar but with different priorities (e.g. Australian farmers) firearms are merely unexceptional tools for animal husbandry and hunting. Regardless, they are treated differently depending on the geographic location and sub-culture. Relative to other countries Australia displays a competence and familiarity with firearms yet its population is increasingly concerned about their misuse. This concern is reflected in the complex regulatory regime that exists. This includes imperatives and procedures for licensing and storage. There are restrictions in the type of firearms available to the general public, and restrictions on the places where firearms can be legitimately used. It would appear that these restrictions have increased over the years, and do not show any sign of abating.

The fundamental point here is that any decision to de-criminalise sound moderators will probably not be treated on its merits alone. Decision makers will find it difficult to set aside emotional issues, including milestones of firearm misuse¹¹, many of which occurred in the late 1990's. While the advantages and disadvantages of sound moderation can be carefully listed in objective technical precision in a document such as this one, with the corollary outcome a logical prediction, it is not that simple. Regulatory decision makers in this case

¹¹ For example the shooting murder of 35 people, and 21 injured at Port Arthur by Martin Bryant, 28 April 1996. This singular infamous act has shaped the firearm regulatory landscape in this country, and continues to haunt, temper and justify regulatory decisions. Bryant did not use sound moderation to commit the crime.

exercise arbitrary power over a sub-culture of consumption (Schouten & McAlexander, 1995) that finds itself subordinate to the whim of the wider community (MacCarthy, 2009a, 2009b, 2010a, 2010b). Those that would seek to impact any decision about reversing the criminalisation of sound moderators in Australia would be politicians, police and those opposed to the private ownership of firearms. The police for example, are unlikely to be entirely comfortable reversing a mindset that has previously focused on removal and prosecution. Undoubtedly there would be some confusion, perhaps even resentment by those believing their role is to regulate firearms. A recent written opinion of the Western Australian Rifle Association President, Philip Metcalf sums it up neatly, “It’s been suggested by some parties that silencers (sound moderators) may be an option if a range suffers from a (noise) complaint. We would expect strong opposition from WA Police in terms of this proposal.” (Appendix 1, p 5)

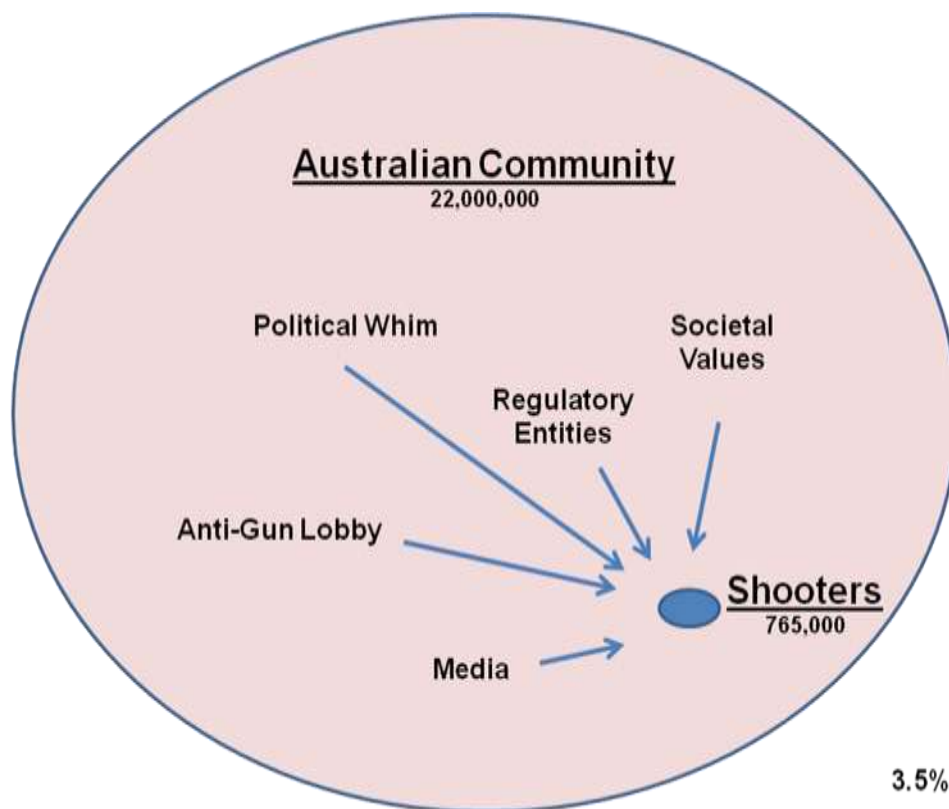


Figure 8. Societal Impacts Affecting Private Firearm Ownership (MacCarthy, 2011).

Notwithstanding the direct influence of regulators on the moderator debate one should also not discount the role of the Australian media. The recent live-cattle export ban¹² based on investigative journalism by the ABC 4 Corners documentary staff. Regardless of one's opinion this is a prime example of how the Australian media has influenced regulation by framing ideas, and prioritising public opinion. How the Australian media acts towards firearms and moderators in particular would suggest their focus would be on maintenance of the status quo. Whether the media acts to influence or reflect public opinion where firearms are concerned is a debate for another forum, however in 2011 moderators are likely to be given no better status than firearms in general by the mainstream media. The media retains a pivotal role in this dynamic situation of Australian firearm ownership. Media displays of firearm usage are ubiquitous, yet selective. Fictional programming and news-stories abound with conflict, whereby firearms are used as tools to both commit and solve conflicting situations. With sound moderators the device is used more often in fiction by the antagonists, the 'bad guys'¹³. Vision of lawful use of firearms in non-conflictual settings however is a rarity.

¹² Suspension of live cattle exports to Indonesia, June 2011, and subsequent lifting July 2011, by Joseph Ludwig, Minister for Agriculture.

¹³ With the occasional exception such as 'James Bond' who uses moderators in violent acts, for the greater good.



Figure 9. Warren Potent. Australian Olympic Medal Winner

One notable example of this is the Australian coverage of firearms in the Olympic Games. Australian shooters have won medals at every Olympic Games since 1900, with gold medals scored in 1900, 1996, 2000 and 2004. Warren Potent won bronze in the 50M Prone Rifle at the 2008 Beijing Games. He went into the event as the reigning world champion in his discipline, a clear favourite to win a medal and so the media had plenty of prior information with which to prepare. Yet there was no coverage of his event on Australian television channels. Even more telling was the absence of the medal ceremony coverage or any typical after-match interview, commentator discussions or press conference. As this was an early medal for the Australian team there was even more pressure on the media to highlight the success, however there was instead passing mention by desk commentators with no accompanying vision; either still or motion. Instead, Potent's performance was upstaged by footage of Australian events and interviews where no medals were won.



Figure10. Michael Diamond. Australian Olympic Gold Medal Winner.

One exception to this rule was when the then Australian Prime Minister, John Howard made the symbolic gesture of arriving at the medal ceremony of Michael Diamond in Sydney 2000 Olympics. Diamond had just won gold in the Men's Trap. With Howard travelled the media, and so Howard arguably realised an opportunity to mend bridges in the wake of his sweeping 1996 gun law reforms, which had alienated the shooting fraternity (and remains a point of contention to this day). Two Olympics later, Michael Diamond was again a clear medal contender in the 2008 Beijing finals of the Trap. Channel Seven, the official Australian television broadcaster of the games replaced their near continuous Olympic coverage at that time with a non-Olympic event; an AFL (Australian Football League) game. After viewer complaints were received the broadcaster justified the decision by claiming previous contractual arrangements with the AFL. Michael Diamond finished fourth. Whether it is deliberate media censorship, concern over alienating the anti-gun lobby, concern over bruising the perceived sensibilities of the wider community, or simply ratings that result in noticeably minimal media coverage of ballistic sports in Australia the phenomenon is clear. Reporting of ballistic sports come a distant last to

almost every other sport in Australia. Arguably this becomes even more poignant when one considers Australia's cultural emphasis on sport. As for moderators, there has never been any footage of non-conflictual use of the device to the author's knowledge in the Australian media. The indelible impression left to the general public is one of moderators being used to commit heinous crime, and this image will likely pollute any discussions regulators have with those seeking to overturn previous criminalization of the device.

5. Advantages and Disadvantages of De-Criminalisation

6.1 Advantages

6.1.1 Hearing Loss Prevention

The most direct and obvious benefit to the use of sound moderated firearms is hearing loss prevention. There have been a number of studies examining and establishing the link between the use of firearms and damage to hearing. The number and veracity of those studies have proven the link between firearm report and hearing loss to the point of being axiomatic. Hearing loss from gunfire is also compounded by industrial noise exposure (Paakkonen & Kyttala, 1994; Prosser, Tartari and Arslan, 1988). This may be worth considering as in the Australian context many of those using hunting rifles are farmers who would also be exposed to levels of industrial noise from farm equipment.

According to Nondahl, Cruickshanks, Wiley, Klein and Tweed (2000) there is a link between the use of recreational firearms and high-frequency hearing loss in men. Again hearing loss caused by gunfire is axiomatic. To sum up the young lady who ran the Western Australian Rifle Association shop in 2009, "All I deal with is grumpy old men who can't hear a word I'm saying." This, talking about a cohort of around 100 middle to elderly participants, shooting from the 1960's to the present day without ear protection in the early years (when it was considered unimportant to wear hearing protection at the range, and without the benefit of more recent studies and attitudes towards self-harm). Nondahl,

Cruickshanks, Wiley, Klein and Tweed also suggest the use of ear plugs, however the use of ear plugs is not part of the hunting culture in the USA where their study was carried out. Hearing plugs are available and used in Australia however often these, and earmuffs are forgone during hunting in order for the hunter to be able to hear ambient sounds and verbal communication, and so facilitate the exercise with efficiency and safety. In such situations both the shooter and those in the immediate vicinity suffer the noise as a result.

It is not just the shooters who are affected by the noise from their firearms. It is stated by Flamme, G. A. (Feb 2011). that friends, spouses, children and others may be at risk. It is these bystanders who underestimate the risk. The study found that the noise from a variety of recreational hunting firearms exceeded safe levels for unprotected bystanders. Animals in the vicinity, including pets, are also at risk, with no known devices to protect animal hearing available¹⁴. One such incident witnessed by the first author attending the Pickering Brook shooting club in Western Australia, circa 2009. A fellow shooter attended with his pet dog and attempted (largely unsuccessfully) to fit ear-muffs to the animal, much to the merriment of fellow shooters. Notwithstanding the muffs were not designed for the narrower animal profile the whole incident was obviously stressful for the dog with varying degrees of indifference or concern by fellow shooters.

Related here is the damage caused to trained gun/retrieval dogs who accompany shooters, and the ubiquitous farm dogs found on most Australian rural properties. Both types of animals are incapable of protecting themselves and are often subordinated to the shooting activity by being expected to be near the shooter. With more sensitive hearing than humans and no hearing protection the potential for hearing damage/loss when using un-moderated firearms is more pronounced in accompanying animals. This situation is specifically referred to by both a well reputed Finnish moderator manufacturer (Reflex Suppressors, N.D.) and an Australian distributor of moderators, Spearpoint Solutions and Technologies¹⁵.

There are four distinct components to the sound from a gunshot; the muzzle pressure wave, the sonic crack caused by the flight of the projectile, the mechanical action noise and

¹⁴ The impracticality of which precludes any manufacturing imperative.

¹⁵ Interview with Mr Dan Skinner, MD of Spearpoint Solutions and Technologies, Queanbeyan NSW. May 2011.

the flight noise (Abraham, 2006). In sub-sonic projectiles the sonic crack is absent. Without a moderator full-bore rifles give peak sound volume levels over 150dB (Brueck, 2004) and specifically 161dB (Allsop, N.D.), caused mainly by a combination of the muzzle pressure wave and sonic crack, as recorded by microphones level with the firearm and 2 metres to either side. In moderated firearms if the design of the moderator can effectively lower the speed of the muzzle gasses to sub-sonic velocity then this effectively lowers this component to below 80dB. If the projectile is also sub-sonic then the sonic crack will be absent. Brueck (2004) found that with supersonic ammunition moderators gave little reduction in the noise at a distance in front of the firing point as noise from the bullet flight dominates. When using supersonic ammunition with a moderator sound reduction is only possible around the immediate vicinity of the shooter. When subsonic ammunition is used sound reduction occurs across the entire trajectory profile.

Not all hunting situations lend themselves to using sub-sonic ammunition. When using subsonic ammunition the shooter needs to be aware of the following. Firstly the maximum effective range will be limited to about 150-200 metres, with all the aiming implications of a 'rainbow' trajectory for the shooter to cope with. Secondly, the impact on the target will be lower than with supersonic ammunition, with not only lower impact energy, but also without the temporary wound cavity typical in projectiles travelling 2-3 times the speed of sound. Thirdly, in popular hunting cartridges ¹⁶ ammunition is manufactured to be supersonic, in calibres designed with case capacities and breech pressures designed to produce supersonic projectile velocity. It is not insurmountable that these calibres can be hand-loaded to below supersonic (.22RF, .22 Short and 17HMR excepted) however this would likely be as a result of weighing the benefits of maximum sound reduction vs disadvantages of choosing a bullet with less 'stopping power'. What is more likely in most hunting instances is that a moderator would be used to lower sound at the firing point, while retaining the utility of a supersonic calibre. This is especially so for hunters who are

¹⁶ 12GA and .410 shotguns, .17Remington, .17HMR, .22Short, .22LR, .22Mag, .222, .223, .243 .303, 22-250, .308 (variants, Russian and NATO), .30-06, 300 Win Mag, and more recently, .338Win, .338RUM and .338LM (currently being banned in some Australian states as 'military-only'). There are also a myriad of wildcat calibres, for example the 6BR and 6BRX used by kangaroo shooters due to the excellent ballistics of the 6mm round. The exception to the above being .22Short and .22LR which can be sourced sub-sonic, and specific sub-sonic calibres with proprietary chambers; e.g. .300Whisper/Blackout, 9.3SUB and .510SUB. There are also some traditional handgun cartridges that are used for short-range hunting in pistol-calibre carbine configurations, e.g. 45-70.

unfamiliar with, or do not have the time, skill set to hand-load their own ammunition. In this case the supersonic crack is an inevitability of the evaluation of the hunting situation.

Related sound reduction notes from the sources;

Paakkonen & Kyttala (1994) found that the use of sound moderators reduce the peak sound volume level at the shooter's position to less than 140 dB. A moderator reduces the level of sound from a hunting rifle by 14-28 dB. With the use of a moderator a hunting rifle can be shot over 1000 times before the daily dangerous exposure level of a shooter is exceeded¹⁷.

The level of noise varies between the types of cartridges used, generally it is less with the use of small calibre firearms, however Pawlwczyk-Luszczynska, Dudarewicz, Bak, Fiszer, Kotyolo and Sliwinska-Kowalska (2004) found that even short-term exposure to impulse noise from small- calibre firearms during target practice might cause temporary impairment of hearing. Related to this is a study by the Australian Defence Department in the 1980's that concluded damaging sound pressure can be transferred through the nearby bones of the skull to the inner ear. The result was a greater emphasis on helmets being worn by Special Forces given this type of personnel was shooting several thousand rounds per day in target practise, at least four days a week. At that time the use of moderators was limited to niche operations only.

A study by the UK Forestry Commission (Brueck, 2004) found that with the use of a sound moderator on a firearm supersonic cartridges could be fired without hearing protection, however it was advised that some form of hearing protection should still be used. The study also found the level of hearing protection provided by the sound moderators varied between those tested. This study is consistent with the author's experience, with the perceived sound of a moderated .223 lowered at the firing point to the sound of an un-moderated .22Magnum. This is a substantial reduction in sound signature, however arguably not enough to tempt repeated exposure without some type of ear protection.

¹⁷ The panel is unsure what the author is attempting to suggest here. The author appears to be suggesting lower decibel level can be damaging if heard for long enough. This would imply that that sound damage is a cumulative concept, similar to radiation poisoning.

Another combination of reports by 19 Finnish authors jointly commissioned by the Ministry of Education, Ministry of Environment, Ministry of Labour and ammunition manufacturer, Lapua Oy in the early 1990's determined much benefit to be had from the use of suppressors. This study arose from concerns about encroaching urbanisation to shooting ranges, and also from the realisation of hearing injury caused by explosive sound pressure. For example, the distinction between the hearing damage of military personnel compared to the rest of the community.

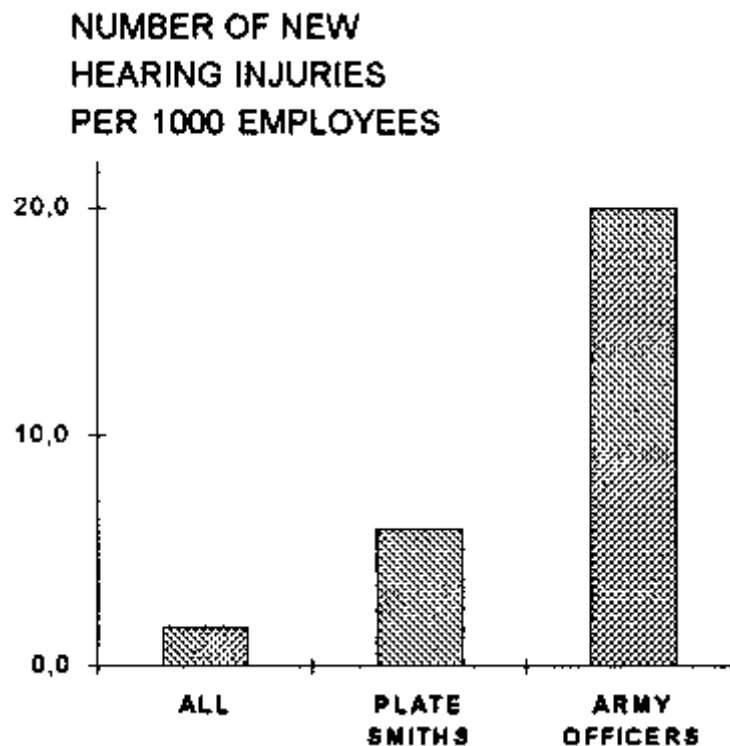


Figure 11. Initial impetus. Finland 1988 (Kyttala & Paakonen, 1995)

Kyttala's and Paakonen's summary of the Finnish studies is as follows,

All rifle suppressors reduced the shooter's exposure from the original 160 ± 3 decibels to below the EU risk limit 140 dB. Differences between brands were small. Shotgun suppressor prototypes approached the limit only when used with subsonic cartridges. At the bystander's and trainer's positions noise reduction was similarly effective.

Environmental noise attenuates almost as well in back and side sectors. The front sector is dominated by ballistic noise, which is not affected by suppressors. Bullet noise, however, is concentrated in higher frequencies than muzzle blast and thus attenuates faster when propagating. (Kyttala & Paakonen, 1995)

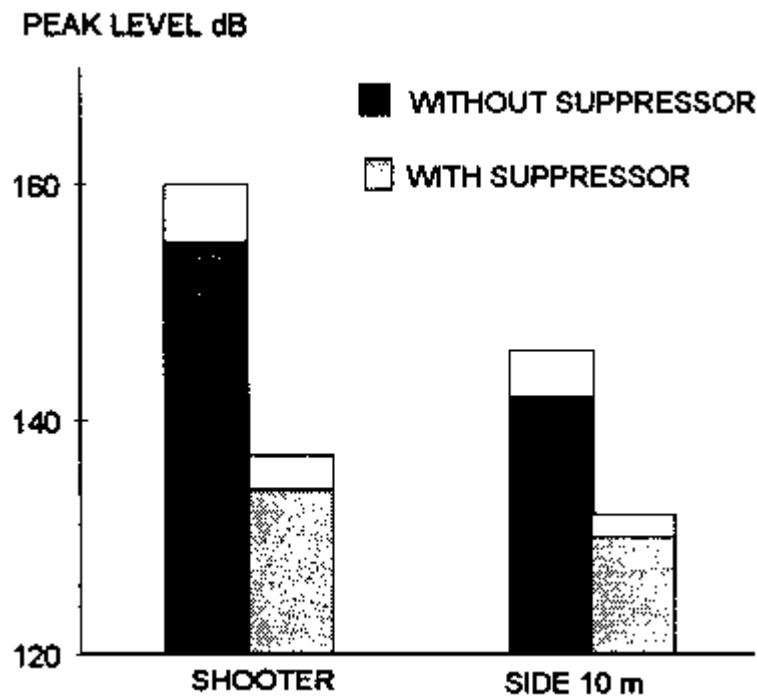


Figure 12. Comparison of Moderated Vs Un-moderated Sound

Given the concerns over hearing damage and noise pollution in general in Finland no restriction to the use of sound moderators are in place.

6.1.2 Increased Accuracy

A properly manufactured moderator influences the inherent accuracy of a firearm in two ways; by restricting the ability of the barrel to whip on firing, and by influencing the release of gas in the wake of an exiting projectile. Allsop (N.D.) attributes this enhanced accuracy

to, “sound moderators will considerably reduce the reverse flow of the gases over the rear of the bullet as it exits the muzzle.”

All barrels experience to some measurable degree axial rotation on firing (Matunas, 1992), with this rotation influenced by how straight a barrel has been bored by the manufacturer, the metallurgy (type and forging methods), the length of the barrel and barrel thickness/stiffness. The cone of fire caused by barrel whip is evident in a firearm’s group size on a target at some distance forward of the firing point. The greater the whip, the less likely the barrel will be deemed accurate (relatively speaking). Given whip cannot be effectively eliminated and given the choice of a shorter heavier barrel is not always practical one way to tame barrel whip is to choose ammunition that leaves the barrel at consistently the same point in the path of the ellipse, preferably the 12 or 6 o’clock positions. In this way the effects of barrel whip on accuracy are minimised as the effects are subordinated to the same axis as friction and gravity, controlled by the shooter using the elevation dial on telescopic sights, or rear-sight/ramp on ‘iron-sight’ firearms. Failing this, and regardless, a moderator serves to add weight to the end of the barrel and in doing so lessens the amount of whip. This results in a tightening of group size to a more or less extent depending on other influencing variables (environment/weather, shooting stability, vagaries of ammunition and shooter ability).

Fitting moderators to the end of a barrel serves to restrict the elliptical whip of the barrel by adding weight to the forward end. This dampening effect will be manifest by both closer groups (by definition, increased accuracy), and changes to a previously zeroed mean point of impact. This assumes all other shooting variables being equal. The second aspect to how a moderator can influence accuracy is by managing the explosive gas column that follows immediately behind a projectile. While travelling through the barrel a projectile’s flight conforms to the confines of the barrel with the propellant gasses behind the projectile following intimately in its wake. On exiting the barrel the projectile and gasses are no longer channelled by the barrel and are free to travel and expand according to the path of least resistance. If these expanding gasses impart pressure unevenly to the trajectory axis this will impart yaw to the projectile.

This yaw or instability is to a degree countered by the centrifugal force of the spinning bullet (smooth bore/non-spinning projectiles excepted). Any amount of yaw imparted on an exiting bullet is a sign of instability which likely diminishes both trajectory and accuracy. Moderators have the ability, both by design and incidence to manage the flow of propellant gasses. By trapping, directing and 'peeling' away gas from behind the projectile there is less turbulent influence on the projectile as it travels through the moderator and finally exiting into the surrounding air.

It is important to note that while the projectile is travelling through the moderator it has technically exited the barrel at the crown and begun its inevitable deceleration through the coincidental influence of both friction and gravity. Any increase in accuracy by the use of a moderator is not always readily apparent in practice, given the effect of accuracy can be slight, with the corollary result being that enhanced accuracy through the use of moderators can be masked by other variables, such as the precision of the firearm components, vagaries of ammunition quality, environmental conditions at the time of firing, and shooter ability.

Is an increase in accuracy through the use of a moderator a good thing? It depends in what context the reader views firearms in general. For some, an increase in accuracy potential through the use of a moderator, albeit marginal, is an increase in destructive potential, to be viewed pejoratively. Regardless however of the sensibilities of interested parties, any increase in the accuracy potential of a firearm is clearly no exclusive increase in its criminal potential. From a pragmatic perspective one might argue along the lines of more humane animal husbandry, while others will simply appreciate that mechanical accuracy potential is a relative concept; relative to other firearms, and relative to one's definition.

6.1.3 Reduced Recoil

In addition to the reduction in noise levels sound moderators have been found to reduce the recoil of the supersonic cartridges by up to 20% to 30% (Abraham, 2006). This would be possible due to the muzzle pressure impacting the forward internal surfaces of the moderator, which are attached to the rifle via the body of the moderator. Allsop's (N.D.)

tests established a recoil reduction of 41%. Whatever the exact amount, which would vary according to the calibre, ammunition and type of moderator, these devices act in a similar way to a muzzle brake forces are harnessed in directions other than rearward with the forward forces counteracting the rearward forces, to a degree.

This reduced recoil has the benefit of not only making more pleasant the act of shooting (and in heavy calibres less bruising) but indirectly assists in increasing accuracy by reducing both flinching and for more experienced shooters, anticipation of the recoil. Increased accuracy results in more humane hunting.

6.1.4 Reduced Stock Disturbance

Moderators facilitate animal husbandry by reducing or eliminating stress and related fright-and-flight behaviour mechanism. The situations where a group of hunted animals react by fleeing to the sound of a firearm being discharged is so universal to be axiomatic. Gregarious animals such as rabbits, goats, camels, wild-pigs¹⁸, donkeys and starlings tend to congregate together. While it would be more efficient to the hunter or farmer (and beneficial to society) that more of the gathered animals are culled often only one is potentially culled due to the rest fleeing on hearing the un-moderated rifle report. The term 'potentially' is deliberately used as the first shot on location will likely be from a 'cold-bore', shooting using an estimation of windage and elevation and with a cool barrel¹⁹. Unlike popular media portrayal the first 'cold-bore' shot is usually the least accurate of a subsequent string of shots, and for this reason is often discounted when shooting to establish the firearm's MPI and/or group²⁰ (accuracy) data. With the first shot generally

¹⁸ Wild pigs are larger hardier animals than rabbits and birds and so the calibre and ammunition would need to be chosen carefully, along with ensuring accurate shot placement to dispatch the animal humanely. The impact energy of subsonic ammunition would need to be considered and perhaps minimum calibre standards for certain species proscribed to ensure humane destruction.

¹⁹ 'Cold-bore' shots are typically in excess of 1 MOA (Minute of Angle) below the mean point of impact (MPI). The MPI being the firearms 'zero', typically established previously from a warm and fouled barrel. In a clean barrel the lesser friction exaggerates the difference even further. Unless the shooter is manifestly aware of the precise nuances of their firearm their first shot will be likely lower than their intended impact point.

²⁰ A 'group' is a string of three or more shots (up to ten for precision bench-rest rifles) fired at the same point of aim. The shape and size of a group gives information about the MPI (for sight adjusting) and the accuracy of the system: The system being the gun, the ammunition, the shooters ability, and the conditions at the time.

being the least accurate, the shooter has a reduced chance of hitting the target on the first shot. In a culling situation this first shot potential 'miss', may be the only chance available to cull whatever animals are in the shooters vista. The fall-of-shot is often visible, enabling quick adjustment for the second and subsequent shots if the first misses. If the target has been spooked by the report of an un-moderated firearm this second shot is often foregone as the rabbits disappear down the holes, the foxes run and the birds fly away. With moderated firearms in the right condition, the animals are more likely to remain in place, enabling any cold-bore misses to be rectified by subsequent shots.

Notwithstanding cold-bore accuracy a moderated firearm can not only be used to cull more in a grouped animal situation but allows for second (and subsequent) shot adjustment in situations where the animals remain in the vicinity, and if un-'spooked' will remain reasonably still - bearing in mind static targets lend themselves to greater accuracy than moving targets.

In situations where stock are required to be culled, any reduction in the level of stress experienced by those about to be culled is without doubt a more humane act. The blast of an un-moderated firearm is not a pleasant or calming sound to an animal, especially one who identifies that death is associated with such a noise. Any effort we can go to as a society to reduce the level of stress experienced by animals in our husbandry is consistent with our cultural values. Ergo, any vacillation in the implementation of a device that more humanely dispatches animals is a cost in cultural reputation that is borne by society, and reflects poorly on Australia internationally²¹.

6.1.5 Reduced Noise Pollution

Moderators are designed to reduce the muzzle report of a rifle. This muzzle report and subsequent ballistic crack of a supersonic projectile is not a pleasant sound to those who live and work nearby. While sound in general can be filtered by the human perceptual

²¹ Concern over stress caused by mandated culling is an Australian cultural tenet. Moderated firearms facilitate humane culling.

system (Solomon, 2010) there a number of factors that confound the human ability to 'adapt' or 'habituate';

1. *Intensity*; the greater the intensity of a stimulus (rifle shot) the less able we are able to ignore it.
2. *Duration*; shorter stimuli are less able to be adapted than longer stimuli.
3. *Discrimination*; simple stimuli lend themselves to adaptation due to the lack of cognitive effort required to process the sound.
4. *Exposure*; repeated exposure to the same (already processed) stimuli is more readily adapted than unique stimuli.
5. *Relevance*; stimuli that are relevant are harder to adapt to than otherwise.

In this case the sound of the rifle shot is the stimulus and over a period of time such as an afternoon's shooting at a nearby gazetted rifle range would constitute the stimuli. Nearby residents notice rifle shooting as an intense, sharp sound and while no empirical evidence was located as to attitudes toward rifle fire, it would be reasonable to assume residents would prefer peace and quiet to rifle fire. Noise abatement laws are related evidence of this. While residents nearby a rifle range or hunting area may to a degree be able to adapt to the sound of firing, it would be preferable if a mechanism was available to mitigate this experience. To illustrate this, the principal author can recount a time when in the Swiss town of Interlaken staying at a hotel next to a rifle range (Landhotel Golf). At the time firing was proceeding, and it took until the afternoon and a walk by the shooting club before it became evident that the dull thumping noise was actually gunfire, the result of careful architectural material and consideration, designed specifically to muffle the report of firearms. It may also have been the coincidental use of sound moderators, although this was never confirmed. The situation in Australia with more (open) space with less people per square kilometre than Switzerland, is the luxury of having reasonable buffer zones around hunting and shooting areas. Still, as our population increases and urbanisation encroaches on nearby hunting and shooting areas it increases the relative utility of moderators in their ability to reduce sound pollution caused by firearm discharge.

6.1.6 Increased Safety through Enhanced Communication

One of the reasons the Australian military (e.g. Special Forces²²) use sound moderated firearms in contemporary combat is to facilitate voice communications in a noisy environment. By the same token during hunting and civilian range practice verbal information is passed between shooters and those in the vicinity. It may be a line of shooters on a rifle range, a group of hunters in the same vicinity, or shooters on the back of a vehicle. Voice communication facilitates safety among other things, a critical commodity when firearms are involved. Commands and information are more readily heard among the din of multiple shots. Moderators in many instances also negate the need to wear hearing protection²³, which then allows for voice and related sounds to be heard. In summary, one important collateral effect of using firearm moderators is enhanced safety.

6.1.7 Increased Safety through Firearm Length

Whether using over-barrel or end-barrel moderators the length of the firearm will be longer than without a moderator. The longer the firearm, the more inclined it is to impact with objects that surround it as it is being moved around. This dictates a greater degree of awareness and concern by the user. Also the longer a firearm, the more obvious it is to people near it, including the obviousness of where the barrel is pointing. A longer firearm is less able to be swung in dangerous proximity to others and one only needs to consider this in comparison to a handgun to appreciate the potential. A rifle with a fitted moderator contributes to a safer shooting environment.

6.1.8 Increased Humane Animal Husbandry through Enhanced Accuracy

The corollary effect of slightly enhanced accuracy using moderators (including, as mentioned earlier, increased accuracy from reduced recoil) is more humane animal husbandry. While albeit slight, any amount of accuracy enhancement will translate into

²² This knowledge derived from discussions with Australian SAF members.

²³ With the exception of electronic ear-muffs; using in-built microphones designed to capture ambient sounds. Electronics then analyse the information and process the sound before reproducing it to the ear via a speaker. If the sound exceeds a programmed decibel level the speaker cuts-out.

more accurate shots. The difference between instantaneous incapacitation through head-shots and wounding (or missing) in small animal targets can be distressing to both the animal and the shooter. If moderators have the potential to improve accuracy over and above noise reduction then this must be acknowledged as a community advantage.

6.2 Disadvantages

6.2.1 *Centre of Gravity Shift*

A firearm is a weight that needs to be carried; often for an extended period of time and perhaps for some kilometres if on foot in a hunting scenario. Adding a sound moderator will not only add to the overall weight of the firearm but also shift the centre of gravity or balance-point away from the body, which in turn manifests as unwanted moment of force. This will be especially obvious when holding the rifle unsupported in preparation for a shot. Typically firearms are designed with consideration as to weight and associated centre of gravity or balance-point. In some instances a heavy rifle is preferred while in others it is the opposite, however in most hunting and unsupported shooting instances shooters will prefer the lightest possible firearm that can reasonably perform the intended task with the centre-of-gravity as close as possible to the support; be it a person, or a person using a rest. When spotlighting from a vehicle weight is less of a consideration however occasionally shots will need to be taken unsupported and the weight of the rifle maneuvered in and about the vehicle.

In target shooting weight can be used to highlight usage; with the distinction between unsupported and supported disciplines. In the discipline of 'Target Rifle' (NRAA; National Rifle Association of Australia) there is a rule expectation (Standard Shooting Rules, 2010) that non-invalid participants lie prone, unsupported while shooting targets out to 1,000yards (931metres). For a projectile to travel this distance requires a barrel length of 30-31 inches²⁴, which is internationally accepted as the most efficient length for the opposing forces of barrel friction and gas pressure. Barrel manufacturers provide the lightest possible target barrel with lengths of around 31-32 inches²⁵. The longer the barrel the heavier it will be and the further forward the centre-of-gravity will be. Not only is a target rifle a relatively long barrelled rifle, but it also tends to be heavy. Heavy barrels are a

²⁴ Australian gunsmiths while versed in Metric typically follow US Imperial measurements for barrel and breech dimensions.

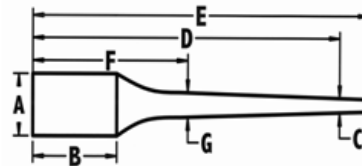
²⁵ This allows an inch or so at the end of a barrel for gunsmiths to cut and discard in the crowning process.

result of being thick, with thick barrels being stiffer than thinner barrels, and therefore more accurate. That's not to say that thin barrels are not 'accurate' as it depends on an accepted definition of accuracy, and also the vagaries of the metallurgy and manufacture quality. The definition of accuracy varies depending on the type of shooting. Regardless, in competitive rifle shooting it is safe to say that accuracy expectations are higher than in hunting or animal husbandry, and so rifle design tolerances are more carefully considered in competitive rifle shooting.

Regardless of the type of rifle weight and centre of gravity are important considerations. For target shooting ranges typically dictate the heaviest barrel that a person can readily tolerate. This is due to the sheer volume of metal aiding both accuracy and with length, range potential. In hunting and animal husbandry the lightest and shortest barrel tends to be preferred, providing the combination allows the shooter to achieve satisfactory results to their standard of competence and expectation.

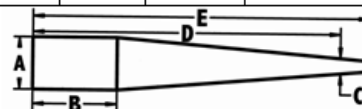
The typical range and weights of barrels are shown in the table below, offered by the US barrel manufacturer, Kreiger (N.D.);

Sporter Barrel Contours^{1 & 4}



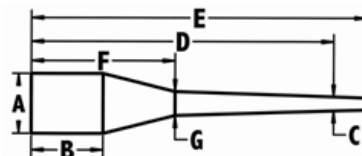
	A ³	B	C	D	E	F	G	Est. Weight
#0 Featherweight	1.250	1.250	.560	22	27	6	.760	2.0#
#1 Light Sporter	1.250	2.250	.560	24	27	6	.760	2.5#
#2 Standard Sporter	1.250	2.750	.600	24	27	6	.800	2.8#
#3 Medium Sporter	1.250	2.750	.630	24	27	6	.830	3.0#
#4 Heavy Sporter	1.250	2.750	.670	26	27	6	.870	3.5#
#5 Bull Sporter	1.250	2.750	.700	26	27	6	.900	4.0#
#6 Heavy Bull Sporter	1.250	2.750	.750	26	27	6	1.000	4.5#
Rem Varmint	1.250	2.200	.830	26	27	4.700	.960	4.5#

Varmint and Match Contours¹



	A ³	B	C	D	E	Est. Weight
#7 Light Target	1.200	2.750	.750	26	27	5.5#
#8 Standard Target	1.200	2.750	.820	26	27	6.0#
#9 Heavy Target	1.250	2.750	.875	26	27	6.5#
#10 MTU	1.250	2.750	.930	26	27	7.0#
#11 Straight Blank	CM 1.300/SS 1.250	--	CM 1.300/SS 1.250	28	29	10.0#
#12 SS Oversize OD	1.450	--	1.450	28	29	13.0#
#12 CM Oversize OD	2.000	--	2.000	28	29	23.0#
#13 50BMG	2.000	--	2.000	36	37	32.0#
#17 Heavy Varmint	1.250	5.000	.900	28	29	7.0#
#18 Light Varmint	1.200	5.000	.875	28	29	6.5#
#19 Hunter	1.250	4.000	.750	26	27	6.0#
#20 Benchrest Short	1.200	4.500	.900	23	24	5.2#

Palma Contours^{1 & 2}



	A ³	B	C	D	E	F	G	Est. Weight
#14 Heavy Palma	1.250	2.500	.900	30	31	5	1.000	6.5#
#15 Standard Palma	1.250	2.500	.820	30	31	5	0.920	5.5#
#16 Light Palma	1.250	2.500	.750	30	31	5	0.900	4.5#

Figure 13. Typical Barrel Contours (kreigerbarrels.com)

These barrels are available in Australia and mimic similar profiles available in Australia from popular barrel manufacturers such as Maddco and MAB (Australian), Tru-Flyte (New Zealand), Archer (UK), Bartlein, Lilja and Lawton (US). Firearm manufacturers tend to make and use their own barrels, again using similar terminology and profiles such as 'Sporter' for hunting rifles.

The implication for users entitled, or mandated to use moderators is that the firearm will weigh more than it otherwise would. Notwithstanding this, the firearm's centre-of gravity will be moved further forward when the moderator is attached to the end of the barrel. Both changes are likely to be resented by the shooter. Exceptions are where the shooter is likely to be in a position to support the firearm when shooting. In hunting, barrel weight is less of an issue when a person can support the firearm against a tree, fence, vehicle, or when using a shooting stick, bipod or monopod. Failing this a shooter will shoot unsupported in popular stances; standing, kneeling, lying and sitting. In target shooting the more accurate shots are taken when shooting supported; using a rifle rest, sandbag or to a lesser extent a sling. Another exception where the added weight of a moderator is unlikely to be resented is where the moderator is an insignificant weight relative to the host rifle; situations such as in the use the smallest cartridges (e.g. .22RF), or using specialist moderators such as low volume bodies or made from light-weight materials such as titanium or carbon fibre. Availability and usage of titanium and carbon fibre moderators would depend on cost and availability with the expectation that fewer shooters would adopt the higher priced specialised moderators.



Figure 14. Carbon Fibre Moderator for a .308

The example above show a 'Lion' brand carbon fibre moderator sold by Shooters Depot in the USA. Priced at \$1,200USD. Note the serial number on the side, to facilitate taxing and control by the BATF.



Figure 15. Titanium Moderator for .223/5.56mm

The example above is a 'HushPower' brand sold in New Zealand. Priced at \$800NZD for uncoated, and \$850 for black. No serialisation is required in New Zealand.

One likely related phenomenon of de-criminalising the use of moderators would be 'realisation resentment' by those shooters who have not considered the weight and centre of gravity changes that will necessarily occur. Given the novelty factor of moderators in a country that has previously banned/criminalised them, it is likely that if made available there will be a number of shooting aficionados acquiring with experiential expectations in mind. This will likely occur without these users having considered the disadvantages of weight change. One can imagine a situation where moderator usage would quickly wane in situations where the firearms' weight profile is changed to the resentment of the user. The 'forbidden fruit tastes sweeter' motive of using a previously banned moderator is likely to quickly wane, replaced with the harsh reality of weight/accuracy imperatives. One can also imagine a scenario where resentment is enhanced in a situation where moderators are not simply de-criminalised but mandated by range rules, or local laws. A possible scenario is where hunters in a particular area, or target shooters at a particular rifle range are mandated to use moderators to reduce noise pollution to the environs. Related here is the current concern in Western Australia pertaining to the administration of noise abatement. Currently (May 2011) there is an intention by the Department of Environment to transfer control of noise abatement to local government including the expectation that shooting bodies/ranges submit noise abatement plans. The fear from the WA shooting fraternity is twofold; that under new governance the Environment Protection (Noise) Regulations will be enforced to onerous levels and secondly, that some local councils may use the regulations to remove shooters from an area. A copy of the Western Australian Rifle

Association submission is attached in Appendix 1²⁶. While this is not the case in NSW it is an example of the growing Australian community concern about the deleterious effects of firearm noise.

6.2.2 Cost

Moderators are a cost to be inevitably borne by the shooter. Current costs based on overseas prices can exceed the price of the firearm. New Zealand prices range from \$50NZD to \$900NZD. The cheaper 'budget' moderators are usually reserved for the lowest calibres such as .17 Magnum, .17HMR, .22 Short, .22LR and .22 Magnum. The more expensive moderators, including titanium models, are usually reserved for the largest calibres such as .338LM or for high-precision target cartridges (.223 Rem upwards). Prices in the US are higher, perhaps in response to the 'attractive item' status the US places on moderators, although manufacturers²⁷ would likely justify the higher costs along the lines of superior 'research and development' and quality. US prices start at around \$300USD to over \$1,000USD, not including the Federal Tax Stamp and dealer costs.

In situations where de-criminalisation of moderators leads to local rules where moderators are mandated this is likely to lead to resentment by some shooters. Especially so for target shooters given their competition is based in international rules, with overseas shooters not being required to similarly use moderators. As for hunters, given the incremental cost to a part-time/lifestyle this is not seen as an insurmountable, nor to many overly onerous.

6.2.3 Potential for Misuse (Crime)

De-criminalising sound moderators could make more readily available these items to those intending to use them to commit crime. While on face value ease of availability implies the

²⁶ The use of sound moderators as one possible solution is mentioned in the WARA 'Letter of concern', however note it is immediately discounted, "We would expect strong opposition from the WA Police in terms of this proposal." The belief of the WA shooting fraternity is that notwithstanding moderators are banned items in WA, but that the police would oppose any change.

²⁷ Reputable manufacturers include (in alphabetical order) Advanced Armaments Corporation, AWC Systems Technology, Bowers, Elite Iron, Gemtech, KAS/Knight's Armament's, Liberty Suppressors, OPS Inc, SRT Arms, Silencerco, Surefire, SWR, Tactical Innovations Inc, Thunder Beast Arms and YHM/Yankee Hills Machine.

only hurdle to their potential use in crime the minutiae of technical imperative makes this a more difficult task. Criminals would need a threaded barrel to fit the moderator and this is something not readily available over-the-counter from the factory²⁸. Firstly the criminal would need to obtain a suitable firearm, which is something already heavily regulated in Australia. If the firearm²⁹ barrel is not threaded this would require attendance at a registered gunsmith, with all the exposure to inevitable questioning that would entail. If not a gunsmith the criminal would need to source a machinist adept with the appropriate tooling and skillset, and willing to commit the offence of machining a firearm without a licence. Machining of barrels requires a lathe with a spindle bore of at least the diameter of the barrel, which in turn discounts 'hobby' lathes. The likelihood that a criminal would spend in the order of \$2,000AUD+³⁰ to furnish themselves with an appropriate lathe, and then obtain the skillset to cut a thread with the axes of both the outside and inside of the barrel parallel to within an acceptable degree of run-out is small³¹. In all likelihood the vast majority of criminals wanting to misuse firearms to achieve criminal aims will continue to use them without sound moderation regardless of whether moderators are legally available to the public or not. Notwithstanding, those willing, motivated and informed enough are unlikely be restrained by any existing laws. One source of unrestricted information readily available to the criminal is the internet.

The two foreseeable situations where moderators may assist criminals are to assist in poaching, and for heinous indictable crime. With poaching the shooter would likely use a small calibre firearm with sound moderation to avoid detection, or with a larger calibre to confound the ability of others to locate them. As mentioned earlier, avoiding detection altogether would require the shooter to use sub-sonic ammunition, in a firearm capable of

²⁸ Moderators can only be fitted to a threaded barrel that necessarily extends beyond any slide (automatic handguns) or 'furniture'. If the firearm has a fore-sight that is affixed at the furthest point on the barrel (often the case to maximise the available sight-radius) this will also need to be removed. A removed foresight will need to be replaced if no other sighting method/mechanism is available, otherwise the effective range will be reduced to less than 20 metres. There are purpose-built suppressed firearms that come readily suppressed however in Australia this weaponry will likely be the exclusive purview of the police/military.

²⁹ Probably illegally obtained.

³⁰ Current prices (June 2011) of the cheapest lathes with spindle bores in the order of 30mm and above.

³¹ If the two axes are not parallel to an acceptable degree of run-out the moderator will be offset to the projectile path, causing instability at least, or impact with the internal components/walls of the moderator at worst.

firing such ammunition. One example would be the ubiquitous .22LR. The likely targets in this instance would be rabbits or birds given the unsuitability of this small cartridge for larger animals such as sheep, kangaroos and cattle. That is not to say a poacher intent on committing crime would not compromise common sense where target size is concerned and endeavour to dispatch the animals at close range with carefully aimed shots. Another situation of poaching is where a shooter uses a moderator to hide the source of the shot while maintaining the usual muzzle velocity of the rifle. That is to say they are using supersonic ammunition with a sound moderator to poach. Given moderators considerably lessen the sound of the shot at the muzzle the overall sound of the shot is reduced, however the supersonic crack of the projectile remains unchecked. Persons in the vicinity would become immediately aware and would then be likely aware that an unauthorized person was discharging a firearm nearby. While the precise direction of the shooter using a moderator is less immediately obvious, the chain of events where the authorities are alerted and summoned to the location would be the same as if the shooter did not use a moderator.

The second scenario of criminal misuse is to facilitate serious indictable crime. Situations that come to mind are murders/assassinations that otherwise would be more noisy without a sound moderator. As mentioned earlier, the most sound-suppressed potential is from a moderated firearm using sub-sonic ammunition. In a rifle scenario this would limit the maximum effective range to 200 metres or less due to the reduced impact energy and trajectory of projectiles travelling at below 1,000fps.

The alternative would be a person using a specialised rifle fitted with a moderator to disguise the exact location of their shot, while tolerating the supersonic crack. This could be in order to utilise the extended range and terminal ballistics of supersonic ammunition, or perhaps because they were not in a position to source subsonic ammunition or appreciate the distinction. In this situation there is little to mitigate in counter-argument other than to note the rarity of this sort of extended-range shooting and the general lack of success. It would appear most criminals who use firearms prefer to be within voice range of their victims, and it is rare for a criminal to have the skillset to shoot from a further distance. There is also the mitigation that in the unlikely scenario of a skilled criminal wanting to use

a moderator to injure a person at an extended range then one can imagine the preparatory effort of sourcing a moderator would occur regardless of whether moderators were available to the public or not. Unlike the popular media portrays, the firearm needed for this sort of crime is not a typical hunting rifle. For ranges 400 metres or less, a hunting rifle will suffice³² but again, a resourceful criminal intent on muffling the shot will likely manufacture a moderator regardless of their legal availability.

Another point of mitigation is while the use of a moderator can at the time to some degree confound the location of the firer, it can also facilitate in the subsequent police investigation. One case in point is the murder of the then Assistant Commissioner of the Australian Federal police Colin Winchester APM on 10 January 1989. David Eastman of the ACT became a Person of Interest in the investigation, was charged and subsequently convicted of the crime. In the detail of the investigation emerges the use of a moderator in an effort to disguise two shots from a .22LR Ruger 10/22 semi-automatic rifle licensed to Mr. Eastman (David Harold Eastman v The Queen, 1997). It appears Mr. Eastman committed the murder using a particular brand of ammunition, which was not found at his house during the subsequent investigation³³. What was found at his house were three moderators, with subsequent forensic testing concluding that burnt powder found in the baffles of the moderator matched the same flecks of powder in the deceased scalp. The nature of the burnt powder found in the scalp of the deceased also pointing to the use of a moderator, which apparently did not achieve the intention of the murderer as Mrs. Winchester claims to have heard the shots from inside the house. This is unsurprising given the brand of ammunition used in the murder was supersonic, and the distance between the murderer outside and Mrs Winchester inside measured by a few metres. The summary of this situation was that although Mr. Eastman professed to be innocent and made efforts to confound the investigation, he was tied to the crime scene by the sound moderator he used. While granted every case is different, in this case the use of a moderator to commit crime actually facilitated in the solving of the crime.

³² E.g. Shooting of William 'Billy' Grierson, Ora Banda WA, October 2000, a range of between 100 and 150 metres. The first shot missed and a second was required.

³³ The conclusion reached was that the defendant had purchased the brand to commit the crime and then disposed of the remaining ammunition in an effort to confound any subsequent investigation.

In summary, one disadvantage of de-criminalising moderators remains, that they can in some niche situations facilitate crime, by disguising or confounding identification of the location of an illegal shooter. This is the extent of their benefit to criminals.

6. Conclusions

To sum the benefits of sound moderation Advanced Armaments Corp (US manufacturer of moderators) offers the following passage on their website;

A silenced firearm is eminently more enjoyable to shoot than one without a silencer. Silencers generally increase the accuracy of a host firearm while reducing recoil and eliminating up to 90% of the muzzle signature. Shooters are able to concentrate more on breath control and trigger pull when they are not subjected to the fatigue and distraction of a deafening, bright, muzzle report. Beginning shooters are typically not intimidated when introduced to the shooting sports with a silenced firearm, and are able to easily hear instructions given to them by trainers as the report of a host firearm is reduced to below the OSHA guideline level for hearing damage. Silenced firearms are also less likely to disturb any people, livestock, or wildlife that may be in close proximity to where you shoot. (Advanced Armaments, N.D.)

This investigation highlights an interesting variety of differences in the way first-world countries view and manage sound moderators. The most relevant and patently obvious distinction is the comparison between the Australian and New Zealand regimes. Both countries share similar cultural values and history. Both share the same area of the globe (the 'Antipodes') and hold a strong bond forged in the ANZAC tradition³⁴. Both were colonised by the British and remain members of the Commonwealth. Both interact similarly with their regional neighbours, while valuing multiculturalism and a sense of indigenous past. Both have similar ethnic make-up. Both are primary producers with similar hunting and animal husbandry issues. Both Australia and New Zealand share similar laws, as adapted from British Common Law and the Westminster system. Yet both countries view sound moderation differently to the point of being entirely opposite on the management continuum. In Australia sound moderators are judged by the regulatory

³⁴ As evidenced by a relaxed regime of border restrictions and defence cooperation, indicative of this close relationship.

authorities to be a criminal item, and heavily restricted from public use. In New Zealand the government attaches no criminality to moderators and there are no restrictions of any kind. In New Zealand any member of the public can purchase a sound moderator from either the internet or a firearm shop with no licensing or 'paperwork' required. The attitude of one New Zealand gun shop owner summed up the collective pragmatism; "I don't know what the fuss is all about?" and, "...some farmers won't even let you shoot on their property without a suppressor"³⁵.

New Zealand holds the view that moderators are merely non-critical devices designed to lower the sound report of an otherwise noisy firearm. They hold no sentience and discount the possibility they are criminally 'contaminated' by proximity to the crime portrayed in popular fiction. In New Zealand firearm sound suppression is viewed as something that has physical, community and animal welfare benefits. Consequently the authorities have deemed there will be no restriction on moderator availability, with the same status as a muffler on a motor vehicle. Australia holds the complete opposite view, that moderators are a pejorative item worthy of criminality. The banning of which is in the public interest; specifically in order to lessen their use in facilitating crime. Mere possession of a silencer will invite charges, confiscation of firearms, official punishment and a criminal record. Given the entirely opposite regimes between Australia and New Zealand **it is clear** that both countries cannot be right in their perception of the device. The answer lies in circumspection of the history, use and misuse of firearms in Australia, including an appreciation of the status of firearms in contemporary Australian culture. A status steeped in political inexpediency, which is the hallmark of firearms treatment in Australian politics.

This in itself is a reflection of a highly governed country with convict heritage (MacCarthy, 2008, 2009, 2010). When one considers the pros and cons of moderator use, while the facts would ordinarily imply an overturning of the current criminal status of the device in Australia the cons appear to be given an arbitrary weighting that reflects the various stakeholders' influence in the decision making process.

³⁵ Recollection of a discussion with one of the staff at Gun City, firearm retailer, Christchurch, Nov 2010, referring to the unsettling of stock by un-moderated gunshots.

One only needs to consider the lack of evidence of criminal misuse in New Zealand (of a concerning amount), or of crimes facilitated by the use of moderators over the years. This coupled with New Zealand continuing to find no issue with the item and one then is entitled to beg the question of the Australian authorities who granted, have not had an imperative (until now) to re-evaluate the status of moderators, what level of crime justifies the continued denial of the benefits provided by a moderated firearm?

It is the opinion of the report-panel that when the documented advantages³⁶ of sound moderators are compared against a perceived amount of crime that criminalisation of the device purports to prevent, then it is argued that continued denial of the benefits is no longer in the public interest.

³⁶ Advantages that are becoming more relevant/important with growing urbanisation, increasing concern for animal welfare, and concern over self-harm vis-à-vis the cost to our public health system.

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Appendix 1

Western Australian Rifle Association concern objection to proposed changes noise abatement. The merits of the objection aside, this response highlights growing community concern over noise-pollution from firearms.

West Australian Rifle Association Inc

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26th April 2011

Attn John Macpherson
Principal Environmental Officer
Noise Regulation Branch
Department of Environment and Conservation
Locked Bag 104 Bentley DC WA 6983

West Australian Rifle Association Inc Submission:

Proposed Environmental Protection (Noise) Amendment Regulations 2010

The West Australian Rifle Association Inc has over 1100 members in WA and has approximately 70 approved ranges within WA. Including the other associations involved in the sport we estimate that there is between 160 shooting ranges throughout the state. The shooting venues are established and operate within the guidelines of the firearms act and generally situated well outside of defined city boundaries. They are run on a social level, generally not for profit and provide a valuable community service. It should be noted;

- Clubs throughout the state have existed for many years without issue in terms of noise complaint.
- WA Clubs have been host to many major events and will continue to do so attracting many visitors to the state.
- Competitions are usually conducted on a weekly basis (typically weekends). The events conducted vary depending on the types of firearms used.
- Members can use these venues for practice as well as load testing outside of those set competitions.

- Some clubs host mid week events which is popular with groups such as pensioners, scouts and cadets.
- It is a legal requirement for members with firearms to attend the same venue for a prescribed number of times each year to retain their licence.
- Many groups utilise the association's venues to qualify for competency, this would include; Army (Norforce), Local Council Rangers, Security firms, Police (including TRG), DEC professional shooters testing and Cadets.
- Every week, many families and an increasing number of young people and disabled members, enjoy the safe and easily accessible environment of approved shooting venues.

Our concerns

In commenting on the proposals we find one comment interesting - "shooting clubs often exceed assigned levels." We would contest this and are only aware of one complaint towards a Rifle Club in terms of noise and upon investigation by the Defense Forces there was found to be more noise from nearby traffic. It was a mischievous complaint. If the new proposals had been in effect the club would have had to pay for the investigation.

Many aspects of the proposals seem guided towards closing clubs down due to the increased financial impost now placed on clubs. Plans become mandatory and are set by local government with a new ongoing yearly fee (\$1000) which appears to be a tax for monitoring even if it's not being conducted. It has been suggested by DEC that the fee "could be up to \$1000", however Local Government subscribe to the "cost recovery" and "user pays" principle which would almost certainly mean maximum fees and monitoring costs. Any perceived deviation could attract a fine of up to \$5000 which is excessive for a club structure. Cost of processing and utilising professional services to produce a clubs NMP would we estimate to be in the range of \$20000. This is based on a previous engagement for professional sound testing services at a metropolitan range by SSAA Inc. The Chief Executive Officer (CEO) or one of his delegated officers, of a local Shire/City Council would have the authority to suspend the operation of a range without any mechanism (apart from a "social decision") for a club to have it arbitrated in a timely manner, the Club's would have no option but to seek redress through the established appeals processes which are both lengthy and convoluted. This would also significantly impact on the individual members of clubs who also have an ongoing attendance obligation under the Firearms Act and Regulations.

Vesting this much authority to the Local Government Council is an opening for abuse of process, and would allow the process to become more subjective, rather than remain reasonably objective.

Some clause specific and related comments;

Reg 5 (2) deletion." which would thereby eliminate the need for there to have been any complaint (let alone many complaints) before a NMP becomes mandatory."

This means that where venues are not guilty of disturbing anyone's peace, an NMP and its associated costs, nevertheless become mandatory. The proposals claim all shooting venues are guilty. They cannot be proven innocent and are 'fined' accordingly.

16B 10b states that an NMP “contains a description of the types of shooting meetings and practice sessions to be held at the venue and the types of firearms and ammunition to be used on each range on the shooting venue.”

This shows little understanding on how the sport operates, “practice is practice” as with all sport the more you do generally the better you get, this is usually determined by the competitor based on work and family issues. Further ammunition used by a competitor is varied with people working up their own loads for individual firearms, monitoring this is near impossible.

16B 10c “sets out the maximum number of shooting meetings and practice sessions to be held in a period specified in the approval and the times of day during which meetings and sessions may be held during that period”.

Shooting like all sports has different times for usage. Setting mandatory maximum range usage times impacts not only on a competitor’s ability to compete but ability to comply with the firearms act. Some outside of hours events also occur such as DEC testing roo shooters and club night shoots as well as peak periods for practice for major competition will be impacted.

16B 10g “contains a list of the persons who will be responsible for implementing the approved noise management plan and sets out each person’s responsibilities”.

It’s hard enough for any club to get volunteers and even more responsibility is being thrust upon those people. This would require additional staff “volunteers” and additional and ongoing costs for training further adding to the financial impost.

16B 11a “ The CEO may require the venue to have a program for the controlling the charge weights of cartridges and/or the noise certification of firearms or cartridges.”

As per the comments above (16b 10b) it shows little understanding of the sport, each individual firearm has a different load or a different ammunition component such as powder projectile primer and even the case(brass) or even specific brand with all producing different ballistic results whether it be accuracy or speed. To monitor and control loads is unworkable and in some case dangerous.

16B 11a contd “or the noise certification of firearms or cartridges”

We understand vehicles when registered receive a noise certification but we have never heard of firearms receiving the same certification. We wonder who is going to do this new level of certification. Once again it shows little understanding of the sport as a whole

Further Comment

Delegation of Authority

We see this proposal as one where DEC is seeking to divest itself of its noise monitoring role where it is subject to Governmental and Ministerial oversight and transfer those responsibilities to an already overloaded and underfunded Local Government sector.

All authority is to be delegated to the local government CEO. They are to decide upon what is suitable in the establishment of a NMP. DEC and other stakeholders have input, but no levels are mandated, only suggested. This then becomes a subjective process, entirely dependant upon an individual, or a “social decision” and not on an objective, defined, legal and measureable basis.

The local CEO is free to reject the previous "assigned levels" of noise. They are also free to change their mind from year to year based on a social decision.

No one person at any tier of government should have this over-riding power. The proposal, if accepted, would establish strong ground for abuse of process and it fails to protect a long term legitimate activity.

Noise range

The proposals seek to establish a 2km ‘noise-sensitive’ radius around a shooting venue. There is no reason or reference given for this distance. It therefore looks arbitrary yet has huge bearing on the formation of any NMP.

Costs All costs of any investigation - even to find acceptable emission/reception levels - and regulation or monitoring as per the NMP determined by the local CEO, is to be borne by the shooting venue.

While there is provision for local CEOs to waive costs, they are unlikely to be in a position to do so. A cost mandated by a regulation is still a cost and local governments will pass this cost on. Local Government is under a great deal of pressure to subscribe to the concepts of “the user pays” and “full cost recovery”. Gaining exemption from having to provide a NMP would be an extremely costly process. Applications may cost many thousands of dollars, with an annual ongoing monitoring fee even if monitoring is not done.

Enforcement

The proposals, if enacted, will become enforceable immediately at shooting venues. This is extremely harsh. A venue could be closed practically overnight, unless they have the financial ability to pay for a NMP. Hundreds of members at venues throughout the State would stand to lose their safe and legitimate recreation. Clubs stand to lose hundreds of thousands of dollars worth of infrastructure they have built up over many years of uneventful co-existence.

Complaints

If complaints are made about noise from a shooting venue, their number has to be seen in the light of the hundreds of members utilizing that venue, particularly where the range was operational before a private residence was allowed close enough for problems to be perceived. It’s been suggested by some parties that silencers (sound moderators) may be an option if a range suffers from a complaint. We would expect strong opposition from WA Police in terms of this proposal.

Sporting Facilities

It must be remembered that the facilities that have been built up over the years and are at risk from closure because of unnecessary and exorbitant costs and possible noise complaints are where thousands of people participate in their chosen recreational sport. These members are involved in their local sport, or in national and international competition, and are generally assisted and supported in this by the WA Dept of Sport and Recreation.

In summary, the proposals are unacceptable. Their premise offers insufficient grounds for action. The noise levels at our shooting venues have not proven to be a problem.

Philip Metcalf
Chairman
West Australian Rifle Association Inc
0429806101

Project Researchers

Dr Martin MacCarthy (PhD, MMgt, BBus) was the Chief Investigator on this project.

Dr MacCarthy is currently a lecturer and researcher at Edith Cowan University. He has been employed at the university for 16 years and teaches in the area of marketing and qualitative research methods.

Dr MacCarthy's experience with firearms originates from his service in the Australian Army. Initially an Officer in the 11/28IRC, Dr MacCarthy relinquished his Commission to serve for a period of years in the Special Air Service Regiment. Given operational service in both 3 and 1 Squadron (Counter Terrorism) Dr MacCarthy is intimately familiar with the use of sound suppressed firearms, including suppressor-related issues (and limitations) such as ammunition performance and ballistics.

As an academic Dr MacCarthy has published extensively on firearm usage in Australia. His PhD is entitled, 'Shooters; Culture and Consumption in Western Australian Gun Clubs.' He continues to research and publish in the area.

Dr MacCarthy maintains active club membership with two local firearm clubs. He is a member of the Swanbourne Services Shooters Club which is the SAS Regiment's handgun club, open to current and ex-serving members of the SASR. Through this activity he maintains links with his past, including familiarity with current SF weaponry (including moderators), and cross-pollination of skill-sets. He is also a member of the Perth/Fremantle Rifle Club. This club is affiliated with the Australian National Rifle Association, shooting the disciplines of F Class scoped long-range supported, and Target Rifle iron-sight long-range unsupported. Several times a year Dr MacCarthy also assists farmers in stock protection/animal husbandry, participating in spotlighting activities, and occasionally hunting. Dr MacCarthy hand-loads his own ammunition (ballistic familiarity) and has maintained a firearms licence since 1978.

Dr Helen Cripps (Senior Researcher)

Dr Cripps is the 'preferred supplier' for local government consultancy for this project at ACU, due to a number of successful consultancy completions. These include; research in to health services in remote Western Australia, an extensive survey of the WA Marine Industry, and currently completing an economic and social impact study into a major marine and tourism facility in Perth.

Dr Cripps PhD focused on the Defence cluster around WA's Garden Island Naval Base, a major base located south of Perth. During the research Dr Cripps consulted with a diverse range of military personnel. Dr Cripps is a seasoned researcher, familiar with consultancy project requirements and supervision of Research Assistants.

She currently lectures in the School of Marketing Tourism and Leisure at Edith Cowan University in innovation and commercialisation and prior to entering academia Helen was a practitioner in government economic policy, community development, relationship building and marketing.

Professor Martin O'Neill PhD, MSc, BA (Hons) PGC (Senior Researcher)

Professor O'Neill is currently based in Auburn University, Alabama, USA. His role in this project was to investigate the usage of civilian access to moderators in the United States. Dr O'Neill is familiar with civilian access via the Tax Stamp Class III system. He is also a shooter; participating in local recreational shooting and hunting activities, along with maintaining a firearms licence and owning associated firearms.

Dr O'Neill has published in the area of firearms; jointly researching, writing and presenting papers with Dr MacCarthy. Dr Martin O'Neill is the Endowed Bruno Professor and Head of the Department of Nutrition, Dietetics and Hospitality Management at Auburn University in the United States of America. Dr. O'Neill is an Australian Citizen, a registered gun owner, active hunter and recreational sports shooter.

Prior to joining Auburn University Dr. O'Neill was employed with the School of Marketing and Tourism at Edith Cowan University in Perth, Western Australia and the School of Hospitality and Tourism at the University of Ulster in Northern Ireland. He holds a BA (Hons) degree in Hotel and Tourism Management, an MSc in Hotel and Catering Management and a PhD in Hospitality and Tourism Management from the University of Ulster, Northern Ireland.

His primary research thrust relates to the concept of Continuous Quality Improvement (CQI) and its application within the broad services field encompassing both public and private sector organizations in the tourism, hospitality and restaurant management fields. His research niche is in the area of disconfirmation modeling as a tool for garnering customer feedback and continual system improvement. During his time in the United States he has been engaged in and successfully completed a variety of research and consultancy projects with the United States Department of the Army and the Department of Alabama State Parks.