2018 GAME REPORT

Nelson Marlborough Fish & Game

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SUMMARY OF THE SEASON

Nau mai, welcome to the 2018 Game Report for the Nelson Marlborough Fish & Game region.

After two years of the duck population building, there is little confidence that the greylard population will continue on this trajectory owing to the very dry Spring experienced, particularly in the Tasman. After a wet winter the taps tuned off at a key time for the ducks, with available ephemeral water at a minimum, and a noticeable reduction in the number of broods observed. Marlborough fared somewhat better, with a normal amount of seasonal rainfall and from what it appears to be decent conditions for breeding.

Considerable efforts continue on Nelson Marlborough's signature legacy project, Para Wetland. The wetland is developing very well, and it has been gratifying to see the hard work is not only providing a wetland that is performing great ecological functions and is aesthetically pleasing, but one that is translating to a some productive waterfowl breeding and hunting also.

Opening Weekend came and went in true top of the south style, with blue skies and light winds. Despite the conditions, some hunters prospered in locales such as Para Wetland, while others on public land in Tasman had a quiet time of things. Ranger teams out on the day were pleased with the high level of compliance shown with just one minor detection.

HIGHLIGHTS

Without doubt the highlight of the season was the culinary extravaganza put on by Fish & Game and chef extraordinaire Phil Hazeldine at Club Waimea at the close of the regular season. Phil put on a stunning twelve course wild gamebird meal, made up from a wide range of offerings from a number of hunters, with nothing but rave reviews from the 80 strong crowd that attended.

The organised pheasant hunt at Moturoa Rabbit Island continues to build nicely, and staff feel very positive about the future of this hunt, which will be a key focus for next season's participation efforts. As more and more available pheasant hunting area gets lost each year to residential and recreational development, this organised hunt provides the region's pheasant hunters with additional, and in many cases, the only, opportunity to experience pheasant hunting.

LOOKING AHEAD

Staff will continue to facilitate organised hunts on behalf of Nelson Marlborough licence holders, with three pheasant hunts as well as the annual pukeko hunt at Wakapuaka on the cards.

There is also collaboration with D.O.C and Nelson Pine Ltd to develop another wetland at Eves Valley. And while there is still some water to go under the bridge here, the end result should hopefully see another balloted hunting opportunity that is reasonably close to Nelson.

Finally, we await with great interest the results from some important duck DNA research which this region has been involved with, which aims to answer the question: is the New Zealand grey duck genetically extinct?

You can read more about this and what Nelson Marlborough Fish & Game has been up to in the following pages.

GAMEBIRD MONITORING

MALLARD MONITORING

Mallard (greylard) monitoring was carried out on March 27 across Marlborough, Nelson/Tasman, and Golden Bay. In Marlborough there was a total increase in the greylard population by 11.8% (29 sites) – see table below. Nelson/Tasman followed suit though to a lesser degree with a 7.1% increase, however both of these increases fall within the margin of error expected with this kind of monitoring and therefore should not be interpreted as a definite increase, until we have a few more years of data showing this trajectory continuing.

Location: Marlborough	2016	2017	2018	
Havelock Estuary 1	44	60	22	↓
Havelock Estuary 2 Kaikumera	33	39	9	↓
Havelock Estuary 3 Km road	5	2	19	↑
Havelock Estuary 4 Kaituna arm	25	26	56	↑
Mahikipawa Wheadon Ck	17	95	7	↓
Mahikipawa Taylors Ck	38	20	41	↑
Head of Mahikipawa	28	0	28	↑
Okiwa Bay	0	0	34	↑
Ngakuta Bay	0	9	9	NC
Para Swamp honey pot	5	1	0	↓
Para Swamp Dbl Mgt	17	1	12	↑
Bush Rd Pond Tuamarina	18	0	3	↑
Yealands pond	0	43	0	↓
Opawa River campground	17	38	54	↑
Waihopai Cemetary Pon	24	26	5	↓
PPCS pond	30	110	33	↓
Old Pond	100	110	144	↑
New Nth Bubbler	20	0	0	NC
New Sth Bubbler	20	0	23	↑
Nth Pond 2b	320	330	249	↓
Middle Pond 2C	210	230	490	↑
Sth Overflow/natural ponds	50	0	0	NC
Taylor DS SH1	26	12	71	↑
Springlands retirement village	76	57	91	↑
Bothams Bend	21	15	0	↓
Grovetown Lagoon (Wharf Rd)	110	172	220	↑
Grovetown Lagoon (Cemetary	85	13	38	↑
Pollard Park	140	130	128	↓
Wairau Diversion	31	80	25	↓
Total	**1510**	**1619**	**1811**	11.80% ^

NELSON/TASMAN/GOLDEN BAY	2015	2016	2017	2018	
Kainui Dam	59	45	0	37	↑
Wakapuaka Oxidation	549	411	441	455	↑
Thorpe Street	27	36	74	42	↓
Staples St /Kumera's Est	85	33	58	37	↓
Motueka Oxidation Ponds	91	136	81	134	↑
Bells Is. Oxidation Ponds	126	113	138	256	↑
Lodders Lane	33	52	20	14	↓
Puketawhai	39	22	82	6	↓
Takaka Oxidation Ponds	57	21	68	34	↓
Motupipi Estuary (Nees R)	79	35	19	48	↑
Waitapu Estuary (Wharf Rd)	9	30	46	13	↓
Waitapu Est (Rangihaeata Head)	91	97	42	179	↑
Parapara Inlet	59	9	66	45	↓
Collingwood Estuary	45	15	53	69	↑
Gorge Creek	0	0	35	46	↑
Pakawau Inlet	4	14	13	17	↑
Lake Killarney		45	44	21	↓
Old Wharf Rd Motueka		71	90	124	↑
Eastons Pond		26	81	44	↓
Marriages Rd		22	15	50	↑
Aranui Rd Mapua		30	25	18	↓
Rabbit Island TicToc		16	40	83	↑
Washbourne Gardens Richmond		52	66	41	↓
Daelyn Pond		50	0	46	↑
Nelson Airport estuary		20	24	24	NC
Saxton Field		20	60	33	↓
Templemore Pond		44	75	72	↓
Founders Park		34	30	28	↓
Queens Gardens		90	110	115	↑
Pearl Creek				42	
Dredge Pond				59	
Awa Awa Road				6	
Total (dotted border only)		**1589**	**1896**	**2131**	7.10% ^

Over the past three years, total greylards counted at 58 sites has risen by nearly 1000 birds – see table below. This was due to favourable breeding conditions during Spring of 2016 and potentially partly as a result of lowering the daily bag limit to 8 birds/day. In 2017 the taps turned off in November and December making for a dry end to the year, though it is of staff belief that many ducklings would have fledged in time for the dry spell which again contributed to a modest increase in our greylard counts, mirrored also by hunter harvest results, indicating our monitoring system may actually work.

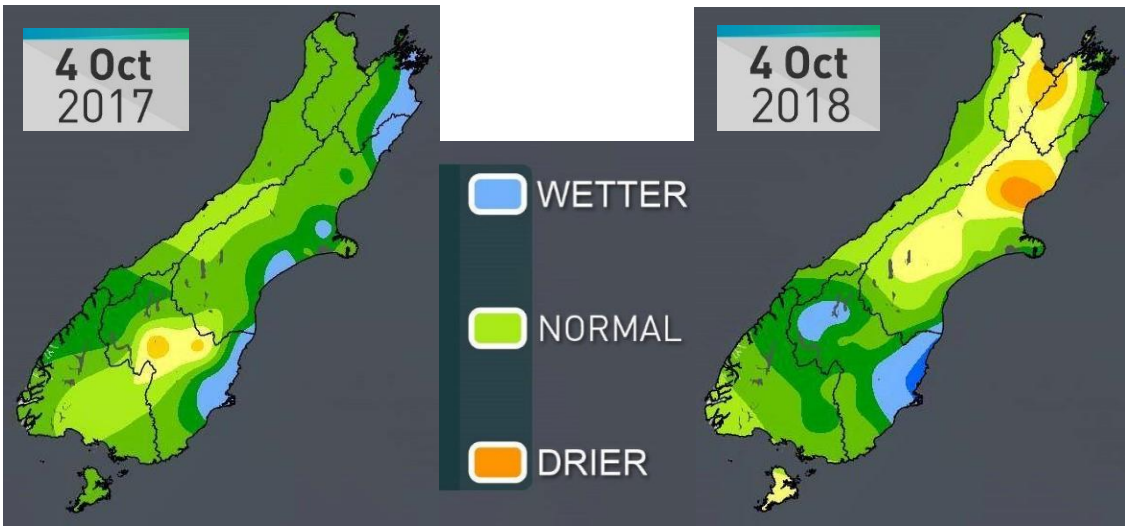
Total greylards Nelson/Marlborough 2015-2018

	2015	2016	2017	2018
Nel/Tas	1353	1589	1896	2238
Marl		1510	1619	1811
TOTAL		**3099**	**3515**	**4049**

MALLARD SPRING BREEDING CONDITIONS

While the trends from our mallard monitoring and our game harvest statistics are positive, staff are concerned about the recent low rainfall Spring and the effect this will have had on mallard numbers for next year. This pertains especially to the Tasman region, which has seen very low levels of rainfall, and a corresponding lack of soil moisture and surface water which is important in successful mallard breeding – see NIWA Soil Moisture Anomaly maps below. As seen on the map, much of Marlborough has fared much better, with a fairly normal amount of Spring rainfall. Consequently, staff have observed few broods in the Tasman area while anecdotal reports from Marlborough are more positive.

NIWA SOIL MOISTURE ANOMALY

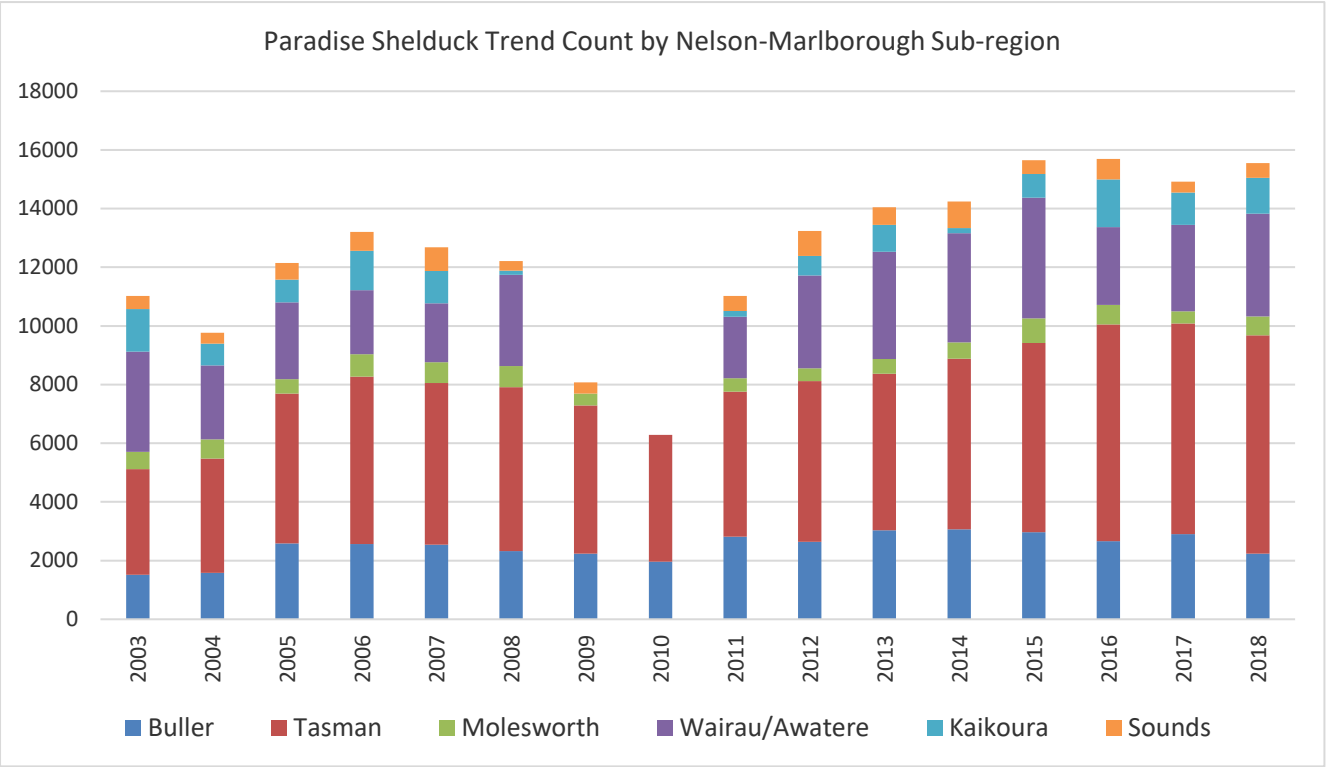


PARADISE SHELDUCK

Trend counts for paradise shelduck were carried out on 25/26 January (Marlborough) and 29/30 January (Tasman/Golden Bay). As it can be seen from the table and graph below, overall numbers are up on the 2017 count by approximately 650 birds, with increases shown in all sub-regions with the exception of Buller.

PARADISE SHELDUCK TREND COUNTS

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Buller	1516	1577	2588	2568	2546	2320	2236	1959	2813	2639	3030	3061	2963	2657	2900	2235
Tasman	3603	3898	5100	5709	5509	5588	5052	4329	4947	5476	5343	5826	6457	7398	7187	7447
Moleswo rth	590	653	494	755	707	724	405	0	458	440	503	554	840	660	410	640
Wairau/Aw atere	3411	2525	2624	2188	2012	3111	Not counted		2092	3168	3652	3718	4114	2658	2950	3510
Kaikoura	1450	740	775	1340	1102	140	Not counted		199	666	920	180	810	1625	1096	1220
Sounds	450	372	565	650	805	330	385	n/c	516	845	600	900	460	700	370	500
Total	**11020**	**9765**	**12146**	**13210**	**12681**	**12213**	**8078**	**6288**	**11025**	**13234**	**14048**	**14239**	**15644**	**15698**	**14913**	**15552**



Paradise shelduck counts 2003-2018 (note Marlborough was not counted in 2010)

Typically, this small increase in shelduck has corresponded to an increase in shelduck harvest, as shown in the game harvest data.

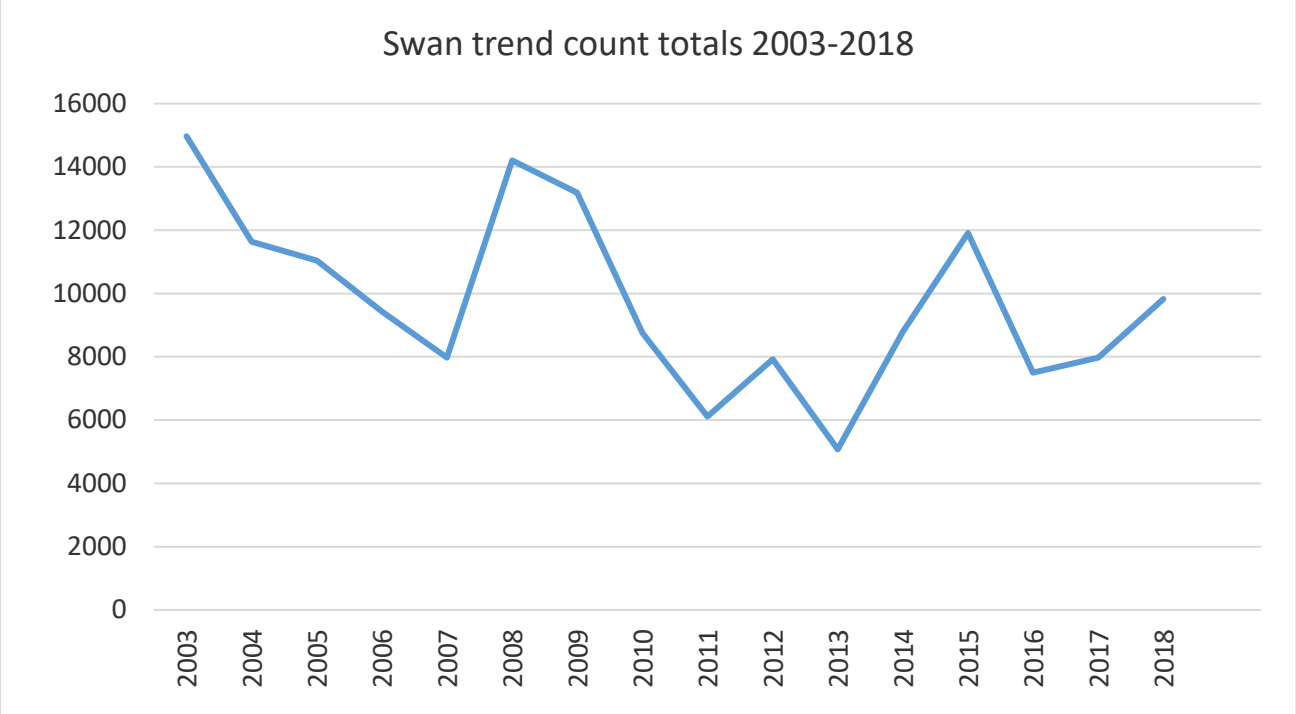
SWAN

Swan trend counts are carried out simultaneously with shelduck, with the most favourable area being in Western Golden Bay, within the inner coastal area of Farewell Spit. This year the overall population was approximately 900 birds higher than in 2017, with the notable rise coming from Farewell Spit with a ~1300 bird increase. It is, however, quite normal for swan populations to fluctuate significantly, owing to their trading habits, specifically the Farewell Spit birds migrating to Wairau Lagoons and Wairarapa, and Westhaven/Whanganui Inlet birds to Okarito on the West Coast.

SWAN TREND COUNTS

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Farewell	13860	10321	9100	7000	5258	10691	9274	6638	4277	4707	4871	7043	10283	6403	7142	8498
Westhaven	455	645	623	572	700	710	199	925	727	464	193	474	525	525	332	260
Marlborough	629	646	1280	1732	1969	2761	3586	1095	1022	2741		1207	1048	489	404	974
Other	24	20	40	126	46	43	123	96	91	11	12	62	58	86	101	97
Total	**14968**	**11632**	**11043**	**9430**	**7973**	**14205**	**13182**	**8754**	**6117**	**7923**	**5076**	**8786**	**11914**	**7503**	**7979**	**9829**

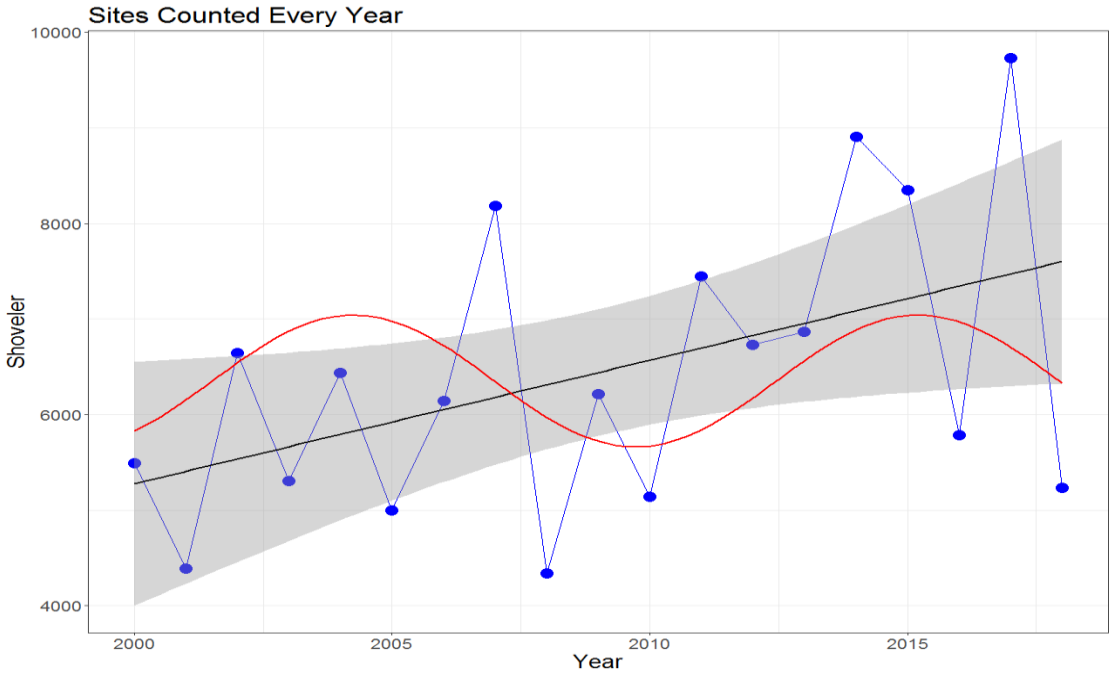
Results from the game harvest survey indicate that 203 swan were harvested (SE 78). The Golden Bay population receives little hunting attention, due to lack of plight path hunting opportunity, with most of the harvest likely taking place around Blenheim/Wairau Lagoons.



Nelson Marlborough swan trend count totals (2003-2018)

SHOVELLER | KURUWHENGI

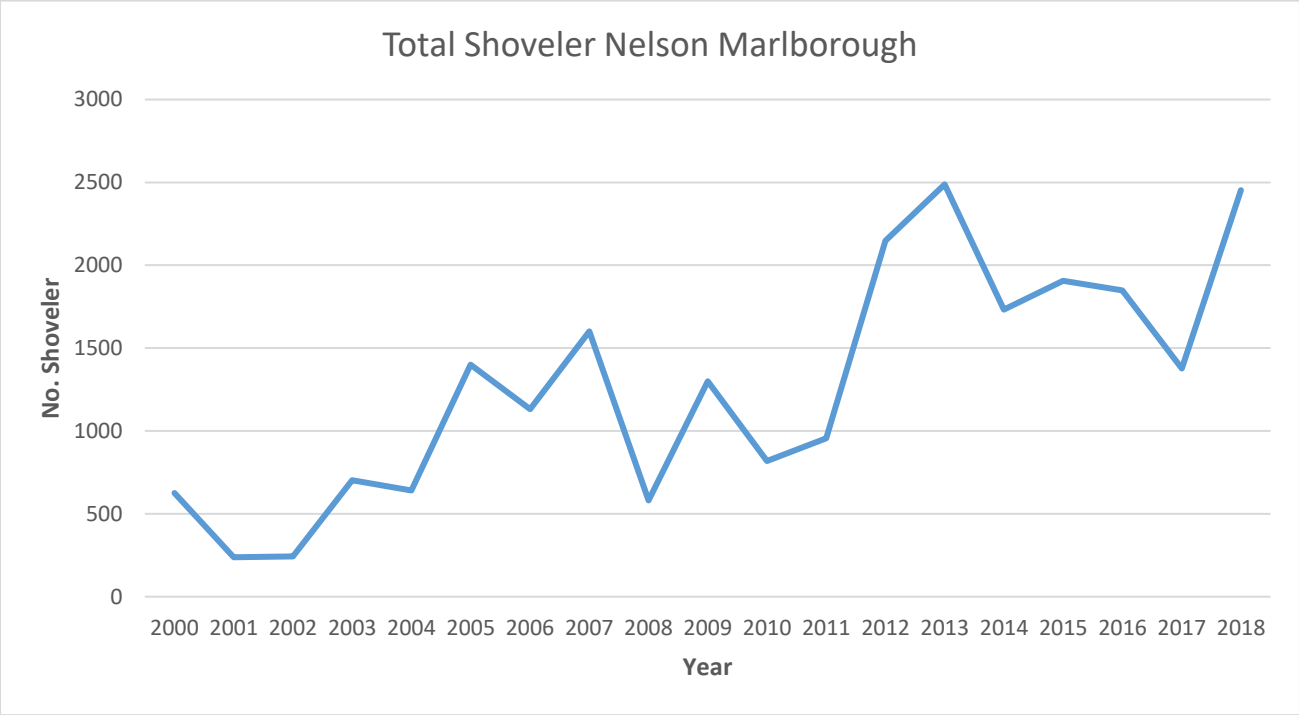
Fish & Game conducted a national count of the Australasian shoveler/kuruwhengi population on 6 August 2018. This was the 19th annual count of the species, in order to monitor change in the New Zealand population. A total of 11,201 birds were counted at 250 sites, with a male: female ratio of 1.56 – see graph below.



Total shoveler count (blue dots) of the sites that have been counted for all 19 years (n=83). The linear model (black solid line ±95% CI grey shading) received better support than the red sine model.

In Nelson Marlborough, 23 sites were counted giving a total of 2452 birds, with most of these coming from Marlborough around Waikārapi/Wairau Lagoons. Grey teal/tētē were also counted, with a lower count than the previous two years at 207 birds. As these birds are highly migratory, little inference can be made here as it is well accepted that the population is rising nationally.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Males	169	135	143	236	82	165	257	132	71	134	181	116	176
Females	111	93	112	179	69	96	183	126	47	58	143	102	63
Unknown Sex	851	1373	327	885	668	694	1707	2230	1615	1714	1525	1108	2213
Total Shoveler	**1131**	**1601**	**582**	**1300**	**819**	**955**	**2147**	**2488**	**1733**	**1906**	**1849**	**1377**	**2452**
Grey Teal	170	468	105	547	872	115	66	247	110	77	350	347	207



Total shoveler count for Nelson Marlborough (2000-2018).

Shoveler harvest is still fairly small in this region as evidenced by game harvest survey results which show that 214 ± 70 birds were harvested.

PUKEKO

No official population monitoring of pukeko takes place within this region. By taking a drive around the Tasman countryside, it is clear to see that the population flourishes here – so much so that the season length is very generous to try and alleviate some of the agricultural issues the birds cause. Crop depredation complaints is one way to monitor the population and Fish & Game have received 19 complaints this year. Game harvest statistics tell us that 1,562 ± 846 birds were harvested over the season, however this does not include the two month summer season which would see this figure rise. Staff consider our warmer winters to be the key reason why pukeko thrive here and on the West Coast.

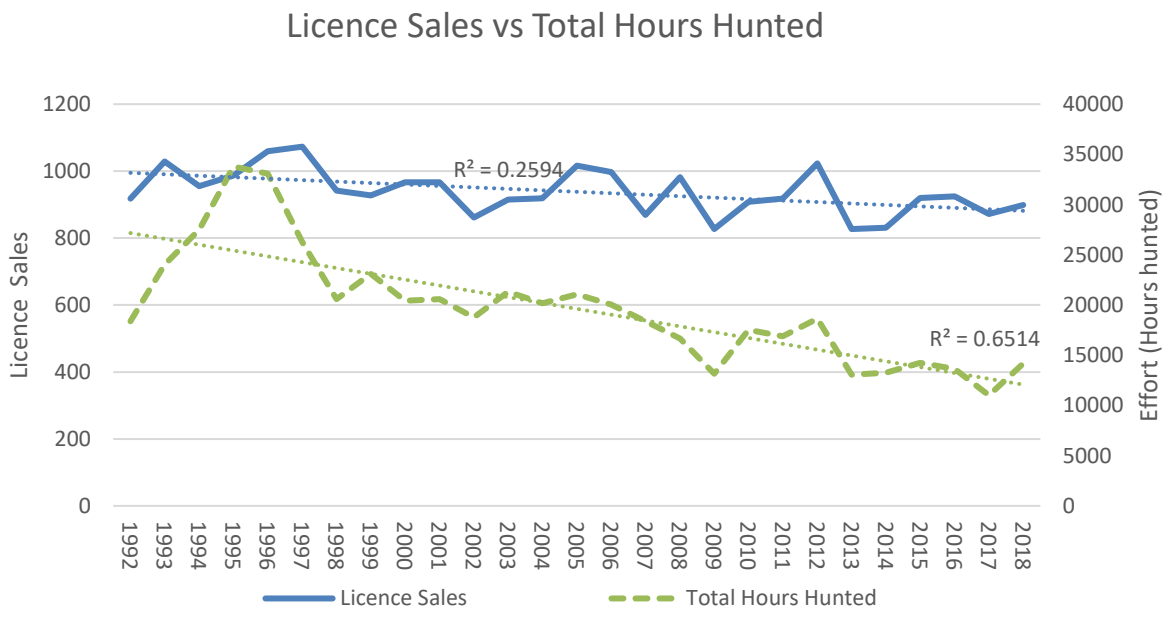
GAME HARVEST DATA

Game harvest surveys (GHS) are conducted by community groups on contract, and involves ringing 100 randomly selected hunters immediately after opening weekend, and every two weeks afterwards. Staff have concerns about the accuracy and validity of the data, which relies heavily on memory over relatively long periods. Other issues include that hunters will frequently state the birds harvested for the group they hunted with (rather than them as an individual), which adds bias to the data, and the interviewers do not have the skills to tease out accurate information from hunters. For upland game, the inaccuracy rises considerably owing to the small number of upland game hunters in the region, and the random nature of the way hunters are selected. Case in point is the total pheasant harvest for Nelson Marlborough being zero birds in 2018, which is clearly not the case. However this is the way it has been done for years now, so at least there is some consistency over time.

The inaccuracies of the GHS have led staff to establish a duck diary initiative with some of the region's most elite and consistent hunters, as a way to ground truth the data the GHS provides – see more information below in this chapter.

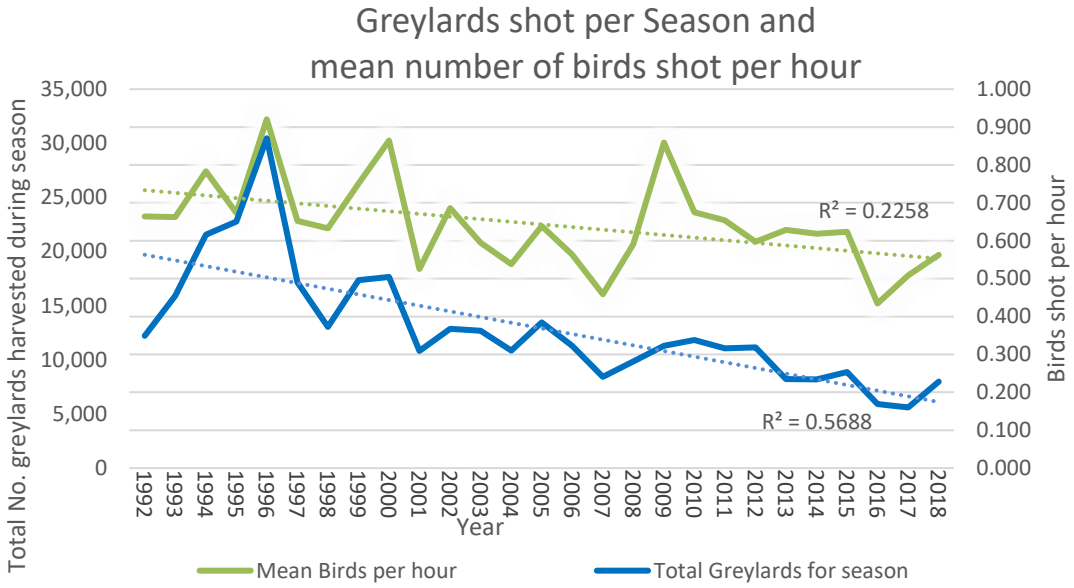
HUNTER EFFORT

Hunter effort increased this season, with a total of 14,166 ± 954 hours hunted, and an average of approximately 15.7 hours per hunter for the season, bearing in mind that there was a modest increase of 27 licence sales – see graph below. This is considerably lower than in 1996 when there were 1059 licence sales and total average effort per hunter was ~31 hours/season, meaning hunter effort has roughly halved in 20 or so years. 47% of the total effort was expended on Opening weekend.

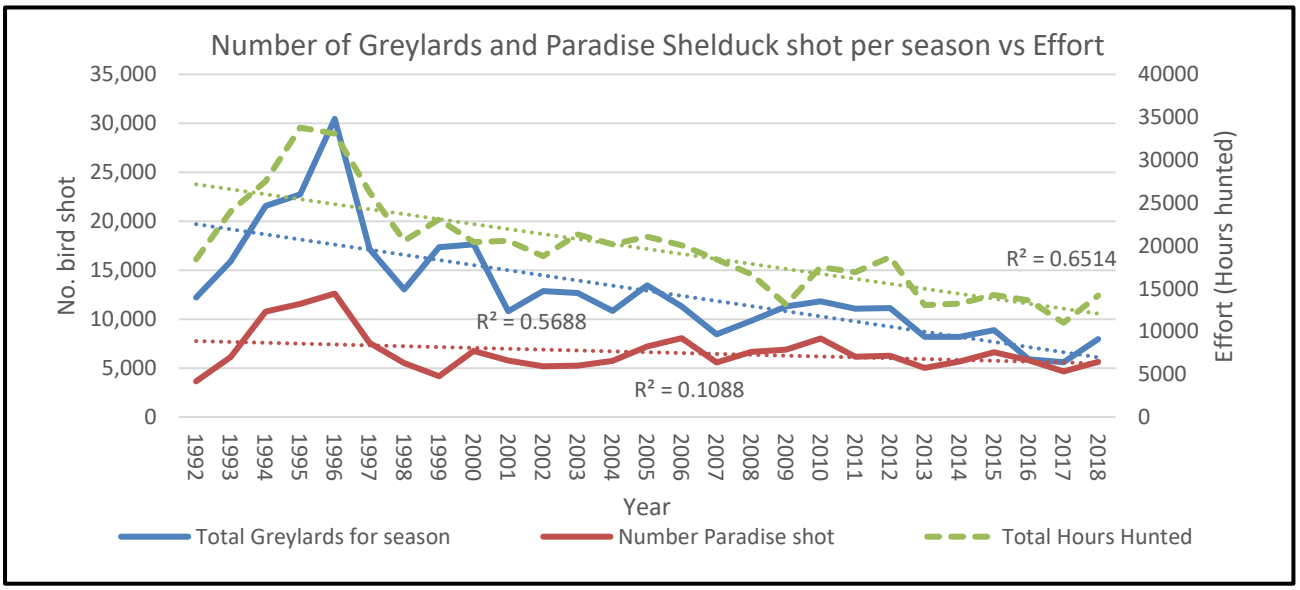


GREYLARD/SHELDUCK HARVEST

The Nelson Marlborough GHS statistics tell us there was an increase (2369 birds) in total greylards harvested this season (7972 ± 1,141 birds) and a corresponding rise in greylards shot per hour (0.563) – see graph below. This would be predicted with a ~10% rise in the greylard population from our annual monitoring counts. It is pleasing to see this increase build on top of the 2017 lift, especially after the disastrous Spring of 2015 and the subsequent plummeting of the greylard harvest in 2016. Greylard harvest makes up 57% of the total bag for waterfowl species (excluding pukeko and upland game).



Hunters accounted for a total of 5,641 ± 676 shelduck over the course of the season, with an average of 6.3 birds per hunter, 981 birds higher than the previous two years. The graph below shows total shelduck harvest, mapped with greylard harvest and total hunter effort. Though lower than the greylard harvest, shelduck harvest makes up a significant portion of the typical hunters bag (40%). The



graph shows a rise in overall hunter effort, and, accordingly, there is an increase in total shelduck and greylard harvested.

UPLAND GAME

The GHS indicates just a total effort expenditure on upland game over the course of the season to be 414 ± 188 hours. It was calculated that 225 ± 115 California quail were taken over the season.

As mentioned, any game harvest data in relation to upland species needs to be taken with a grain of salt. For example, the GHS results infer that zero pheasants were harvested – markedly different from the previous two years where it was estimated that 35 birds were taken in 2017 and 25 the previous year.

Phil Bradfield with the fruits from a good shoot on the Wairau River >

HUNTER DIARY

Using 16 of the regions keenest hunters, My Duck Diary (MDD) was another success this year in terms of gathering some very valuable data on harvest rates and other key information (i.e., crippling rates, hunt satisfaction, mallard/grey ratio). The online (Facebook group) diary is now in its second year which allows us to start comparing notes between years, and is a very good way to truth what the National Game Harvest Survey provides. Basically the success revolves around experienced hunters that hunt consistently throughout the season, who upload their hunt statistics immediately following the hunt. This removes ambiguity which you get with the game harvest survey, which relies on distant memory of both experienced hunters as well as hackers, among other key issues. In the opinion of staff, the GHS certainly has its flaws, and the MDD initiative is a good tool to verify or balance this information.

All told this year our 16 hunters went on 182 hunts and harvested 1177 birds. This is more effort for less birds compared to the previous season, however hours hunted was similar meaning hunt duration was typically shorter this season.

	2017	2018	
Total Birds Harvested	1266	1177	↓
Total Greylards	548	517	↓
Total Parries	639	570	↓
Other (excl. pukeko)	79	90	↑
% Greys		25%	
% birds wounded		5.01%	
Birds/hr/per person	1.75	1.58	↓
Total hunts	150	182	↑
Total hours hunted	722	744	↑

Besides birds/hour other important statistics are % birds wounded and % grey type ducks. Unfortunately we did not ask for these in 2017, but for this season the percentage of birds wounded that got away was 5%, far less than SAFE's bold claim of 20%. Interestingly one quarter of the greylards harvested were pure looking grey ducks.

Hunt satisfaction was generally higher this year compared to 2017, surprising as birds/hour harvested was lower. This appears to be somewhat at odds with the GHS results which show a lift in harvest when compared with 2017, whether this is due to a small sample size or an error in the GHS findings is unclear, however both will be useful when compared with greylard monitoring results to build a picture of the population.

A huge thanks goes to MDD members:

Reice Piggott | Heather Baigent | Ben Sowry | Rhys Barrier | Marc Jary | Justin Weaver
Steven Holmes | Nev Gane | Brad Tasker | Geoff Irvine | Cory Jones | Troy Appleton
Jason Buys | Jack Archer | Kieran Scott

MDD IN PICTURES

It is a rare occasion that a MDD member does not post a picture of their hunt, successful or otherwise. Here is the story of their season in pictures:





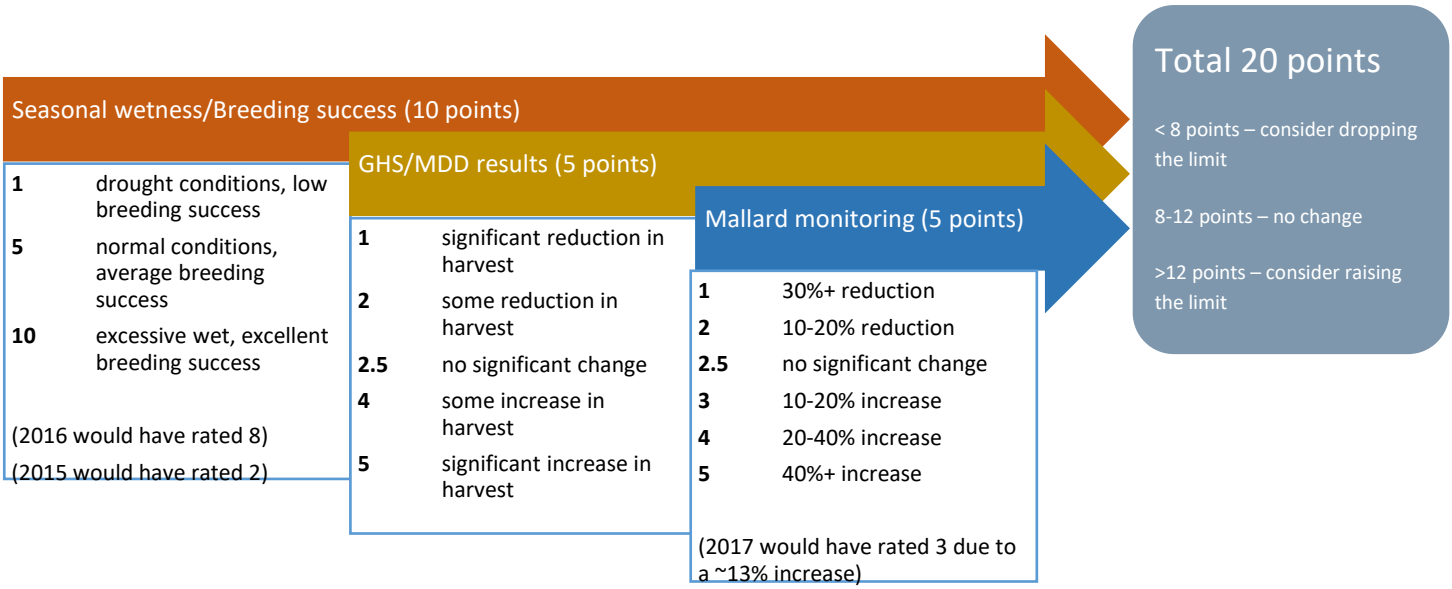




REGULATION REVIEW

MALLARD LIMIT RECOMMENDATION

Last year staff devised a simple points system to set the daily bag limit for greylards. This system factors is spring/summer breeding and rearing conditions (10 points) based on monthly average rainfall figures/staff observations; game harvest data (5 points); and mallard monitoring (5 points), to form a total out of 20, which will ultimately determine whether current limits remain as they are, or there is consideration to raise or lower the daily bag. Spring breeding/rearing conditions generally trump any conservative management measures such as bag limits/magazine restrictions, therefore receives greater weight in setting limits. The one flaw to the system is the date at which we carry out mallard monitoring (late March), which falls well outside the timeframe required to confirm the daily bag limit, therefore data from the previous season is to be used.



Based on the below table, we have assigned the following values to determine the greylard limit for the 2019 season:

Seasonal wetness:	3/10 (average in Marlborough, poor in Tasman)
GHS/MDD results:	3/5
Mallard monitoring:	3/5 (11.8%^ Marlborough, 7.10%^ Tasman | 9.5% average)
TOTAL:	9/20 – recommend no change to limit

RECOMMENDATION

That the mallard/grey (greylard) limit be kept at 8 birds/day across all Nelson Marlborough sub regions for the 2019 season.

CHUKAR

Last year the Council considered introducing a limited chukar season by permit only, however this ran into difficulties with DOC officials (who scrutinize and authorize the game gazette) specifying that a daily limit and season length was legally required. Though the Game Committee initially recommended a limited season as per the staff recommendation, this was not ratified by the full Council on the grounds that more information was needed on bird distribution and numbers.

Canvassing goose hunters who attend the Molesworth Goose Hunts clearly has not worked, with little recent feedback to date, however several Marlborough hunters and DOC staff members have been in touch with their thoughts on a limited season, and specific information on where they have seen birds. Their comments/observations can be seen in Appendix 1, along with chukar sightings from historical F&G run Molesworth hunts (Appendix 2), and a Council memo prior to game committee resolution on chukar (Appendix 3) which provides a good summary of the state of play.

While this paints just a small picture, the upshot is a group of regular users of the Marlborough High Country in full support of a limited season, based on their observations and experience. It is staff belief that a limited season is viable, with the potential harvest minimal when compared to the effects of predation. Having a limited season is a way to gather information on distribution and density, which is unrealistic for staff to do due to the time-consuming nature of this work. It is also to be noted that some harvest of coveys can be beneficial for the population to reduce inbreeding and subsequent issues with low fertility within small populations. Most hunters are aware of the need to leave the pairs and small coveys (6 or less) alone, and not harvest more than 20% of any specific covey, and not over hunt one particular area due to the territorial nature of chukar. This will be conveyed to hunters when they apply for their permit.

The CSI experience

In Central South Island Fish & Game region, recent game harvest statistics tell us that hunters bag just one bird every 8 hours of effort, so clearly numbers aren't important for this band of enthusiastic hunters who don't wish to bag many birds. It is the view of CSI F&G that harvest has minimal effect on the overall population (here there is a 10 bird/day limit with a season that spans 3.5 months). Chukar are a 'special interest' bird and their hunters are responsible and only take a small amount of birds as to not compromise the covey, and as such, they effectively self-manage the harvest impact for future sustainability. The average covey size is around 8 birds, with the maximum size being no more than 20 birds.

Staff in CSI, as well as Otago (where there is a 3 month, 2 bird/day limit), believe the chukar population is driven by predator density within the landscape. Locally this has been confirmed by owners of Muller and Middlehurst Station where there has been a huge effort to control possums for bovine TB, and as chukar are very vulnerable to ground nest predation by possums, a notable corresponding rise in the chukar population – see more comments from Awatere landowners below.

Access

DOC have indicated that hunters will be able to apply for a small game permit and apply for blocks on Molesworth the same way which big game hunters are catered for. Access to high country stations will be at the discretion of landowner.

Consultation with Awatere landowners

When a limited season was suggested in 1999 this was generally not supported by high country farmers due to low numbers, however 20 years on, due to a marked increase in pest control, there are more birds around.

Here are a few comments from consultation with Awatere station landowners:

Steve Satterthwaite | Muller Station: says the population is at a huntable level, although he would not let general public hunt on his property. He says the chukar rebounded when possum control began in earnest, particularly after recent 1080 operations removed ground predators. Supports a month long season (July), noting that 3 weekends may be too restrictive noting it is best to hunt after a snowfall therefore having flexibility is best via a one month season.

Hayley Pitts | Mt Gladstone: notes that there is a few more birds than usual, but not enough to hunt and would not allow hunting regardless due to their fondness for the bird.

Willie McDonald | Middlehurst: good numbers of birds around, regularly seeing covey's 30-40 strong, and says the chukar population is stronger than the quail population. Would be quite comfortable with a limited season and would even hunt a small number himself, however would not take more than 10 birds/year. The birds are building up to a level where they are nesting around the homestead.

RECOMMENDATION

That a limited chukar season be introduced. It is recommended that a limited season of either 3 weekends, or alternatively for 1 month (July), with a daily bag limit of 2 birds per day, and a clause in the game notice specifying the requirement that hunters obtain a permit from F&G, plus maintain a diary of birds seen/harvested to be supplied to F&G.

PARTICIPATION

MOTUROA | RABBIT ISLAND PHEASANT HUNT

This season we held two organised upland game hunts at Moturoa/Rabbit Island. The first was advertised via Both Barrels and was fully subscribed, although there were minimal chances at birds. The second hunt was advertised via email to all licence holders and there was a fantastic response, with over 30 applicants for 8 blocks.

For this hunt around half of the blocks harvested birds, while there were chances in other blocks. This was the best hunt so far, and many of the hunters were delighted with the day.

Ben Eggleston looking pleased with his first Nelson rooster >

It is pleasing to see that there has been some significant radiata harvest take place within the hunting area over the past 12 months, which will result in some very good upland habitat for the next half dozen or so years. In particular, two of the eight blocks, which were entirely made up of mature pines and had poor hunting opportunity, have now had some sections felled, and have opened up some good hunting areas for the next few years. Unfortunately the spray programme the forest operates means the first winter on which the hunts will take place will see all of the good food source/habitat sprayed for replanting, but subsequent years should see an improvement. Added to this, staff have noted patches of inkweed in most blocks which is a favoured food source for pheasants.

Murray Brydon and Murray Neumann with a bird each >

^ Inkweed provides a good food source

Inkweed stems eaten by pheasants >

Hunters frequently ask whether Fish & Game will be undertaking any enhancement work in the name of bird releases prior to the hunts taking place. Staff believe there is capacity for limited releases of

hens and roosters, both in the months leading up to, and just prior, to the hunts taking place. There has been a good deal of effort from staff in getting this hunt up and running, as well as a comprehensive trapping programme on the island by staff and volunteers, and in the interest of maintaining hunter enthusiasm for the hunt, staff advise that a small number of birds be purchased for the 2019 season.

RECOMMENDATION

That Fish & Game purchase 60 birds (50 roosters/10 hens) for the purpose of pheasant enhancement at Rabbit Island, to be liberated in the months leading up to the hunts.

ANNUAL PUKEKO HUNT AT WAKAPUAKA

Unfortunately due to M-bovis concerns, the landowner asked that the hunt not take place this season. This was entirely understandable considering the risks involved to the farming operation.

There still seems to be demand for this hunt, with fairly good attendance from year to year.

GAMEBIRD FOOD FIESTA

At the close of the regular season Nelson Marlborough Fish & Game held an evening to 'celebrate the bird'. It was something we have been keen on doing for a while as there appears to be a high level of lethargy with Nelson/Marlborough hunters taking their harvested birds to be cooked by nominated restaurants. In general Fish & Game nationally do a decent job pushing the culinary qualities of gamebirds and we felt we needed to do the same regionally. The other reason was to provide some cooking inspiration to us hunters, who can be at times fairly conventional with gamebird cooking.

We had the right man for the job in Phil Hazeldine who's a keen hunter and has his own restaurant at Club Waimea. During the season we advertised the evening for 60 max hunters and put out a call for gamebirds to be used on the night. The evening was quickly subscribed and with a bit of work we got a pile of whole mallards, breast meat from swan, parrie, goose and mallard, pukeko, and duck livers.

Chef Phil Hazeldine pondering what to do next >

On the night we had around 80 punters turn up which meant the room was bulging at the seams, but a quality chef always prepares more and the extras were easily catered for. Phil addressed the crowd saying he would be serving 12 different dishes, but kept everyone guessing as to what the meat was until

the end. Some people took this seriously writing down their answers as to what bird they were eating, similar to what takes place on a quiz night.

Pukeko soup, swan sausage rolls, duck sushi & duck liver pâté started it off, followed by more voluminous dishes like parrie schnitzel, smoked goose and duck breast plus others. The meal was finished off with dishes like roast duck and black bean sauce, and swan pasta carbonara. A fan favorite was the reconstituted swan bite served on a tooth pick with a creamy pepper sauce.

It was a brilliant evening and a great way to round off the season. Feedback from those who attended was overwhelmingly positive, with many enlightened as to what is possible with the spoils of the hunt. The good news is that Phil has expressed an interest in building on the success of this year's effort, to go for another round in 2019, though moving to a larger room and catering for 100 max.

A huge thanks goes to Phil, who put in around 50 hours of his own time, as well as to those who donated gamebirds for the evening.

Some comments from local hunters on the night:

"A magnificent effort on the chef's part. A great evening thanks to Nelson Marlborough Fish and Game".

"Every Fish & Game area should hold a night like this"

"11 dishes and all bloody beautiful, bloody good night organised by Fish & Game"

"Top effort to all those involved. What a great way to wrap up the season. Thanks to Fish & Game for pulling it all together"

"Yes it was a great night, a BIG thank you for the great evening & the food was the best!"

RECOMMENDATION

That Fish & Game hold a gamebird food evening in August 2019, and fully support Phil Hazeldine with his efforts. That investigations be made as to whether there is suitable personnel to hold a similar event in Marlborough.

C.W.A EXCHANGE

Lawson Davey hosted two hunters from the California Waterfowl Association (CWA) as part of the NZ/CWA exchange programme. Running for the past three decades, dozens of hunters have

made the journey across the Pacific to experience hunting in another country. This year it was Matt Greene and Loren Poncia's turn to see how it's done in New Zealand.

They began in the North Island hunting ducks and pheasants, then headed south in pursuit of ducks and deer around Nelson. They then set off on a South Island roadie to hunt pukeko and paradise shelduck on the West Coast, before jumping over the hill to hunt black swan at Ellesmere, then north for quail, geese and more ducks.

Matt and Loren enjoying the NZ hunting scene >

After about 30 years, Mat Keller & Pete Arnold (who have been organising the programme in California) have handed the hunter exchange program to CWA, with Jeff Smith, Program Director of the CWA Hunt Program, taking over the reins.

PUKEKO COMPETITION

The pukeko competition ran again this year, with very little interest from hunters. Staff are of the opinion that this promotion has run its course and should be discontinued.

RECOMMENDATION

That the pukeko prize promotion be discontinued.

WETLAND DEVELOPMENT AND ENHANCEMENT

PARA WETLAND

It has not been possible to get as much done as hoped for in the past year due to regular rainfall events that occurred, particularly after the start of the New Year, which meant the wetland remained hydrated right through the summer and autumn period. This is similar to what happened the previous year resulting in even more waterfowl inhabiting the wetland. This was good news for hunters with most hunters achieving bag limits on opening weekend and enjoying the best hunting season at Para in the last decade.

Daniel Lynn with a good bag of ducks >

Whilst good for waterfowl and hunters, the regularly wet conditions prevented the ability to get any earthworks machinery onsite to install culverts for improving the hydrology of the wetland, or for creating further areas of open water for hunting spots / waterfowl habitat. The wet conditions also meant it was not possible to get as much ground-based weed and willow control completed as expected for the second year running.

When conditions were dry enough the following was achieved:

- Graveled the rutted and scoured portions of the new dry weather 4x4 access track at the southern end of the wetland and kept the new fence clear of flood debris.
- Planted a further 300 swamp flax and 300 Kahikatea trees
- Weed released at least twice around the native plantings that we have been getting established over the last three years
- Strategically planted weeping willow poles to create future overhead cover for ducks and fish in the short term and oak trees to provide an autumn food source for ducks.
- Ran 5 Conservation Volunteer NZ working days in conjunction with staff from Pernod Ricard Winemakers
- Two field trips with Queen Charlotte College for plant transect surveys and eel fishing
- Two planting days with Queen Charlotte College
- Ground based basal stem willow control in the driest areas of the wetland
- Vine weed control around previously established plantings
- Gorse and broom control along the State Highway 1 edge
- Aerial spot spraying trial of willow regrowth over 35 hectares of the wetland. Whilst being a lot more efficient in covering the area compared to ground control, initial indications show results that aren't anywhere near as good as we would have liked, with around half of the treated plants/bushes looking to have around about 10% of stems still live. This means we will have to try and improve application coverage of the spray or use a different chemical.
- Liaison with Marl. Kaikoura Trail Trust to try and minimise any impact to waterfowl and hunting from proposed cycleway/walkway which is planned to be routed adjacent to the wetland.

It is pleasing to note that the general public can see that real progress is being made and we are now receiving mostly positive feedback regarding the willow control.

^*Decaying willows and flourishing natives – a scene pleasing to hunters and the public.*

SUPPLEJACK VALLEY

Surprisingly this combination fire control/duck pond created by Sumitomo survived cyclone Gita. Staff are unsure how popular this site will be with ducks as site constraints meant a small sized pond only was able to be developed, however we have undertaken planting of a few oaks/natives and intend to monitor use of the site over time by waterfowl.

^ *Initial plantings at Supplejack Valley wetland*

The wetland one year on >

GIBBS RD

This Nelson Forestry ex-gravel quarry is substantial in size and has provided several enquiring hunter groups some limited hunting opportunity for greylards, as it is a favoured daytime roost site. Established oak trees at the site continue to be weed released along with broom/gorse control around parts of the wetland perimeter including the hunter access track area.

CHALLIES ISLAND

Weed control under contract to Tasman District Council continues, and the site continues to provide nesting/rearing habitat for greylards and shoveler. It is now also a popular dog exercise and gun dog trial area. Some limited hunting opportunity during wet conditions exists here.

TOP VALLEY RESERVE

A weed contractor was engaged earlier this year to control the blackberry infestation around Top Valley wetland. In the future, once resource consent is obtained, some earth works will be undertaken to provide a better hunting area as the wetland is currently in a fairly unusable state and very overgrown with willow and other species.

EVES VALLEY – POTENTIAL SITE

There is potential to develop a decent wetland at this site in partnership with Sumitomo and DOC. Fish & Game staff time to develop the proposal is the key constraint here, we hope to be able to get progress on it over Autumn/winter.

COMPLIANCE

OPENING DAY

Our compliance efforts in Nelson Marlborough this season were centered on the Nelson/Tasman area. It would be fair to say that the numbers of hunters we intercepted mirrored the numbers of ducks in their bags, that being very low. In fact, many of the hunters we spoke to thought it was the worst opening on record in terms of ducks harvested. This was surprising after our mallard counts indicated an increase on last season, on top of a decent increase on the year before that.

Rhys Barrier in action on Opening Day >

Three ranging teams checked many private ponds in the Moutere/Nelson area, and did a sweep of public waters around Waimea and Motueka estuaries. The teams were staggered by the number of unoccupied ponds that in previous years have been hunted. Hundreds of ducks were enjoying a quiet time of things on these ponds, which was undoubtedly the reason why the hunting was so slow for those hunting nearby. There just simply were not enough hunters around, with many making their annual pilgrimage to neighboring regions and saving their ponds for the second weekend. At times it seemed like the duck hunting season had not even started such were the limited number of shots fired.

The guys on public water were also doing it tough with very modest numbers of birds harvested for the effort expended. However, owing to fields of recently harvested maize, there were large numbers of shelduck in some locales – and a few groups did well obtaining limit bags if they were handy to these. Compliance wise, our compliance teams had a quiet time of things, and were delighted with the behavior of hunters encountered. From 30 hunters checked, only one failed to produce a licence and none were found to be in possession of lead shot. In the case of the sole case of licence not produced, the hunter was sharing a shotgun with another (licenced) hunter and admitted to firing a few shots at ducks.

A few additional checks were carried out in Marlborough with no problems encountered. The hunting was much better here with limit bags the norm in Para Wetland, excellent hunting in the Wairau Lagoons, and private land also producing the goods.

A further 25 licences were checked via the Moturoa Rabbit Island pheasant hunt. Unfortunately due to the cancellation of the Wakapuaka pukeko hunt, we could not add another 50+ licences to the tally. As a result, we did not achieve our target of catching up with 10% of licence holders.

GENERAL

MOTUROA | RABBIT ISLAND TRAPPING GROUP

The predator line at Moturoa Rabbit Island has continued to build on the previous year, and significant effort has taken place over winter to carry out maintenance on all traps, as well as repositioning the entire predator line. This was done due to harvest operations around much of the exterior of the island where the original line was located. Owing to the unsuitable nature of recently harvested areas, the majority of the traps were moved to the Northern (beach) side of the island where much of the good pheasant habitat is.

Lawson Davey removing a weasel from a trap on the estuary line >

The small volunteer group has again been outstanding this year, and are, more or less, running the line of their own accord with less on the ground input from staff. The table below shows the catches for this calendar year at the time of writing, noting that 179 pests have been exterminated which is already higher than the 2017 total with two months to go. During the winter another sting on the feral cats was carried out in this area, and it was pleasing to see that our 2017 efforts had really dented the local wild feline population. Just three cats were eliminated this year in comparison to the 16 caught last year – good news for the upland game and native birds on the island.

MOTUROA | RABBIT ISLAND TRAPPING GROUP

	Date	Mice	Rats	Weasels	Stoat	Ferret	Possum	Hedgehog	Cat	Hours
JAN	16/01/2018	1	3		3			17		9
FEB	16/02/2018	3	2		3			16		16
MARCH	15/03/2018	10	2	1	1			8		6
APRIL	19/03/2018	11	5		1			8		6
MAY	21/05/2018	13	1		1			9		6
JUNE	13/06/2018	3	2		1			2		9
JULY	24/07/2018	5		1				1		6
AUGUST	22/08/2018	*	*	*	*	*	*	*	*	18
Cat trapping	**Aug-Sept**		**2**				**5**	**9**	**3**	**7**
SEPTEMBER	20/09/2018	4	4	1				3		6
OCTOBER	21/10/2018	5						9		8
NOVEMBER										
DECEMBER										
	TOTAL	**55**	**21**	**3**	**10**	**0**	**5**	**82**	**3**	**97**
								TOTAL PESTS	**179**	

CROP DEPREDATION

For the 2018-19 financial year a total of 46 permits were issued for crop depredation purposes, 25 for shelduck, 16 for pukeko, 3 for both shelduck + pukeko, and two for swan. On three occasions junior hunters were sought out to take on the job, however in many cases the landowner had their preferred hunters so juniors were unable to be used.

DUCK DNA RESEARCH

The 2017 season was one that grey type ducks featured more heavily in the hunters bag, particularly in the Nelson Marlborough region. This was alluded to in the 2017 Game Report and piqued the interest of one of New Zealand's leading waterfowl biologists, Murray Williams.

This season, noted United States duck geneticist Philip Lavretsky from the University of Texas El Paso spent two weeks in New Zealand, to answer the question: is the New Zealand Grey duck extinct? The key purposes of Phil's research is to genetically identify pure NZ grey (if they exist); establish the amount of hybridization that occurs within grey/mallard ducks; develop a regional map of where we have true pure grey ducks, pure mallards, and where hybridization exists; and develop a key which Fish & Game NZ can use to determine whether the birds have pure genetic lines, or the level of hybridization.

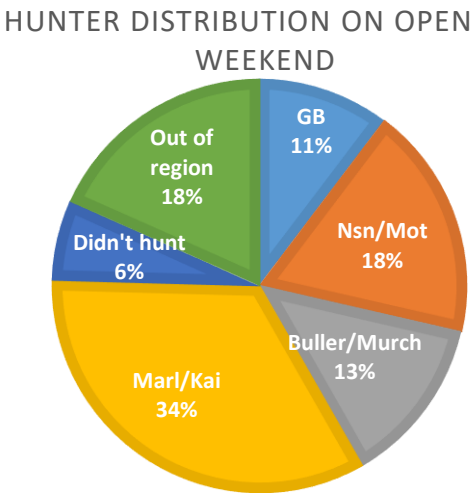
Phil's team gathered over 200 samples from our ducks to which the Nelson Marlborough region contributed significantly. Initially this involved sending out a request to hunters asking for whole bird samples, and it was gratifying to get such an excellent response. All told, regional hunters contributed around 60 birds, encompassing a cross section of ducks from pure looking greys to pure looking mallards and everything in between. The birds were sourced from a diverse geographical area, including Golden Bay, Tasman, Marlborough and Murchison. In particular, Phil really wanted to obtain some pure looking grey ducks, and our hunters were able to provide some fantastic grey type specimens for the study.

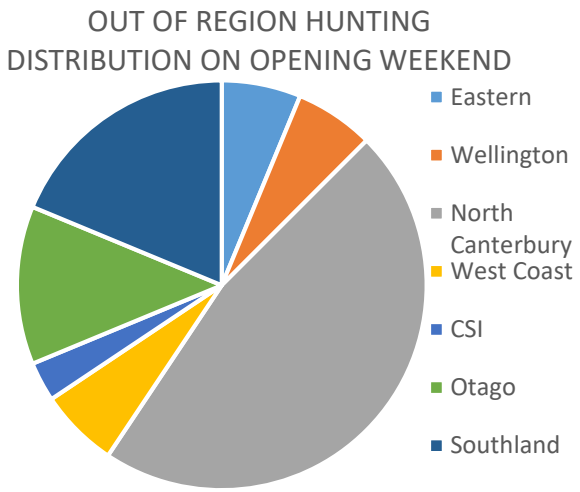
Many believe the New Zealand grey is genetically extinct, so the results of this study will be important for the Fish & Game interest, which occasionally comes under fire for historical mallard releases which have diluted the native duck strain. At the time of writing, all birds have been processed, sequenced and the team are running their analysis. Phil has said this is one of his biggest datasets to date.

Fish & Game featured a short video which you can see on the Fish & Game New Zealand Facebook page: search Phil Lavretsky.

HUNTER DISTRIBUTION OVER OPENING WEEKEND

After opening weekend, 100 callers are selected at random to find out where they hunted and what they shot. The charts below show a fairly typical distribution over opening weekend, noting that 18% of hunters chose to leave the region in search of ducks elsewhere, and 6% of hunters did not hunt opening weekend at all. Of the outside regions which hunters frequented, not surprising North Canterbury took the greatest slice of the pie, and although the West Coast is said to house just 6% of effort, this would have in fact been higher as this a very popular opening weekend destination for Nelson Marlborough hunters.





LICENCE REVENUE

This season licence sales were up slightly from 2017, with 923 full licence equivalents (LEQ's) providing $87, 099 in revenue – see table below. It was pleasing to see an increase in junior and child licences with 116 allocated (11% of all licences).

Year	Licence Sales (LEQ's)	Game Income Generated
2006	952	$ 69,698
2007	914	$ 68,733
2008	980	$ 76,686
2009	1017	$ 81,576
2010	1059	$ 85,068
2011	977	$ 84,277
2012	964	$ 85,077
2013	975	$ 88,026
2014	909	$ 83,077
2015	955	$ 86,060
2016	948	$ 87,426
2017	893	$ 83, 428
2018	**923**	**$ 87, 099**

HEAVY METALS SUMMARY

Auckland Waikato Fish & Game commissioned a study looking at cadmium (Cd), copper (Cu) and lead (Pb) accumulation in waterfowl. Cadmium accumulates in soil from superphosphate application, particularly on high input farms, and is passed onto waterfowl where it accumulates in the liver/kidney. Consequently, there is a potential health risk to hunters who consume bird liver pâté from areas with high Cd. Similar to lead and copper, cadmium can have negative impacts on human health, as well as significant effects on waterfowl health (i.e., fertility, behavior and parenting ability).

The Waikato area has the highest levels of soil Cd in New Zealand and was used by Fish & Game as a study area alongside the Southland region. Blood and gizzards from gamebirds were sampled to determine levels of Cd, Cu and Pb, as well as the amount and type of shot ingested.

Results from the study are summarized in Appendix 4, however in total 32.4% birds had liver Cd concentrations elevated above background levels and 5.06% suggestive of sub lethal adverse effects, with Cd and Cu highest in Southland birds. Within the New Zealand standards, assuming waterfowl would be held to the same standard as livestock, 16.1% of the livers exceed the maximum allowable threshold. However, if the more conservative value of 0.5 mg.kg-1 is used, then 55.4% of the mallard livers in the study exceeded the safe threshold for human consumption.

RMA ACTIVITY

Most resource management activity within the hunting space has centered around the Fish & Game submission and subsequent hearings process for the Marlborough Environment plan. We have sought recognition of the Marlborough gamebird hunting sites identified within our sports fish and game management plan, and advocated to ensure hunting remains a permitted activity within the Marlborough landscape.

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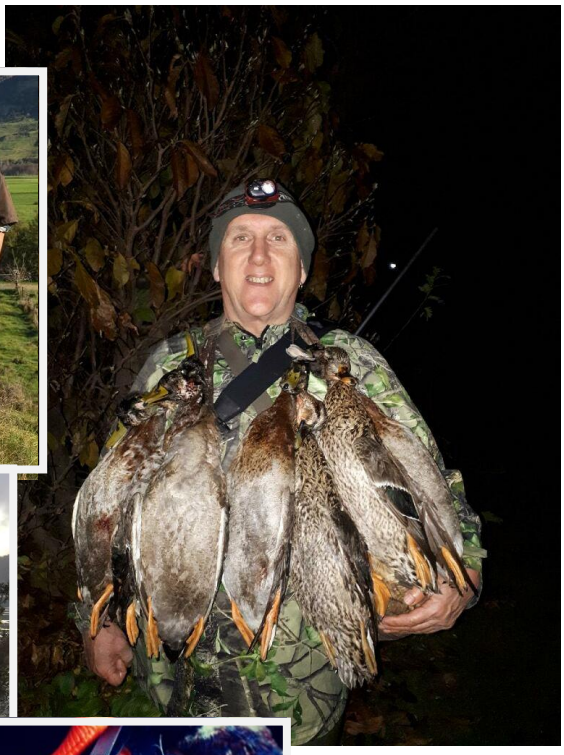
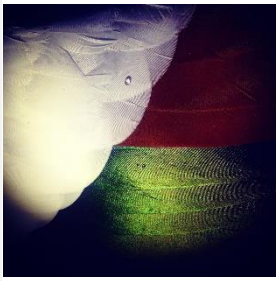
TOP SHOTS FROM 2018












APPENDIX 1

Date	Where	Number in covey	Reported by	Comments
2015	Acheron River d/s Guide	30	Jacob Lucas	Seen on way to goose block
2015	Muller Station	Multiple coveys	Jacob Lucas	Very good numbers on this farm. 20-30 birds in coveys
Mar-16	Guide, 1km u/s Acheron confluence	30	Phil Bradfield	
Sep-16	Timms Creek	4	Phil Bradfield	
Oct-16	Pudding Hill carpark	2	Phil Bradfield	
Oct-16	Acheron River d/s Guide confl	4	Phil Bradfield	
Dec-16	Mt Severn	2	Phil Bradfield	
Mar-17	Carters Saddle	2	Phil Bradfield	
2016-17	Dillon River	Multiple Coveys	Jacob Lucas	Seen/heard while hunting deer over two trips
15/03/2017	TL Acheron River	3	Marc Jary	
17/03/2017	Saxton River	2	Ross Discson	Opposite Saxton Hut
18/03/2017	Yarra River	5	Reuben Miller	On a Molesworth hunt
17/04/2018	Conf Cow Stream & Alma	10	Phil Bradfield	
17/04/2018	Cameron Stream, Yarra	6	Shane Hall	The 6 Chukor we flushed were in one group, where the green X is on the attached map. We heard some in one other place but didn't see them
7-10 June 18	Alma Crimea	12	Ian Brown	On a Molesworth hunt
2016-2018	Mt Peggioh/Waima River	Multiple coveys	Jack Gauld	Multiple coveys on Richmond Brook North Facing slopes

2016-2018	Blackbirch Stream, Altimarloch	Multiple coveys	Jack Gauld	Conservation land, multiple mobs, conservation land, totalling 50+ birds
2016-2018	Ring Creek	Multiple coveys	Jack Gauld	Conservation Land, north facing sites
2016-2018	Cam River catchment TL	Multiple coveys	Jack Gauld	Private land
2016-2018	Hodder/Wadsworth Stream	Multiple coveys	Jack Gauld	Private land
2016-2018	Winterton River	Multiple coveys	Jack Gauld	Private land
2016-2018	Castle River (upper north facing)	Multiple coveys	Jack Gauld	Private land, good with hunting access
2016-2018	Molesworth	Multiple coveys	Jack Gauld	Lower Guide, Cat Creek, Lower Alma
2016-2018	Gladstone Downs (Pitts)	Multiple coveys	Jack Gauld	Hugo Pitt, could be good with access
2018	Awatere		Justin Weaver	I have some reliable contacts who hunt and work in the Awatere Valley, and they are all commenting on the numbers of Chukor they are seeing on regular occasions which is fantastic. If numbers are strengthening? A one or two day designated hunt at some stage through the next season with a one or two bird limit would be a good indication of numbers?
2018	Awatere Valley		Fraser Cooper	Not high numbers in lower valley, but good numbers in upper Awatere and believes there is scope for a limited season there. Also said that coveys benefit from some harvest by taking out dominant males etc and get new blood lines to provide more robust genetic diversity.
2018	Awatere Valley		Andrew Herd	TBC info
28/10/2018	Maukuratawhai, St James	2	Phil Bradfield	
Nov-18	Muller Station		Steve Satterswaite	Believes the population is now at a huntable level, says a 1 month season might be better (July) as better to hunt after snow fall and hunters may not be able to get to weekends

APPENDIX 2

Date	No.	Map Reference	Description
Nov-93	2	N30: 980959	Hamner road opposite Rag & Famish
Mar-00	10	N31: 233855	upper Halfmoon stream
Oct-01	12	030: 332119	Upper acheron upstream of Munroe hut
Jan-02	12	N31: 153854	yarra confluence
Jun-02	25	N31: 097797	yarra hut
Jan-03	1	N30: 263017	Wards pass pylon track
Oct-03	2	N31: 133,681	Hossack just inside gate opposite blinkers
Oct-03	3	N30: 025913	Cat Creek
Oct-03	2	N30: 005967	Just past Sedgmere Chalet on Road to Hamner
Oct-03	10	N31: 202844	guide river
Oct-03	5	N31: 063816	upper Yarra
Oct-03	2	N31: 106800	yarra track
Oct-03	2	N31: 124818	lower yarra
Oct-03	2	N30:900000	Robinson Creek
Oct-03	2	N30: 263017	Wards pass
Jan-04	2	N31: 272692	top of cloudy range hut track
Mar-04	9	N31: 070818	upper yarra
Mar-04	4	N30: 263017	Wards pass
Jun-04	44	N30 035942	mt tarndale
Oct-04	2	N30: 113039	lower severne
Oct-04	2	N30: 160997	Redgate block Mt Augarde area
Oct-04	2	N30: 035943	tarndale to sedgemere track
Oct-04	2	N30: 119938	Alma ford between tarndale and redgate
Oct-04	2	N30: 195057	lower saxton
Oct-04	4	N30: 227067	Lower saxton
Oct-04	2	N30: 232107	Upper saxton above team hut
Oct-04	10	N30: 903925	Robinson Creek
Oct-04	2	N30: 250905	Awatere River
Oct-04	20	N30: 198985	Isolated flat behind hut
Jun-05	10	N31: 000864	halfway up crimea
Oct-05	8	N31: 202844	guide river
Oct-05	10	N31: 124818	lower yarra
Oct-05	3	N30: 195060	lower saxton trib
Oct-05	3	N30: 220100	team stream
Oct-05	5	N30 : 130925	bull stream
Oct-05	1	N30: 130955	alma above redgate
Oct-05	20	N30: 250905	upper awatere
Mar-06	24	N30:900950	middle robinson
Mar-06	4	N30:900910	upper robinson
Jun-06	16	N30:130930	bull stream
Jun-06	2	N30: 030980	upper wairau
Jun-06	7	N30:900000	lower robinson
Jun-06	11	N30:030910	Cat Creek
Oct-06	2	N31: 070815	Yarra above hut
Oct-06	2	N31:090790	Yarra Tributary west of hut
Oct-06	2	030:550930	goose flat track Clarence Reserve
Oct-06	2	031:440865	saddle between seymour and Quail flat clarence resv
Oct-06	20	N30:900950	middle robinson
Oct-06	23	N31: 220900	top of guide

APPENDIX 3

Council memo for consideration prior to endorsement of game committee's resolution on Chukar

The Game Committee resolved at the March 28th meeting that expressions of interest be sought from licenced gamebird hunters for an organised chukar hunt on Molesworth with a limit of 2 birds per day and no more than 4 for the weekend. The full Council is now required to endorse this resolution. The objective of this change was to gain more information on our chukar population through allowing a very limited sustainable harvest to occur.

Following this Game Committee meeting and the resolution around chukar I have had further discussion with staff, and also other South Island staff where a chukar season currently exists (Hamish Stevens CSI, Morgan Trotter Otago). I have also discussed regulatory constraints with Robert Sowman. There are a number of implications arising from the current resolution before Council that need due consideration before voting on the resolution.

Regulatory: because we currently have a gazetted closed season, nothing in the Wildlife Act allows us to over-ride this by special permit or similar. Basically a special amendment to the game regulations would be required, and discussion with Robert Sowman around time frames (DOC staff/Ministers office processes), indicates that around 6-8 weeks would be required. So in practical terms we are probably better off at looking to changes to next year's game regulations allowing us time to consult other station managers properly and also gauge hunter interest. A chukar hunt this game season is therefore unlikely.

NM Chukar population impact: Otago currently have a daily bag limit of 2 chukar and no requirement for a permit. Discussion with Morgan Trotter from Otago indicates that hunter uptake of this opportunity is low-nil, mainly due to low numbers of chukar within Otago, and the fact that where there are isolated populations, access is very difficult to gain permission for. Morgan's view was that environmental conditions are the limiting factor on Chukar (rather than hunting) within Otago, and there is likely a link to the rabbit population, and rabbit control. Morgan also noted that a Game preserve had captured some wild Chukar from Otago and tried to breed them, but were unsuccessful, with the English Game Keeper concluding that Otago birds appeared inbred/had low fertility (this could however also have been related to capture stress/bird age etc).

CSI have a 10 bird per day limit but hunting is by permit only so they retain control over hunting effort and get diary information on the distribution and number of Chukar within CSI. Hamish Stevens was strongly of the view that chukar are a 'special interest' gamebird only, that only appeal to a very small number of super keen upland gamebird hunters within their region. They are NOT a species that is hunted for food, or shooting action, as the average hours hunted per bird shot from their diary information is 8 hours. The average covey size at CSI was 8.7, with the

largest covey size 20. Hamish noted that the select few keen upland gamebird hunters that chase chukar do not really affect overall chukar populations, as they effectively self-manage their harvest impact for the long term future of chukar. Their hunters voluntarily take only 2 birds out of each covey encountered and do not harvest coveys of less than 10 birds (or at least that's what they say in their diary returns!). The average number of coveys encountered per day by each hunting party was 1.1, so Hamish is of the view that experienced chukar hunters realise that this upland game species needs to be carefully/selectively harvested if they wish to sustain their hunting opportunity for chukar into the future. Hamish was of the view that CSI chukar populations are controlled/impacted most by the predator population within the landscape which is linked directly to rabbit numbers – he noted on a station where rabbit numbers had been kept low for a number of years through the employment of a professional rabbiter, the chukar population was doing well/healthy, but in other areas following past aerial 1080 use for rabbit control, chukar numbers had dropped, presumably as a result of predators switching to chukar instead of rabbits following rabbit control. We should note that the entire Molesworth Station is currently out for tender for aerial 1080 control, what this will do to existing predation pressure on Molesworth chukar is unknown (probably depends on whether numbers of mustelids/cats are reduced through secondary poisoning as part of that operation). I suspect any pest control operation that reduces predator numbers within high country landscapes will directly benefit chukar reproductive rates, and conversely if prey items such as rabbits are dropped without reducing the existing predator populations, then chukar will be negatively affected. If chukar hunting does commence within this region therefore, hunters should be encouraged to target any feral cats/mustelids encountered during their search for chukar.

When I discussed the present Game Committee preference of an organised Molesworth chukar hunt with Hamish Stevens, he did sound a word of warning to us in terms of an organised hunt 1) raising expectations amongst a large number of hunters of lots of hunting action (won't be the case); and 2) an organised hunt will likely attract hunters over and above the small number of motivated upland gamebird hunters whom would otherwise be the only interested participants and whom are more likely to understand the population dynamics and high risk of covey overharvest that exists with chukar hunting.

OWP Implications: To run a simple permit/diary system and produce a summary report at the end of the season for upland gamebird hunters, takes an estimated 15-20 hours staff time for CSI, and is very well received by their upland gamebird hunters. If NM region ended up adopted a similar approach to CSI, we could cover these hours within our existing OWP for next year. The present Game Committee preference of an organised hunt however, will incur a lot more time than this. Past Goose hunts averaged a minimum of 200 hours per hunt for staff to organise/oversee, so an organised Molesworth chukar hunt would need at least 100, possibly 150 hours to find from other projects within next year's work plan. In effect if we are to run an organised Molesworth chukar hunt next season, we will need to consider dropping this year's

present pukeko and rabbit Island pheasant hunts for next season as a minimum, and run an organised chukar hunt instead.

Manager's recommendation:

Due to the danger of raising unrealistic expectations and subsequent overharvest of chukar, it would by my advice to Council that rather than an organised hunt we consider adopting the CSI approach instead, with the permit/diary requirement as this fits within our existing work plan, will not result in loss of hours from other projects such as the annual pukeko hunt which is very popular with a good number of hunters including juniors, and is also less likely to result in potential overharvest of chukar. This approach would lead to limited additional hunting opportunity, be well received by a small number of upland game hunters (whom we currently do very little for), and could also be rolled out into surrounding stations should there be support from land owners/managers. A simple change to our game regulations for next season is all that would be required for this option, with a suggested 2 bird daily bag limit (mirroring Otago), and requirement for a permit (as occurs with CSI). The ability to not issue permits gives us direct control over the amount of hunting pressure our chukar population receives, and perhaps a maximum of 2 permits per season for each Molesworth block could be considered by the Game Committee in order to limit harvest? Permit returns would be analysed at the end of the season and reported back to participants and the game committee.

As always however, I am in your hands and we will run an organised chukar hunt if that is still Council's preference, but if we pursue this option I will need to gain agreement from Council on what other area of hunting outputs the hours can be sacrificed from in next year's OWP.

Rhys Barrier

APPENDIX 4

Heavy Metals Key points

Cd (Cadmium)

In males can reduce sperm volume, and concentration and abnormalities in sperm cells

In females impacts egg development and production (suppresses). Egg shell thinning in some instances.

Can alter behavior – ducklings running further from adverse stimuli, or become more active (hyper-sensitivity and responsiveness)

Negatively impairs parenting ability – decreased brood survival

Dairy and Perennial crop has the highest Cd concentration.

Waikato soils higher than Southland (but greater variability)

Healthy waterfowl: Cd liver concentrations <0.9mg.kg-1 w.w so this is considered the threshold for increased exposure

In total, 32.4% had hepatic Cd concentrations elevated above background levels and 5.06% suggestive of sublethal adverse effects.

Southland – had higher hepatic Cd

Cd levels increased with age

Cd toxicity in blood (both regions) is well below the lowest blood concentration that is associated with adverse effects.

Cu (copper)

Cu no known threshold or critical range, so unsure of adverse impact.

Higher in horticulture and perennial crop and in Southland.

15.8% had hepatic Cu concentrations elevated (over background levels).

Pb (Lead)

Of the 343 collected gizzards, 55 had ingested shot, but only eight of these (2.3% of total gizzards sampled) contained Pb shot (3 females, 5 males; 3 juveniles, 5 adults). Waikato birds had the highest ingestion rate of 3.5%, while Southland birds had only 1.2%. This is a marked difference from a Fish and Game survey the year before Pb shot was restricted, which reported an ingestion rate of 7.5% (17/226) in the Southland region and 10.6% (41/385) in the Waikato (Garrick, 2001).

Pb in blood – if elevated above 0.2mg.kg-1 = subclinical poisoning, above 0.5 = clinical toxicity, above 1= severe clinical toxicity

Pre-season bloods showed 9.4% above 0.2, 2.9% with clinical toxicity.

Post-breeding bloods had 7.14% above 0.2, 0.7% clinical toxicity, and 1.4% with severe clinical toxicity.

In total (both regions), 9.4% (16/171) of pre-breeding and 7.1% (10/140) of post-breeding blood samples were elevated above the environmental background levels of Pb, with 3.6% of all sampled bloods estimated at levels consistent with clinical Pb toxicity.

Pb highest in Waikato

Notes

Cd and Cu highest in Southland birds, Cd decreased between pre and post breeding. Males have lower Cu than females. Blood Cd highest in adults compared to juveniles.

Cu highest in blood, then Pb, the Cd.

Cu and Pb higher in males, with Cd higher in females

In Southland heavy metals changed throughout season with Cd increasing May-Aug and Pb and Cu decreased.

Human consumption

Lead

Levels of Pb in the liver of mallards may be of concern for human consumption, as 10.4% had levels ≥0.5 $mg.kg^{-1}$, the maximum level of metal contamination allowed in edible offal of cattle, sheep, pig and poultry in New Zealand (Australia New Zealand Food Authority, 1987). However, most countries reduce this to ≥0.1 $mg.kg^{-1}$ for food intended for infants and children (Food and Drug Administration, 2006, Food Safety Authority of Ireland, 2009), which would suggest that 29.5% of the mallard livers in my study were unsuitable for consumption by children.

Cadmium

Within New Zealand, the maximum level of Cd allowed in the livers of cattle, sheep and pig used for human consumption is 1.25 $mg.kg^{-1}$, however, this does not include poultry. Other countries that include poultry in their standards implement a maximum level of 0.5 $mg.kg^{-1}$ (Food Safety Authority of Ireland, 2009, Commission Regulation (EC), 2006). Within the New Zealand standards, assuming waterfowl would be held to the same standard as livestock, 16.1% of the livers exceed the maximum allowable threshold. However, if the more conservative value of 0.5 $mg.kg^{-1}$ is used, then 55.4% of the mallard livers in my study exceeded the safe threshold for human consumption. While not large numbers of hunters will eat the internal organs, the high number of livers which exceed the maximum levels of metal contaminants in food is a major concern for the transfer of these pollutants into humans.

Implications for the human food chain of models of cadmium accumulation in sheep (2005)

S.H.Prankel[a]R.M.Nixon[b]C.J.C.Phillips[c]

There is a suggested limit to the total human consumption of cadmium not to be exceeded per unit of time: the provisional maximum tolerable daily intake (PMTDI) of 1 µg/kg BW and a provisional tolerable weekly intake (PTWI) of 7 µg/kg BW (JECFA, 1993). The latter value was confirmed in 2003 as 0.007 mg/kg BW.

Cadmium has been reported to be hazardous to human health if consumed in quantities greater than 75 µg/day (Smith et al., 1991). Kidney malfunction in humans begins to occur when cadmium accumulates in excess of 200 µg/g WW in the kidney cortex as originally reported by Friberg et al. (1974, p. 114),

However, it has to be emphasized that more recent estimates of average dietary exposure indicate a higher margin of safety, yet a reduction of dietary Cd is still advisable for high-risk-exposure populations (Troxell, 2000). The typical exposure was said to be around 25 µg/day, although in the US it was quite a bit lower (<12 µg/day); high consumption of foods that contain relatively high cadmium levels could be a problem, because these extreme exposures were quite close to levels where deleterious effects actually occur (Troxell, 2000).

The model focuses on liver and kidney as they are the only organs of concern with regard to the transfer of cadmium from ruminants and other mammals to humans (meat (muscle) and milk do not present major sources of cadmium despite being consumed in much greater quantities (MAFF, 1997).

Three of the parameters investigated were found to be significantly linked to the accumulation of cadmium in sheep kidney: the cadmium concentration in the feed (*p*), the duration of exposure to that feed (*d*), and the predominant chemical formulation (speciation) of cadmium in the feed (*c*).

Potential measures to prevent increased risk to human health from dietary cadmium of animal origin include preventing the livers and kidneys of older animals from entering the human food chain and strict implementation of current legislation.

A. H. C. Roberts , R. D. Longhurst & M. W. Brown (1994) Cadmium status of soils, plants, and grazing animals in New Zealand, New Zealand Journal of Agricultural Research, 37:1, 119-129, DOI: 10.1080/00288233.1994.9513048

Grazing animals consumed and retained Cd in kidney tissue whether naturally occurring or added by agricultural practice. Some 22-28% of sheep and 14-20% of cattle between 1988 and 1991 had kidney Cd contents greater than the permissible level of 1 *u,g/g.*