WELLINGTON FISH AND GAME COUNCIL

SPORTS FISH AND GAME MANAGEMENT PLAN

Approved 31 January 2005.

PART 1

1. STATUTORY REQUIREMENT & CONTEXT

1.1 Fish and Game Councils are required by Section 26 Q(1)(e)(iii) of the Conservation Act 1987 "to prepare draft sports fish and game management plans in accordance with this Act".

1.2 Section 17 L of the same Act provides that "the purpose of a sports fish and game management plan is to establish objectives for the management of sports fish and game within (a region). Each Fish and Game Council shall prepare for approval by the Minister such sports fish and game management plans as are necessary for the management of sports fish and game within its area of jurisdiction". The plan is required to comply with any Acts of Parliament, any policies approved under any Acts in respect of the particular area involved, any provisions of conservation management strategies, conservation management plans, or freshwater fishery management plans. Those preparing management plans are obliged "to have regard to the sustainability of sports fish and game in the area to which the plan relates, have regard to the impact that the management proposed in the draft is likely to have on other natural resources and other users of the habitat concerned, and include such provisions as may be necessary to maximise recreational opportunities for hunters and anglers."

1.3 Section 17 M of the same Act prescribes the procedure to be followed by a Fish and Game Council for consultation between the initial preparation of the draft plan, and its referral to the Minister of Conservation for approval.

1.4 The Conservation Act provides for there to be statutory policy documents to guide the operations of the Department of Conservation. These documents include the General Policy for areas managed under the Conservation Act, and the operative Conservation Management Strategies for the Wellington, Taranaki-Wanganui, East Coast, and Tongariro-Taupo Conservancies, as well as future versions of these plans as they come into effect. While these planning documents do not provide a complete code for the management of fish and game, they do make provisions for the areas to which they apply that must be complied with by Fish & Game New Zealand, and this Sports Fish & Game Management Plan specifically does not over-ride any provisions of those plans.

1.5 Besides the Conservation and Wildlife Acts, and Plans and Regulations made under those Acts, there is also a raft of other Acts and Plans that to some extent impinge upon Fish & Game's functions. The Biosecurity Act, various regional policy statements and plans, and statements of intent by most Government Departments and local bodies all have some bearing on Fish & Game business.

This Sportsfish & Game Management Plan does not over-ride any other plan or requirement, but nor does it list all those Acts, Plans, and Statements.

1.6 By way of summary, the Conservation Act ("the Act") requires this Council to prepare a draft management plan to establish objectives for fish and game management. The three specified goals of the plan are sustainability of sports fish and gamebird species, recognition of impact on other users of habitats and on natural resources, and maximised recreational opportunity. The plan is effectively a set of objectives to guide Wellington Fish and Game Council in its operations and its decision making; it imposes no duty on anybody else, and is itself required not to derogate from other statutes and formal planning documents.

1.7 The effects of this management plan, once adopted, will be to furnish to Wellington Fish and Game Council the statements of objective from amongst which, according to its priorities and the resources available, it will prepare its Annual Operational Work Plans, as directed by Section 26Q(3) of the Conservation Act 1987.

2. THE WELLINGTON FISH AND GAME REGION

The Wellington Fish and Game Region, hereinafter referred to as "the region", is defined on Plan S.O.36311 of the Department of Survey and Land Information.

It comprises the southern portion of the North Island of New Zealand, bounded by a line running northwards along the West Coast from Wellington to the Turakina River mouth, then up the Turakina-Rangitikei watershed and including Taihape and Waiouru to the head of the Rangitikei catchment east of Turangi, then southwards along the Ruahine Range summit to the Pohangina Saddle, then south eastwards past Norsewood and Ormondville to the sea at Cape Turnagain, and finally south westwards along the coastline back to Wellington.

The region is bounded by those of the Taranaki Fish and Game Council in the west, the Hawke's Bay Fish and Game Council in the east, and the Eastern (for game) and Taupo (for sports fish) regions to the north.

The region includes the whole of the Manawatu River catchment, and all of the Rangitikei River catchment with the exception of the part of the Moawhango River catchment that is included in the Tongariro Power Development upstream of Moawhango Dam.

3. STRATEGIC FRAMEWORK

3.1 PURPOSE

The purpose of this plan is to set the strategic direction for the Wellington Fish & Game Council, establish the framework within which it will develop its annual plans, and to meet the statutory requirement to establish objectives for the management of sports fish and game within the region.

3.2 VISION

Our vision for the future is that the sportsfish and game resources of the Wellington region are conserved and where appropriate enhanced, are managed to provide high quality angling and hunting experiences, and target levels of participation in these sports are achieved.

3.3 STRATEGIC GOAL

To ensure the long term relevance of the Fish & Game movement to the fabric of New Zealand society, high levels of participation in hunting and fishing are critical. Therefore, within the Wellington region, the Council's long term targets against this goal are to raise the overall participation rates in both sports fishing and gamebird hunting to 1.2% of the population base.

Measurable Targets

3.3.1 .85% of the population participate in sportsfishing by 2007, 1.0% by 2010, and 1.2% by 2014.

3.3.2 Over the same period, angler access to fishable water trends upwards to a target of 1,200 kilometers.

3.3.3 Over the same period, angler satisfaction with their fishing experience trends upwards to a target of 90%.

3.3.4 Over the same period, the average number of days fished per season per angler trends upwards to a target of 12 days.

3.3.5 0.85% of the population participate in gamebird hunting by 2006, 1.0% by 2009, and 1.2% by 2012.

3.3.6 Over the same period, hunter satisfaction with their hunting experience trends upwards to a target of 90%.

3.3.7 Over the same period, the average number of days hunted per season per hunter trends upwards to a target of 10 days.

The Council is committed to resourcing its various operational activities to support delivery against this Goal. It will also resource sufficient evaluation of the effectiveness of each of these activities to ensure maximum overall effectiveness is achieved within resourcing constraints.

3.4 HIGH-LEVEL PRINCIPLES.

Besides working to achieve a package of stated objectives, there are also several key procedural steps that Fish & Game takes in order to ensure that it delivers those objectives in a proper manner. These procedural steps, or "Principles", are not objectives in themselves, because they do not deliver a result that can be achieved. The Principles define certain aspects of the way in which Fish & Game makes its decisions, and it is just as important for the Council to commit itself to these principles as it is to adopt the objectives that are the focus of the rest of this plan.

The Principles to which this Council commits itself in respect of all its operations are as follows.

3.4.1 Linkage to Fish & Game New Zealand.

New Zealand Fish & Game Council has a function of coordination for the twelve regional Fish & Game Councils, of which Wellington Council is one. The New Zealand Council has adopted six high-level principles to guide the direction of the whole organisation, which are as follows.

1. *New Zealand has a heritage of sports fishing and game bird hunting.*
2. *All citizens have an equal customary right to fish and hunt.*
3. *There shall always be sports fish and game to fish and hunt throughout New Zealand.*
4. *New Zealand has a tradition of public ownership of the fish and game resource.*
5. *The public shall have unhindered access to this resource.*
6. *Sports fish anglers and game bird hunters shall manage their own affairs.*

Wellington Fish & Game Council is committed to following these principles, and aligns its activities with those of the New Zealand Council where this is appropriate.

The New Zealand Fish & Game Council also has the function of making National Policy, which is binding on regional Fish & Game Councils. There are issues upon which further National Policy development is likely, including aspects of the interface between the Department of Conservation's and Fish & Game's respective responsibilities, on which for a variety of reasons this Management Plan has not made a policy commitment. Such issues include the removal of sports fish in order to enhance indigenous biodiversity, the management of guides licences and concessions, and the management of game bird hunter access on conservation land. It is expressly recorded that Wellington Fish & Game Council will operate according to any National Policies when they come into effect, and will change this Management Plan to reflect such National Policies at the next review opportunity.

3.4.2 Good Governance and Strategic Focus.

Wellington Fish & Game Council has a firm commitment to good governance, and intends to maintain a strategic focus while leaving operational matters to the organisation's management.

3.4.3 Duty to Licence holders.

The Wellington Fish & Game Council is established by, and operates according to, statute, and reports to the Minister of Conservation. It is obliged to follow national policy decisions of the New Zealand Fish & Game Council. However, the Council's funds come from licence holders, and its Councillors are elected from, by, and for the licence holders. So while Council will always endeavour to sustain the species involved, and to meet the needs of other users of the habitats involved, the Council's decision making will reflect the interests of its licence holders to the extent that such focus does not compromise its statutory obligations.

3.4.4 Duty to the Treaty of Waitangi.

The Treaty of Waitangi guarantees Maori "the full, exclusive, and undisturbed possession of their fisheries" amongst other things. Maori, through their respective Iwi, have a guardianship relationship with the natural resources within their particular areas, and regard the collective life forces of lakes, rivers, land, and wildlife with a particular reverence. Maori have traditional and accepted uses of some freshwater species, particularly eels, lampreys, and koura. The Conservation Act requires Fish & Game Councils to interpret and administer it in such a way as "to give effect to the principles of the Treaty of Waitangi".

In the past, management of sportsfish and game in the Wellington region has paid little heed to Maori values. For example, eel drives were believed to improve the quality of trout fisheries, and Maori were not consulted on these.

In general, Maori interests in the well being of water bodies, and in the sustainability of customary harvests, are parallel to those of Fish & Game.

For the future, Wellington Fish & Game Council needs to develop and strengthen a relationship with Maori/Iwi, in order to resolve issues where our respective intentions differ, and to mutually support the achievement of the many environmental objectives which we share. This Council will pro-actively seek to understand the views of tangata whenua within its region about the management of sports fish and game.

4. TIMELINE AND REVIEW.

This plan is intended to guide the operation of Wellington Fish & Game Council for a period of ten years from the date of its approval by the Minister of Conservation. It will be reviewed by the Council every three years, half way through each of the Council's three year electoral terms. The plan may at that time be re-notified for consultation and formal approval, if substantive changes are proposed as a result of that review.

PART 2

5. THE ROLE OF MANAGEMENT.

The elected Council employs staff ("Management") to undertake and facilitate the activities that will enable the Council's objectives to be met. A comprehensive package of Executive Limitation Policies, in conjunction with appropriate employment agreements, govern the relationship between the Council and its Management.

6. MANAGEMENT GOALS AND OBJECTIVES.

The intention of the implementation of this plan will be to manage the region's fishery and wildlife resources as established by this plan, in such a way as to balance three competing statutory requirements:

- the sustainability of the species involved, and
- the needs of other users of habitats and natural resources, and
- the maximisation of recreational opportunity.

In seeking to balance these three competing requirements, we will try to achieve the most acceptable compromise possible. Each of these three requirements is treated as a Management Goal, within which all Objectives for each species managed are grouped.

An Objective describes a situation which Fish & Game is trying to achieve, which is the purpose for undertaking any particular item of work. As far as possible, Objectives are defined in terms of Quality, Quantity, Time, Place and Money, so that the questions of whether any Objective is actually being achieved, and whether that achievement is worth the cost involved, may be clearly assessed.

7. OPERATIONAL MANAGEMENT PRINCIPLES.

7.1 **Value of the Resource.** Greater priority will be given to the management of sports fish and game resources that are perceived by licence holders to offer a more highly valued experience.

7.2 **Pressures on Sustainability.** Greater priority will be given to work that will address issues putting pressure on the sustainability of Sportsfish and Game resources.

7.3 **Vulnerability to Over Harvest.** Greater priority will be given to work to reduce harvest, where over harvest is likely to threaten sustainability.

7.4 **Number of Licence Holders Affected.** In deciding from time to time on the appropriate level of intensity of management of a particular species, added weight will be given to activities that affect greater numbers of licence holders.

7.5 **Indigenous Biodiversity.** Regard will be given to the impact that fish and game management is likely to have on indigenous biodiversity, and regard will be given to the Government's Biodiversity Strategy.

7.6 **Work in Conservation Areas.** Fish and game management in areas managed under the Conservation Act will comply with the requirements of the Department's General Policy, and efforts will be made to ensure that work is undertaken in a way that delivers beneficial conservation outcomes.

7.7 **Cost Effectiveness.** Resources of staff and funds will be committed to activities, to the extent that the value of the result of the activity will be sufficient both to warrant the cost involved in achieving it, and to warrant the opportunity cost of not committing its resources to any other activity instead.

8. FORMAT OF PLAN

This plan is based around the fish species and groups of game species whose management is the purpose of Wellington Fish and Game Council. After the introduction and statements of general principle and purpose, the groups of species are addressed as follows.

A. Trout
B. Perch & Tench
C. Dabbling Ducks
D. Shoveler
E. Paradise Shelduck
F. Canada Goose
G. Black Swan
H. Pukeko
I. Upland Game

This plan addresses the management requirements of each of these species groups in turn, under the following headings:

1.	Location	-	where they are
2.	Population	-	how many there are, increasing or declining and aspects of species biology that have management implications
3.	Habitat	-	what they need to thrive, trends in quality and availability of habitat
4.	Harvest	-	how many are caught
5.	Participation	-	how many licence holders use them, what they expect
6.	Recent Management	-	what Council's approach to this species has been recently
7.	Conflicts and Opportunities	-	what key things limit the numbers and success of licence holders pursuing this species, and what can be done about it
8.	Information Needs	-	what we need to know that we don't already know
9.	Management Objectives	-	what are we trying to achieve
10.	Implementation	-	how we propose to achieve it

Sports fish and gamebird species not present in our region, i.e. salmon and chukar, are not addressed any further.

A. TROUT

The two trout species introduced into the Wellington Fish and Game region and managed by this Council are:

- Brown Trout, *Salmo trutta*, and
- Rainbow Trout, *Oncorhynchus mykiss*

While remnants from introductions of Brook Char many decades ago are still to be found in the Moawhango catchment, they are not significant sportsfish in Wellington and are not deliberately managed by the Council.

A1. LOCATION

Rainbow Trout are present in a self-sustaining wild population in the Rangitikei River and its major tributaries.

Centennial Lagoon in Palmerston North has had a population of rainbow trout that has been sustained by hatchery releases, that in turn has sustained a significant population in the Manawatu River. Releases of hatchery reared fish into Henley Lake (Masterton) sustained a rainbow trout population in the Ruamahanga River for many years, but with the recent curtailing of these releases this fishery is expected to revert to one of brown trout only. Rainbow Trout have not established self-sustaining populations in other Wellington rivers, despite a sustained programme of releases of millions of fish over nearly one hundred years.

Brown Trout are widespread and abundant in self-sustaining wild populations in almost all rivers and streams running off the greywacke Ruahine, Tararua and Rimutaka Ranges. The region's major rivers in the Rangitikei, Manawatu, Ruamahanga, Hutt and Otaki catchments all support good brown trout fisheries, as do the smaller catchments in the same vicinity, including the Wainuiomata, Waikanae, and Ohau Rivers.

Brown Trout are not a significant presence in the muddy, papa catchment rivers of the east coast and eastern Wairarapa to eastern Dannevirke hill country.

A2. POPULATION

Catchable sized adult trout are normally present at between 5 and 20 individuals per kilometre in clear rivers flowing at one to five cubic metres per second over gravel beds. There are wide variations in numbers according to local conditions; reaches without pools may hold very few adults, and lack of cover, poor water quality, poor recruitment,

predation, over-harvest and several other environmental factors can all reduce trout numbers in otherwise apparently suitable waters.

In support of adult populations there are invariably much larger populations numerically of younger trout; only small percentages of fingerlings and particularly of fry survive to become catchable sized adults.

The Council has not found it necessary to estimate the total trout population of the Wellington Fish and Game region. Instead, regular spawning surveys in the winter and drift dive counts of adults during summer, carried out on selected rivers are used to provide comparative assessments of the condition of our trout populations.

Wellington's adult trout populations overall are considered to be stable, with local variations according to conditions. Exceptions are as follows:

- Rivers flowing to the lower North Island's east coast carry high silt loads from their papa catchments, and generally do not sustain significant trout populations.

- A combination of natural bed instability and river control practices have prevented some reaches of some rivers from becoming as good a trout fishery as their rate of flow and high water quality would suggest.

- River control works, involving regular bed shaping by bulldozer and channelisation by stop banking and tree planting have had localised impacts on trout population levels in many rivers. These impacts have been long term and severe in the lower Oroua River for instance, with the effective destruction of many kilometres of what would otherwise be good trout habitat. It should also be noted that other river control activities have been carried out in such a way as to benefit trout habitat values.

- Due to the absence of suitable sites for spawning, trout populations in such lakes as Centennial Lagoon can only be sustained by continued hatchery releases.

A3. HABITAT

Catchable sized adult trout do best in clean, plentiful, well-oxygenated cold fresh water, running over gravel beds. Specific habitat features required for good trout habitat are as follows:

A3.1 WATER QUALITY

High water quality with good clarity, lack of suspended sediment, and lack of nutrients and contaminants is required. Reduced clarity and increased suspended sediment load occur naturally during floods and are tolerated by trout in short episodes, but not for long periods. Short discharges of nutrients can similarly be tolerated, but persistent discharges

encourage algal and macrophyte growth which in turn reduce available oxygen in the water, reducing trout populations. Contaminants such as petroleum products, pesticides, ammonia and untreated dairy shed effluent in quite small concentrations can be lethal to trout. Dissolved oxygen is especially important for trout, requiring both fast moving water to dissolve the oxygen, and lack of such oxygen consuming features as decaying vegetation mats. Water temperature in excess of 22 degrees is not helpful to trout.

A3.2 WATER QUANTITY

Trout in streams and rivers need sufficient flow to thrive. At its most basic, this means enough water for fish passage, to be able to actually swim along the stream. But trout habitat requires much more than just fish passage, there needs to be a sufficient range of depths and velocities to sustain both food production systems and the various growth stages of trout.

A3.3 SUBSTRATE

Fine, mobilisable gravel on stream beds is an essential prerequisite for successful trout spawning. If it is so mobile as to be unstable, "redds" of trout eggs will be variously eroded away or swamped; but if the gravel is too tight, cemented, and "non-mobile", spawning adults will be unable to excavate their redd sites. Cobbles and larger stones in well oxygenated riffles provide the essential living conditions for the insect larvae that are the main food supply for adult trout; absence of such substrate, or its smothering by fine silt or clay sediment, means no insects, which in turn means no trout.

A3.4 COVER

Big rocks, overhanging ledges and riverbed logs provide cover for trout to hide from shags, kingfishers, and anglers. Adult trout will not be present if there is nowhere to hide. In faster streams, white water below riffles provides useful cover. Vegetation cover, including big trees, on river banks is important to provide shade, which is also valuable for hiding, besides keeping summer water temperatures down and providing an excellent source of insects for feeding. Rivers without at least some trees overhanging the water are invariably poorer trout habitat than those that are tree lined.

A3.5 CONFIGURATION

Ideal trout streams consist of a succession of runs, riffles and pools.

- Runs are the "ordinary" parts of streams, with velocities of perhaps half to one metre per second in midstream, falling away to a few centimetres per second at the shallow edges. There is often no cover on either bank, and while fish passage is unimpeded, adult trout do not wait around in runs.

- Riffles are the short, steeper, faster "little waterfalls" within a riverbed, over which water will travel shallower and faster, perhaps up to two metres per second, than in runs. These are a river's most efficient food production sites.

- Pools are the slower deeper parts of a stream, more than half a metre deep and with velocities of less than half a metre per second. Pools typically form up around such obstructions as tree stumps, rock bluffs, and durable river control structures. Where cover is adequate, and a riffle feeds into the head of the pool, adult trout may be expected to lie in wait for a feed, whether it be an insect larva washed off a cobble in the riffle, or an angler's hare and copper nymph.

Most of Wellington Fish and Game region's gravel bed streams have trout habitat with all the above criteria in abundance. The protection of these features is specified in Section 7(h) of the Resource Management Act 1991 as requiring the "particular regard" of those administering that Act, and trout habitat protection using that Act has become one of the Council's major activities.

While only a modest proportion of Wellington Fish and Game region's human population participates in freshwater angling, rivers that are managed as good habitat for trout are thereby also made/kept suitable for a very wide range of other community needs, uses, and wishes. The quality of trout habitat in Wellington region is not in imminent danger of rapid and irreversible decline, but is subject to insidious and pervasive degradation from a myriad of causes: individual problems are usually minor, but the cumulative effect of problems not properly addressed would be severe.

Current pressures on trout habitat in Wellington Fish and Game region are as follows, listed in the same order as the desirable trout habitat features described above.

i) Water Quality Reduction

Pollution of water by discharges is widespread, and continued economic development of agriculture, industrial processing and manufacturing, and urban expansion all bring the prospect of extension and intensification of pollution of the region's fresh water resources. Point sources of pollution are comparatively easy to identify, address and remedy, although adequate treatment and discharge of sewage from many of the region's inland towns is an obvious problem for some District and City Councils. Adequately addressing diffuse pollution of lowland streams and rivers by run off and subsurface flow carrying dung, urine and surplus fertiliser from intensively managed farm land presents practical, technical and political difficulty. And the continued high quality of the water of the Hutt River is a tribute to the environmental commitment of the two city Councils and Regional Council involved. On the regulatory front, the Manawatu Wanganui Regional Council's plan for water quality management in the Manawatu catchment has set highly desirable targets for improvement of water quality that are national pace-setters.

ii) Water Quantity Reduction

Abstraction of water from streams occurs for municipal and domestic water supplies, hydroelectric power station operation, irrigation, and a variety of minor

purposes. While the west side of Wellington Fish and Game region, including the Rangitikei River, Ruahine and Tararua Ranges enjoys generous annual rainfall, which normally sustains good stream flows, the east of the region from Dannevirke to Martinborough can be summer drought prone, leading locally to acute competition for available water. Some water abstractions are essential for community purposes, and most pose little threat individually to trout habitat values. Nevertheless, wholesale pasture irrigation by many farmers during a drought, when streams are already low and warm, can pose a significant cumulative threat to trout habitat values. And with an upsurge in investment in dairy farming, a much wider demand for irrigation water than was the previous norm has been experienced, challenging the water allocation capabilities of the Regional Councils responsible.

iii) Degradation of Substrate

Gravel extraction operations "in the wet" in rivers, and mechanical interference with riverbeds have the ability to spoil the trout replenishment capabilities of spawning streams.

iv) Lack of Cover

Farm development in Wellington Fish and Game region has now got well past the stage of clearing bush to enable pasture development, and there are now few situations where farmers see any need to clear scrub or trees from stream banks. However, riparian land use involving grazing livestock having unimpeded access right to the water's edge is the norm rather than the exception, and lack of cover at stream banks is a widespread issue throughout our region.

Initiatives by Regional Councils to make financial incentives available to farmers to improve riparian land use by fencing and planting are developing, and will be particularly welcome to Fish and Game.

v) Spoiling of River Configuration

River control works, if designed and carried out with appropriate care, can usually enhance trout habitat by placing durable obstructions to river flow in such a manner as to encourage the formation of pools. However, such works including culverts, bridge piers and abutments, fords, cross blading, and "pushing the river back over the other side where it always used to be", also have the ability to destroy the run-riffle-pool sequence that is the essence of good trout habitat, replacing it with a featureless run. The run will be a hydraulically efficient floodwater conduit, but while it may well provide unimpeded "fish passage", it will have no value as trout habitat. Weirs and bed level control structures prevent upstream trout passage unless they are specifically built in a way that avoids this problem.

Wellington Fish and Game Council does not have a systematic trout habitat quality inventory for its region. With such exceptions as the Oroua River around

Feilding, and the Rangitikei River at Bulls, we assume the status quo to be generally adequate as regards the trout habitat value of streams. We rely on the Regional Councils administering the Resource Management Act to require all activities likely to impinge on the trout habitat issues above to avoid or mitigate adverse effects through appropriate plan or consent requirements. Fish and Game participates in consideration of the plans and consent applications involved to advocate for outcomes favourable to trout habitat values. This work load is substantial, consuming 13% of staff time and 10% of total budget for Wellington Fish and Game Council in most years. We regard the results of this work as valuable and necessary, but will remain watchful for opportunities to reduce the work load, without compromising the results.

A4. HARVEST

We do not have reliable, structured information on how many trout get caught, and have not regarded this information as necessary for the sustainable management of the trout fishery in most situations. The expectations of yesteryear that a successful fishing trip meant catching lots of big trout have evolved and developed; many dedicated and capable anglers these days choose to release most of the trout they catch.

Harvest information has been gathered, and will continue to be gathered, where the application of bag and size slot limits are seen as necessary to sustain a particular quality of angling experience.

A5. PARTICIPATION AND EXPECTATIONS

Participation in the Wellington trout fishery was assessed in the 1994/96 National Angler Survey, and again in 2002, while anglers' expectations were assessed and analysed in depth in the 1995 "Attitudes Towards Hunting and Fishing Amongst Licence Holders" study for Fish and Game New Zealand by MRL Research Group. We consider both these information sources to be reliable, generically if not in specific detail.

Almost all Wellington fishing licence holders fish for trout; our region has no salmon (besides the occasional farm escapee from the Marlborough Sounds) and coarse fishing does not yet attract large numbers of followers. This region sold fishing licences to over 4,400 anglers in each of the last five years. This represents 0.76% of Wellington Fish and Game region's population of 579,274 (1996 figures). This percentage of the regional population that are licenced anglers is low by national comparison; it is also low in the context of the fact that 89% of all New Zealanders regard freshwater angling as a desirable or acceptable activity. Numbers of people choosing to participate in trout fishing are a complex product of the availability of good fishing and the population's patterns of lifestyle preference.

The 1994/96 and2001/02 National Angler Surveys provide data on the numbers of "angler days" spent by anglers on our region's various trout waters, as tabulated in Table A1. Significant features arising from this table are as follows:

- The region's five most popular fishing rivers, which are the Hutt, Manawatu, Rangitikei, Ruamahanga, and Mangatainoka Rivers, carried 71% and 76% of the region's total fishing effort in the 1994/95 and 2001/02 surveys respectively.

- The Manawatu River and its tributaries carried 28% of the region's angling effort in 1994/95, rising to 39% in 2001/02.

- The Wairarapa waters, being the Ruamahanga River and its tributaries, carried 15% of the region's angling effort in 1994/95, rising to 19% in 2001/02.

- The use of lake fisheries is generally several hundred visits per kilometer per year, reflecting short shorelines and comparatively easy fishing. Strong trends between surveys reflect declining water quality in some lakes, and the cessation of trout releases in some others. The use of the lakes has halved from 1994/95 to 2001/02, from 9% to 4.5% of the region's total angling effort.

- The intensity of use of the region's rivers falls into three groups, as follows.

- Most intensive is the Hutt River, which despite a two thirds decline between surveys, still receives some 200 angler visits per kilometer of fishable water per year. This is regarded as our top priority for fishery protection and management.

- Then there is a group of rivers receiving between 21 and 70 angler visits per kilometer per year, which comprised 9 rivers in 1994/95, reducing to 6 rivers in 2001/02. The Manawatu River heads this group with 53 visits per km per year in 1994/95, rising to 61 in 2001/02. Given the long reach of seldom fished water below Palmerston North and the limited access to parts of the upper river, this most popular of our region's fisheries probably sustains over 100 angler visits per kilometer per year in the areas that are normally fished. These waters are the significant ones for allocation of fishery protection and management.

- Finally there are the rivers receiving 20 visits or less per kilometer per year. There were 12 of these in 1994/95, rising to 16 in 2001/02. While this group includes some under-utilised favourites, their protection and management receive comparatively low priority.

Anglers' expectations in the twenty first century have moved on from the urge to catch as many big fish as possible. While the possibility of catching a big one is obviously an incentive, the combination of solitude in a clean environment, the test of one's skill

against a smart trout, and the anticipation of possible success are all features that continue to attract anglers to their sport. Many anglers' respect for their quarry results in caught fish being carefully released so as to remain available for another angler, another day.

Table A1 - Use of Trout Streams by Anglers, 1994/95 and 2001/02

Rank	Stream / Lake	Fishable km	Angler Visits 1994/95	Angler Visits 2001/02	Angler Visits/Km/Yr 1994/95	Angler Visits/Km/Yr 2001/02
1	Hutt River	33	19,960	6,649	605	201
2	Manawatu River	225	11,966	13,708	53	61
3	Ruamahanga River	130	7,386	6,755	57	52
4	Rangitikei River	250	5,713	5,881	23	24
5	Mangatainoka River	63	3,042	1,664	48	26
6	Wainuiomata River	24	2,388	746	100	31
7	Henley Lake	2	2,253	282	1,127	141
8	Pohangina River	60	1,400	914	23	15
9	Waiohine River	52	1,325	954	25	18
10	Makakahi River	32	1,171	159	37	5
11	Hautapu River	56	1,057	357	19	6
12	Whitby Lakes	5	932	399	186	80
13	Kourarau Dam	2	851	607	426	304
14	Waitawa Lake	2	824	141	412	71
15	Makuri River	40	817	515	20	13
16	Waikanae River	21	752	415	36	20
17	Kopureherehere Lake	1	714	210	714	210
18	Otaki River	60	694	343	12	6
19	Kopuaranga River	20	521	518	26	26
20	Waingawa River	36	429	136	12	4
21	Tauherenikau River	32	364	214	11	7
22	Kawhatau River	63	331	85	5	1
23	Mangatarere River	27	262	156	10	6
24	Ohau River	56	233	181	4	3
25	Hokowhitu Lagoon	2	219	429	110	215
26	Mangahao River	44	213	821	5	19
27	Oroua River	120	204	616	2	5
28	Lake Wairarapa	35	200	150	6	4
29	Moawhango River	35	188	62	5	2
30	Tokomaru River	18	158	52	9	3
	Others		1,575	1,534		
	Total	**1,546**	**68,142**	**45,653**	**43**	**29**

A6. RECENT MANAGEMENT

Much of Wellington Fish and Game Council's activity in recent years has been focused on the management of trout, their habitat, and angling as follows.

a) Fish Monitoring. Drift dives and spawning surveys of a representative selection of the region's rivers are undertaken each year in order to monitor the condition and trend of the region's sportsfish populations.

b) National Angler Survey. Wellington Fish and Game Council participates fully in the occasional (every 8 years or so) telephone survey of licence holders to assess angler usage of waters.

c) Hatchery. The Council operated a hatchery at Masterton continuously since the late 1800's, producing up to two million fish per year to stock the region's waterways. The operation was scaled down in the mid 1970's, when Masterton Intermediate School used the facility to raise about 3,000 fingerling rainbow trout each year from ova purchased from the Eastern Fish and Game Council hatchery near Rotorua. The last fish from the hatchery were released in July 2002. Fish & Game has sold its interest in the hatchery property, which is now occupied by the School, although limited production could be resumed if the need arose in future.

d) Liberations. Each year Fish & Game brings about 3,000 two year old rainbow trout from hatcheries at Rotorua and Turangi, for release for children's promotional fishing events in Centennial Lagoon (Palmerston North) and Capital Trout Centre in Wellington. Capital Trout Centre is an initiative of the Wellington Flyfishers Club, and all fish released there are eventually caught; there is no river for them to escape into. Palmerston North fish that are not caught during the children's events escape into the Manawatu River.

e) Season Regulations. In July every year the Council assesses all its available information, both structured and informal, to prepare and make its recommendations to the Minister of Conservation on what the coming season's Anglers Notice regulations should be. The most recent season conditions have lakes and non-spawning rivers open all year, while spawning waters are closed to fishing in the winter. Most waters have no bag limits and no size limit, but waters believed by the Council to have limited populations of takeable fish are restricted to one fish per day, with upper size limits to protect the best breeding fish. Some waters are also restricted to "fly only" methods as a conservation measure.

f) Resource Management Act. This Council has made extensive use of the opportunity afforded by submissions on resource consent applications and plan proposals to seek appropriate protection of trout habitat in the context of the

commercial and economic development of the use of the region's natural resources.

g) Access. Council has used the few available opportunities presented by subdivisions to advocate for the creation of new angler access to trout streams where this is appropriate. Information on available angler access is prepared and made available.

h) Information. The Council prepares an annual trout fishing supplement to Fish and Game New Zealand magazine, sending it without charge to all whole season fishing licence holders in our region. A regional newsletter is also prepared and made available through licence agents. A variety of angler information pamphlets and regular contributions to trout fishing publications are produced.

i) Compliance. Warranted rangers check trout fishermen for licences and compliance with season conditions in the field; the Council prosecutes offenders.

j) Advocacy. Wellington Fish and Game Council supports the advocacy work of Fish and Game New Zealand based in Wellington, keeping issues affecting the interests of anglers properly researched and presented, in the manner and in the places where they will do most good.

A7. CONFLICTS AND OPPORTUNITIES

A7.1 SPECIES SUSTAINABILITY

A7.1.1 Poaching. People fishing without licences, or out of season, or with unauthorised gear, or taking spawning fish, or exceeding specified bag limits are poachers. At a low level poaching is an irritant only, but in waters of limited extent serious poaching would threaten the viability of fisheries. Council's Compliance programme aims to limit the impact of poaching on our region's trout resources.

A7.1.2 Over Fishing. Even if anglers are licenced and follow all regulatory requirements, there is still scope for too many anglers to impact adversely on the fishery and on each other. Council can respond to these situations either by tightening bag limits or by restricting methods allowed, either way reducing the impact of anglers on the fishery.

A7.1.3 Predators. Shags and eels have been suspected by generations of anglers of illicit harvest of trout; even quite decent sized fish are known to have been taken by shags where opportunities allow. We now consider that a modest level of predation helps to maintain a healthy and balanced population of fish, and that all

the small trout could not possibly grow into big ones anyway. Predators in naturally balanced situations are not regarded by Fish & Game as constituting a threat to trout populations. However, further information and education will be necessary to allay traditional suspicions on this issue, particularly when shags are a protected species, and eels have value to Maori and other members of the community.

A7.1.4 Environmental and Habitat Threats. These are the most serious threats to the sustainability of trout fisheries. There are the natural events, such as earthquakes, volcanoes, droughts and floods that can destroy fisheries. And there are the various human activities that can reduce habitat suitability, most of which we are able to address through Resource Management Act procedures.

A7.1.5 Adequacy of Fish Stocks. In some waters, fish may need to be added from time to time to make up for poor or non-existent natural replenishment by breeding. To this end, Wellington Fish & Game Council and its predecessor Acclimatisation Society ran a trout hatchery at Masterton for over one hundred years. That hatchery is now closed, with such fish stocks as may be required being able to be sourced from hatcheries in Hawera, Rotorua and Turangi. All transfers of trout meet the requirements of the Director General of Conservation under Sec 26 ZM of the Conservation Act.
There are several scenarios for the supply of trout, as follows.

- Rivers can be restocked. We would do this and pay for it, if Council deemed it necessary. It hasn't been necessary within the Wellington Region for many years.
- Lakes can be restocked, either to sustain a fishery or to enable promotional children's fishing events at safe and conveniently manageable locations. We do this as part of our responsibility to promote the sport.
- Private lakes can be stocked, to provide an otherwise unavailable trout fishing opportunity. We do not currently do this, but would do so, and pay for the fish, IF reasonable free access to the fishery by any licenceholder is allowed by the lake owner. If such access is not available, the lake would not be stocked.
- Trout can be provided for display in suitable ponds. We do this, subject to the pond owner agreeing to the fish not being available to be caught, and to meeting all Fish & Game's costs in making the fish available.

A7.2 ANGLER OPPORTUNITY

A7.2.1 Access. While the water in lakes and rivers, and the trout in that water, are public property, whose management is vested in the Crown, the same cannot always be said for the access to that water or to those fish. There are several aspects of access with the ability to cause problems for anglers, as follows.

- Where is a good place to fish? New recruits to the sport, and anglers new to an area, can be discouraged by not knowing where to go. Provision of information to reduce, if not remove, this problem is seen by this Council as a key requirement.
- Am I allowed to go there? While the Manawatu, Rangitikei and Hutt Rivers have been well endowed with legal public access, other areas including particularly the Wairarapa are such that much of the access needed by anglers is through and on private land. This Council needs to advocate for better angler access in such areas, and generally to make information on where anglers are allowed to go more widely available and in more accessible form.
- Are angler access opportunities free, or are they up for sale? The sale of fishing rights is prohibited by law, and this Council remains firmly opposed to any exclusive sale of access which inhibits the opportunities available to ordinary licence holders.
- While a total of 1,546 kilometers of water is identified in Table A1 above, not all of this is necessarily accessible or available as of right to anglers. Fish & Game has set itself a target of 1,000 kilometers of water (Objective A9.3.3) where it expects to have access practicable and available to anglers.

A7.2.2 Scope for Promotion. There is scope to promote a substantial increase in angler usage of some of Wellington's trout fisheries, while others such as the Hutt River already receive a comparatively high level of use. The conflict here is between the urge to keep good fishing places secret, so that they will continue to be good fishing places, and the opposing urge to get more people into the sport. Fish & Game is committed to preserving the quality of angler opportunity and experience, and its promotion of the sport needs to focus on untapped potential rather than just increasing numbers.

A7.2.3 Anglers' Preferences. Fish & Game is an organisation driven by its licence holders. It is important that the management of this region's trout resource is receptive to the wishes and aspirations of these licence holders, and that it delivers the sorts of regulations, information and ultimately the sort of fishing experience that anglers want.

A7.3 COMPETITION WITH OTHER RESOURCE USERS

A7.3.1 Trout Competition with Native Species. Trout are well adapted and successful carnivores that have made room for themselves in otherwise little modified native environments. There have undoubtedly been impacts on native fish, crustaceans, mollusc and insect populations. However, trout have now been present for over one hundred years in most waters that they currently use, and in that time new and sustainable balances of populations have clearly established themselves. Trout are now a self-sustaining ecological reality. Nevertheless, there are waters without trout, and in the interest of enabling the continuation of the

little modified native ecosystems present in those waters, this Council will need to remain sensitive to the possible impacts of any extension of current trout waters. There may even be circumstances where the removal of trout may be desirable for the protection of indigenous biodiversity, although a national policy framework for the management of such removal has yet to be agreed with the Department of Conservation.

A7.3.2 Maori Values. As noted in 3.4.4 in the introduction to this plan, there are Maori values in the land, the water, and the wildlife that need to be taken into account in the management of sports fisheries.

A7.3.3 Fish Farming. Section 26 ZI (4) of the Conservation Act 1987 provides that "No person shall establish, manage, or operate a fish farm for trout". Wellington Fish and Game Council remains opposed to any establishment of trout farms (other than Fish and Game hatcheries) because of concerns about disease and poaching, both of which could adversely affect wild populations of trout that are the mainstay of our sport.

A7.3.4 Other Introduced Fish. An assortment of carp, catfish, mosquitofish, rudd and other undesirable species are seen as posing threats, both directly and indirectly, to the habitat of trout. Besides these, there can be commercial releases of grass carp and silver carp for the purpose of water quality management. All live transfers of fish are regulated by the Director General of Conservation under Section 26 ZM of the Conservation Act 1987, as well as by Fish & Game under Regulation 57 of the Freshwater Fisheries Regulations 1983. Where a proposed fish release is considered to be relevant to Fish & Game's interest, we operate both as regulator (Reg 57) and as submitter (Sec 26 ZM). Our approach to these controls on fish releases is to allow, with appropriate conditions, releases that will not adversely affect trout habitat, and to oppose those considered to adversely affect trout habitat.

A7.3.4 Other Users. The wider community has a wide range of uses for freshwater, many of which are highly compatible with the presence of trout and anglers. However, waste discharges and the use of rivers as floodwaters conduits are activities that can have impacts on trout habitat values. Jetboating is a legitimate form of recreational use of rivers, but it can spoil an angling experience and we need to find ways with the boaties to enable each other to use rivers without unreasonable limiting of each other's enjoyment.

A8. INFORMATION NEEDS

A8.1 POPULATIONS

Our existing methods for assessing trends in trout populations in key rivers, involving spawning counts and drift dives, are regarded as appropriate and in need of extension and continuation.

A8.2 HABITATS

We do not have a comprehensive regional trout habitat inventory, although key rivers were studied and reported on in detail in the mid 1980's. Assembling a regional inventory of habitats and angler usage would be a large task, but it may be a key to reducing and focusing our present reactive Resource Management Act work.

A8.3 HARVEST

Studies that would give reliable and useful results on how many fish get caught, how big, where, and when are regarded as being necessary in Wellington Fish & Game region only where intensity of angler use or competition from other water users are such as to warrant the expense.

A8.4 PARTICIPATION

The National Angler Survey, conducted once every eight years or so, gives a valuable overview from a national perspective. However, a lower order of participant survey with greater frequency and finer acuity of focus will be necessary for more effective management to better identify and deliver our licence holders expectations. A Regional Angler Survey is a high priority in Wellington Fish and Game region.

A9. MANAGEMENT OBJECTIVES

A9.1 GOAL: SUSTAINABILITY OF TROUT AS AN ANGLING RESOURCE

A9.1.1 Objective. Trout populations in all fisheries in the Wellington Fish & Game region, that are valued by licence holders, will remain stable over time.

A9.1.2 Objective. The maintenance and improvement of the region's trout resource by the formulation and annual recommendation to the New Zealand Fish & Game Council of fishing season conditions that can be demonstrated to be sustainable.

A9.1.3 Objective. The quality and quantity of trout habitat in the Wellington Fish & Game region will remain stable over time.

A9.1.4 Objective. The protection and enhancement of the region's sportsfish resources by the operation of an enforcement programme to deliver not less than 95% compliance of anglers with licence and legal requirements, and season regulations.

A9.1.5 Objective. The maintenance and improvement of trout fisheries by stocking with hatchery-reared fish where this is necessary, achievable, and cost effective, in order to sustain significantly valued fisheries that do not have the spawning capability to sustain themselves, or have suffered a one-off decline from which unassisted recovery is unlikely. (See also A9.2.3.)

A9.2 GOAL: THE ACCOMMODATION OF THE NEEDS OF OTHER USERS OF TROUT HABITAT

A9.2.1 Objective. The identification and accommodation of the needs of other users of trout habitat.

A9.2.2 Objective. The protection of the Wellington Fish & Game region's indigenous biodiversity.

A9.2.3 Objective. The replenishment of trout fisheries with hatchery reared fish, where indigenous biodiversity values of equal or greater significance than the trout fishery in question will not be compromised.

A9.2.4 Objective. Not less than 80% of the Wellington regional general public are aware of, and favourably disposed towards, the activities of sports fishers and Fish & Game New Zealand.

A9.2.5 Objective. A positive relationship with the Wellington Fish & Game region's Iwi will be sought in respect of the management of trout.

A9.3 GOAL: THE MAXIMISATION OF RECREATIONAL OPPORTUNITIES FOR TROUT ANGLERS

A9.3.1 Objective: Angler Participation. Not less than 5,000 licenced anglers will undertake not less than 40,000 angling visits per year in the Wellington Fish & Game region.

A9.3.2 Objective: Angler Satisfaction. Not less than 85% of licenced anglers in the Wellington Fish & Game region will have a satisfactory fishing experience.

A9.3.3 Objective: Angler Access. Not less than 1,000 kilometers of angling water will be accessible to anglers in the Wellington Fish & Game region.

A9.3.4 Objective: Remote Experience Fisheries. The uncrowded quality of remote experience fisheries may be deliberately managed, if this is clearly shown to be necessary.

A9.3.5 Objective: Fishery Quality. Sports fisheries that exhibit characteristics that are valued by anglers will be identified and safeguarded.

A9.3.6 Objective: Angler Information. Not less than 85% of licenced anglers will be satisfied with availability, quality and extent of information available.

A9.3.7 Objective: Angler Ethics. Anglers will be aware of appropriate ethical standards.

A10. IMPLEMENTATION

A10.1 PROJECT COMMITMENTS "Projects" are items of work that are "oncers", that are intended to be completed comparatively quickly, in order to provide a sound basis for regular, ongoing work.

A10.1.1 Establish a Wellington Regional Angler Survey (9.3.1, 9.3.2, 9.3.5, 9.3.6)
A10.1.2 Establish a Wellington Regional public awareness survey. (9.2.4)
A10.1.3 Establish a Wellington Regional trout habitat inventory. (9.1.3)
A10.1.4 Establish and promulgate a code of anglers' ethics. (9.3.7)

A10.2 ONGOING COMMITMENTS are packages of work that require to be done on a regular, usually annual, basis. While they have objectives that are intended to be achieved, they all involve a long term work commitment.

A10.2.1. Annual drift dive and spawning surveys of a rotation of six of the regions 25 most frequently used trout fisheries (9.1.1)

A10.2.2. Undertake the Wellington Regional Angler Survey as often as required. (9.3.1, 9.3.2, 9.3.6)

A10.2.3. The annual preparation and timely despatch of the Council's Angler Notice recommendation to the New Zealand Fish & Game Council (9.1.2, 9.3.5)

A10.2.4. Make submissions on resource consent applications and plan proposals as opportunities arise to seek to achieve protection of trout habitat (9.1.3)

A10.2.5. Operate and participate in regulatory and advocacy procedures to protect trout habitat from adverse impacts of introduction of other organisms, including

advocating or undertaking, where Council considers it appropriate, the control of aquatic pests where they threaten or compromise trout habitat values. (9.1.3, 9.2.2.)

A10.2.6. Promote Riparian Enhancement Programmes with Regional Councils as opportunities allow. (9.1.3)

A10.2.7. The maintenance of an adequate number of properly trained Rangers; an annual ranging programme to check the compliance of ten percent of the region's anglers; the prosecution of all anglers found unlicenced or in substantial non-compliance with legal requirements or season regulations without just cause (9.1.4)

A10.2.8. Annually advocate and provide for the protection and improvements of angler access to the region's valued fisheries (9.3.3, 9.3.4.)

A10.2.9. Annually provide information to anglers through Fish and Game magazine, newsletters, the Fish & Game New Zealand website and regional information pamphlets as appropriate (9.3.6, 9.3.7.)

A10.2.10. The provision of news releases, displays and other forms of public communication as appropriate (9.2.4, 9.3.6)

A10.2.11. Annual programme of licence sales support and promotion (9.3.1.)

A10.2.12. Not seek, or allow, or condone the release of trout into trout free waters that have indigenous biodiversity values that would benefit from the exclusion of trout, and work actively with the Department of Conservation to ensure that all releases of trout are appropriately authorised under the Conservation Act. (9.2.2, 9.2.3)

A10.2.13. Operate and administer a Guides Licence regime, as provided by Section 26 Q(1)(f)(iii) of the Conservation Act 1987, and in line with Fish & Game National Policy when it is adopted.

B. PERCH & TENCH

Perch (*Perca fluviatilis*) and Tench (*Tinca tinca*) are the two species of Coarse Fish introduced into the Wellington Fish and Game region, managed by Fish & Game, and which are formally designated as Sportsfish. There are also Carp and Rudd in certain of the region's waters, but they are formally regarded as noxious, were not introduced by this Council, and are not under the positive management of this Council.

B1. LOCATION

Perch and Tench fisheries are known in both Whitby Lakes at Porirua, and in Forest Lakes near Otaki. Perch are more widely distributed than Tench, having been established in many of the dune lakes along the West Coast between Paraparaumu and Turakina and in the Lower Manawatu and Lower Ruamahanga Rivers. Recent finds of Tench and other coarse fish in such other waters as Lake Wairarapa and Kourarau Dam are a source of concern to Fish & Game.

B2. POPULATION

There are assumed to be thousands of perch well established in breeding, self-sustaining populations in each lake or pond where they are present. The status of riverine populations is unknown, but they appear to be sustaining themselves. Perch populations in particular lakes have been observed to fluctuate on a cycle up to ten years long between modest numbers (hundreds) of large fish (over one kilogram) and larger numbers (thousands) of small fish (up to 200 grams). Pressure on Perch populations, whether from anglers or from shags, has been perceived to incline populations towards less and larger fish.

We have no structured information on Perch or Tench populations, relying on anecdotes and personal experience for our information.

There are assumed to be hundreds, at least, of tench well established in breeding, self - sustaining populations in the three lakes where they are known to exist. As with Perch, we have no structured data on Tench populations.

B3. HABITAT

Tench and Perch live in lakes and slower flowing rivers which often have poorer water quality, (higher nutrient levels, turbidity, temperature and lower oxygen) than is popularly regarded as optimal for sustaining a good trout fishery. Perch are known to sustain breeding populations in the lower reaches of Wellington region rivers such as the Ruamahunga in the Wairarapa. They are, however, a wholly freshwater species, at no stage entering the sea or even estuaries where salinities are elevated.

Perch have been released into many farm dams in the mistaken belief that they will control water-weed. In fact, Perch are a predatory species that feeds on a variety of animals including chironomids, caddis larvae, beetles, damsel fly larvae, molluscs, and fish such as smelt and bullies. In some lakes Perch of all sizes feed mostly on midge larvae and pupae, but in rivers like the Selwyn in Canterbury common bullies are the preferred food source. In lakes, small Perch (less than 200 mm) tend to feed on zooplankton or midges, while larger Perch switch to forage fish if they are available. Cannibalism of small Perch by large ones also occurs, particularly in high density, stunted populations.

Tench feed, hide and rest in weed beds in ponds.

Perch and Tench are regarded as posing competition for trout where they coexist, and their extension into the regions "cleaner" waters is actively opposed by trout anglers. Duncan (1967) considered that Perch were unlikely to compete with trout for food in Otago's Lake Mahinerangi, where Perch fed mostly on midges. However, competition for food between Perch and Trout is thought to have caused a secondary decline in Taranaki's Lake Rotorangi Trout population, four years after the lake was formed in 1984. While Perch do not take surface foods, they appear to have a feeding advantage over Trout in lakes where thermal stratification in summer forces Trout to reside in deeper, cooler water (Perch are not restricted in their distribution by warm water temperatures).

Predation of small Trout by large Perch can also be a problem in some lakes and releases of fingerling rainbows into some Taranaki lakes have been curtailed because of the expected high losses through predation.

There appears to be "plenty" of habitat suitable for Perch and Tench in the region's lakes and ponds, and this habitat is not subject to significant known threats. The fishes' tolerance of lower water quality further assures their survival in this area. We have no systematic inventory of Perch and Tench habitat.

B4. HARVEST

We do not have systematic, or any other, information on the rates of harvest of Perch and Tench. Our observation is that despite being a flavoursome food fish, Perch harvest is sporadic and often limited to a few kids with modest equipment. The coarse fishing fraternity generally do not kill the species that they catch, preferring to record their details and release them to catch again another day. Rates of harvest of Perch and Tench have

not been observed, or heard, to have any other impact on populations than to encourage smaller populations of bigger fish.

B5. PARTICIPATION

The Hutt Valley Coarse Fishing Club has about fifty active members who pursue these species, most frequently at Whitby Lakes and Forest Lake. The equipment used is highly specialised involving very long rods, elasticised lines without reels, and an eclectic variety of baits. Angling usually takes the form of a competitive "match" between participants, who draw specially constructed and nominated fishing platforms by lot, then attempt to catch the greatest cumulative weight of fish during the four hours of the match. Hooks are tiny and typically barbless, and all fish caught are placed in a submerged "keep net" for subsequent weighing and release. While the sport has a comparatively small following in New Zealand, it is hugely popular in England, where the prohibitive cost of trout or salmon fishing makes coarse fishing the only affordable opportunity for all but the seriously wealthy.

Besides local matches, there is an established circuit of inter-regional and even international matches, involving local teams and at times local venues. The sport is currently limited by having three lakes at two venues, and growth of the sport would require the establishment of access and platform facilities at some more of the lakes known to support populations of Perch and Tench. The comparative safety of fishing from the bank of a lake, combined with the modesty of physical effort required (you sit in a comfortable seat, and don't have to walk far) can offer a highly accessible and high quality fishing experience to the very young and the very old alike.

The coarse fisherman's expectation of the fishery is understood to be a capacity to deliver at least a couple of dozen fish each to perhaps a dozen anglers during the four hour duration of a "match," with the reasonable prospect that several of the anglers will land a one kilogram or greater fish. Peace and quiet at an attractive lake are non-fishery components of a good fishing experience.

We understand that these expectations are met quite well at the three usual Perch and Tench fishing venues in our region, but that there is always room for improvement.

B6. RECENT MANAGEMENT

Wellington Fish and Game Council has done very little with or for Perch and Tench in recent years; there is scant reference to them in our Anglers Notices or promotional

material. Perch and Tench are believed largely to look after themselves, and Council has concentrated on the trout that are considered to be the main or only quarry of the great majority of our angling licence holders.

Regulations governing the use of Perch and Tench fisheries are liberal; they are generally open to angling all year. There are no restrictions either on the methods that may be used, or on the number of Perch or Tench that may be killed by an angler in any one day. It can again be noted that the serious coarse fisherman releases, rather than kills, his fish.

Wellington Fish & Game Council does not arrange or approve the release of Perch or Tench anywhere in its region, and similarly has undertaken no particular population assessments, habitat protection, harvest assessment or promotion of the fishery. The Council has received a number of requests from landowners regarding the provision of Perch for release into private farm dams. Current Policy provides that all such releases will require the prior formal approval of the Department of Conservation.

B7. CONFLICTS AND OPPORTUNITIES

B7.1 SIZE

When populations tend to larger numbers of smaller fish, this is considered to reduce the attraction of the fishery to anglers.

B7.2 LIBERATIONS

Perch and Tench have been, and evidently are still being, widely spread into many waters around our region. The Perch, especially, are active predators that can take a high toll on indigenous biodiversity values. Whereas Trout have quite specific breeding requirements, Perch and Tench breed very successfully in water of almost any quality, so one liberation of them usually means the successful establishment of a new population. And once populations are established, they are normally very difficult to eradicate. While the law is clear that fish liberations without proper authorisation are unlawful, the law is incapable of correcting damage done to native and other faunas once the liberation has occurred.

Wellington Fish & Game Council has been concerned to discover that Tench have recently been liberated into Kourarau Dam, and that Perch, Tench and the noxious Rudd have made unauthorised and unwelcome appearances in Lake Wairarapa, presumably in the expectation that this would open further coarse fishing opportunities. In the interests of protecting both native faunas and existing Trout habitat, Fish & Game must take steps to prevent and discourage unauthorised liberations of Perch, Tench, or Noxious fish.

B7.3 ACCESS

Most of the lakes known to support Perch and Tench populations are on private property without free public access. This could become an issue to be pursued if the several lakes that are freely accessible started to be over-utilised, and the provision of access to additional Perch and Tench fishing opportunities would be a positive part of promoting the sport. This enhancement of opportunities through access to "new" waters would need to be negotiated with the Department of Conservation, to ensure an appropriate containment of these fish and to protect indigenous biodiversity.

B7.4 FACILITIES

The shores of nutrient rich lakes normally have, or develop, strong communities of weeds, both submerged (oxygen weed) and emergent (raupo). This can make casting and retrieval of lures difficult, as can fences, trees and a variety of other obstacles. Fishing platforms have been installed at some lakes in the Wellington region by the Hutt Valley Coarse Fishing Club, and further development along similar lines may be desirable.

B7.5 PROMOTION

There are opportunities to promote increased use of existing and designated Perch and Tench fisheries, without necessarily extending the number of existing locations. Fish & Game will need to remain aware that promotion of Perch and Tench fishing, while having the potential to increase angler opportunity, could also increase the possibilities of unauthorised transfer of these fish.

B8. INFORMATION NEEDS

Reliable information on which to base rational and accountable management of the region's Perch and Tench fishery is non existent. Information requirements are as follows.

B8.1 LOCATIONS

A basic inventory of sites (lakes, rivers) supporting Perch and/or Tench populations, is the first requirement, without which we can do little further.

B8.2 POPULATIONS

An assessment of population numbers and size distribution in a representative lake would be helpful to enable an understanding of population dynamics.

Feasibility and cost effectiveness of harvesting perch (e.g. with eel fyke nets) to reduce population numbers and increase the average size of Perch available to anglers could also be explored.

B8.3 HABITAT

Although we have no structured information on the habitat of Perch or Tench in Wellington, gathering this information is a low priority given that we are not aware of active threats to the sustainability of perch or other coarse fish populations.

B8.4 HARVEST AND PARTICIPATION

Unbiased estimates of angler use will be obtained by the National Angler Survey, at eight yearly intervals, and more detailed information should be gathered more frequently in regional angler surveys.

B8.5 IMPACT ON OTHER VALUES

Both hard facts and the opinions of others interested in Perch and Tench habitats should be collated for the purpose of establishing the extent to which these species have unacceptable impacts on other habitat values, and how and whether such impacts might be moderated.

B9. MANAGEMENT OBJECTIVES

B9.1 GOAL: SUSTAINABILITY OF PERCH AND TENCH AS AN ANGLING RESOURCE

B9.1.1 Objective. Information on Perch and Tench localities, population dynamics, and harvest and participation statistics sufficient to provide a rational basis for Anglers Notice preparation are available.

B9.1.2 Objective. The region's designated Perch and Tench fisheries will be utilised by licenced anglers in such a way as to sustain those fisheries.

B9.2 GOAL: THE ACCOMMODATION OF THE NEEDS OF OTHER USERS OF PERCH AND TENCH HABITATS

B9.2.1 Objective. Perch and Tench are confined to their present known habitats.

B9.2.2 Objective. Perch and Tench are eliminated from habitats where they have unacceptable impacts, where this is feasible and cost effective.

B9.3 GOAL: THE MAXIMISATION OF RECREATIONAL OPPORTUNITIES FOR PERCH AND TENCH FISHING

B9.3.1 Objective. The region's designated Perch and Tench fisheries will provide satisfactory fishing experiences for not less than 200 licenceholders on not less than 1,000 angler visits per year.

B10. IMPLEMENTATION

Wellington Fish and Game Council's Annual Plans will provide for a programme of work each year which, within resource and budgetary constraints, and reflecting the Council's priorities, will deliver the Objectives stated in 9 above.

B10.1 PROJECT COMMITMENTS are:

B10.1.1 An inventory of Perch and Tench localities will be prepared, and Perch and Tench fisheries approved by Fish & Game, the Department of Conservation, and affected landholders will be formally designated. (9.1.1).

B10.2 ONGOING COMMITMENTS are:

B10.2.1. Anglers Notices will provide for the sustainable use of the region's designated Perch and Tench fisheries (9.1.2).

B10.2.2. Anglers Notices will prohibit Perch and Tench fishing in waters that are not formally designated as Perch and Tench fishing waters (9.2.1).

B10.2.3. Wellington Fish & Game Council will neither condone nor promote Perch and Tench releases that that conflict with the Department of Conservation's Conservation Management Strategy objectives (9.2.1)

B10.2.4. Perch and Tench fishing in formally designated Perch and Tench fishing waters will be actively supported and promoted. (9.3.1)

C. DABBLING DUCKS

- Anas platyrhynchos (mallard)
- Anas superciliosa (grey)

These two closely related species and their hybrids are essentially managed as a single entity by the Wellington Fish and Game Council. The Mallard is an introduced species that has become New Zealand's most important game bird. The Grey Duck is a New Zealand native that is currently considered to be a sub-species of the Australian Black Duck, although the differences between sub-species are subtle and their genetic relationship has still to be clarified.

C1. LOCATION

Mallard Duck and their hybrids are widespread and abundant throughout the Wellington Fish and Game region, particularly in areas developed for agriculture.

C2. POPULATION

Mallard Duck

While the first introductions of Mallards from Britain in 1867 were not particularly successful, introduction of American birds in the 1930's by the former Auckland Acclimatisation Society saw the species establish firmly. Harvest information indicates that the Mallard population increased rapidly in the Wellington region during the late 1960's and 1970's at the expense of Grey Duck, which underwent a reciprocal decline in abundance (Figure C1). Mallards are now the most common wetland bird in the Wellington region, and in New Zealand.

Key Points:

- Mallards have a high rate of reproduction. This is important in the context of harvest regulations and, combined with the opportunities presented by a long breeding season and adaptability to a range of habitat types, has enabled this species to sustain high population levels in most parts of New Zealand.
- Manawatu Mallard survival rates, assessed 1979-83 and 1986-90, were the lowest recorded in New Zealand and in North America. Wairarapa Mallards, in 1977-81, had similar survival rates to other New Zealand regions.
- Manawatu Mallard hens have significantly lower survival rates than their drakes.
- It is estimated that at current Mallard hen survival rates, about 4 ducks per breeding female need to be produced to fledging to sustain the population.
- Banding studies in several Fish and Game regions have shown that around seventy percent of Mallards are shot within forty kilometres of the banding site, which suggests that the bird is relatively sedentary. This means there could be several Mallard sub-populations present in the Wellington Fish and Game region.

Grey Duck

Prior to human colonisation, Grey Duck was the most numerous and widespread wetland bird in New Zealand. However, forest clearance, wetland drainage, habitat competition, and especially hybridisation with the introduced Mallard resulted in Grey Duck populations declining substantially. For example in Manawatu see Table C1.

Table C1:Proportional Change in Mallard to Grey within the Hunters Bag, 1970-1998

Manawatu	1970	1980	1990	1998
Ratio Mallards:Greys	76:24	87:13	92:8	93:7

The extent of remaining populations of pure-bred Grey Duck is not known. However, with hybridisation believed to be the greatest threat to remnant pure Greys, hunting is unlikely to influence the rate of change unless remnant populations that can be hunted are being targeted. Also, the Australian Black Duck, being genetically similar to the Grey Duck, ensures the maintenance of the species as there is evidence that Australian birds are infiltrating the New Zealand Grey Duck population.

Banding studies have shown that Grey Duck are more mobile than Mallards, as only about fifty five percent of banded birds are shot within forty kilometres of the banding site (compared with seventy percent for Mallards). The remaining birds disperse widely.

It is now believed that virtually all dabbling ducks taken by hunters are mallard-grey hybrids. While some birds display predominantly the characteristics of one or other of the parent species, it is apparent that seventy years of cross breeding has resulted in a genetic continuum, and that seeking to manage the two species separately is no longer realistic.

Mallard and Grey Duck Population Assessment

The autumn population size of Mallard and Grey Duck is assessed utilising aerial counts along preselected flight lines to establish trends in the region's overall dabbling duck population. In conjunction with the proportion of these species within the hunters' bag population change can be reliably and effectively monitored on an annual basis.

Based on an average harvest rate of about 30% (estimated from banding studies), it is our subjective opinion the regional dabbling duck population has varied between 156,000 and 355,000 since 1987.

C3. HABITAT

Mallard Duck

It is axiomatic that ducks take to water. Preferred Mallard habitat is irregularly shaped shallow wetlands predominantly of open water with a mix of open (grazed) and vegetated edge. Islands can be especially beneficial in larger (>0.5ha) wetlands. Mallards require

comparatively large open water with secluded margins for moulting and flocking, dense ground cover for nesting, and shallow water margins for feeding and brood rearing. The amount of ephemeral wetland in late winter/spring is very important for successful brood survival.

The Mallard is a very successful generalist, utilising a wide range of habitats and eating a wide range of foods. They will occupy for varying reasons any sort of wetland, from estuaries to small ponds, large lakes, drains, ditches, streams, swampy areas or the dry paddocks of agricultural land. They are equally at home in the solitude of wild wetlands or in the midst of a city park. Food taken ranges from agricultural grain and fodder crops to aquatic plants, animals and insects.

Grey Duck

Preferred Grey Duck habitat was the secluded forested wetlands of New Zealand. Such areas in the Wellington region are almost entirely found now in the Tararua, Ruahine and Kaimanawa Forest Parks. Grey Duck would probably have adapted to the agricultural environment, were it not for the introduction of the Mallard. Aggressive colonisation of modified habitats by Mallards ensured that Grey Duck retreated along with the wild wetlands.

The Grey Duck is not the generalist the Mallard is, and therefore is more limited in both habitats occupied and foods eaten. Foods mostly comprise aquatic plants and seeds, animals and insects.

Wetland Habitats

The extent and condition of wetland habitats are regarded as major factors controlling the abundance of dabbling ducks in the Wellington Fish and Game region. Fish and Game assessed these factors in the Manawatu and Wairarapa lowlands in 1997 and 1998, in a study that had the following highlights.

i) In the Manawatu, 2,136 wetlands totalling 6,130 hectares were identified, of which 96% were less than ten hectares, and 52% were open water. 30% of the wetlands by number and 90% by area are natural, with the remaining 70% by number and 10% by area being man made. 56% of the total number of wetlands are completely unfenced from adjacent pasture, while 23% are fully fenced off.

ii) In the Wairarapa lowlands, 925 wetlands totalling 10,255 hectares were identified, of which Lake Wairarapa itself comprises 7,800 hectares. 75% of the wetlands by number are man made, but with a mean size of 0.15 hectares these represent only 1% of the total area of wetlands.

iii) In the Eastern Wairarapa Hill Country, about 6% of the total area was surveyed revealing an average 1.7 man made ponds per square kilometre with a mean area of thirty metres square, of which 94% are unfenced from surrounding pasture.

Trends in the extent of wetlands have still to be reliably enumerated. It is estimated that less than five percent of the original natural wetlands in the Wellington Fish and Game region remain today. The rest have been drained over the last hundred years, mainly for farm development purposes.

The rate of drainage of permanent wetlands has decreased significantly in recent times, owing to the removal of farm development subsidies in 1984 and also because there are now few large wetland areas left to drain. Drainage activities currently focus more on the maintenance and improvement of existing drainage systems, which are likely to have most impact on the extent of ephemeral wetlands. Proof of this comes from a 1998 Horowhenua District Council evaluation of a 1993 wetland inventory of their district. An alarming 4 wetlands of very high value and 56 wetlands of high value have been lost during that time. This equates to a wetland loss of 35% in 5 years.

The fact that more than half the ponds recorded by Benn, (in his unpublished 1998 Inventory of Wetlands in the Manawatu for Wellington Fish & Game Council,) were man made, indicates that the rural community prefers to retain some wetlands, albeit often for a range of reasons besides providing homes for ducks.

There are threats to wetlands of course, with their conversion to pasture being the main one. In addition, the insidious incremental loss of wetlands through sedimentation and eutrophication continues. While the Resource Management Act identifies wetland protection as a national priority, in practice there is little that local government, or even Fish and Game Councils, can or will do to prevent the locally normal range of farm development options being exercised by farmers. While the Resource Management Act and the activities of several public agencies can and do deliver the protection of the largest, most pristine and "regionally significant" wetlands, the protection of the rest is largely dependent of individual landholders' attitudes and actions. This will remain especially so until there is a wider availability of comprehensive wetland inventories against which change can be measured.

C4. HARVEST

Harvest information is gathered annually through the National Game Bird Hunter Survey. This involves a systematic telephone survey of randomly selected licence holders, which produces reliable information of good precision on Mallards in particular.

Hunter Survey results show that, on average, Mallards comprise 75% of all game birds taken in the Wellington Fish and Game region, making it by far the most important species in the harvest. Hybrids with predominant Grey Duck characteristics make up about 5% of the harvest, and are more susceptible to hunting than Mallards (Barker 1991).

The Wellington region has been divided into two districts for harvest survey purposes; Wellington West and Wellington East. Wellington West comprises the Rangitikei,

Manawatu, Horowhenua and Greater Wellington districts west of the Rimutaka, Tararua and Ruahine ranges. Harvest of Mallards has varied in the period 1987-98 between 30,000 and 55,000. In the same area over the same period the harvest of Greys has varied between 1,000 and 4,500.

Wellington East comprises the Tararua and Wairarapa districts to the east of the Rimutaka, Tararua and Ruahine ranges; it is generally drier country with less ponds than Wellington West, but with the huge opportunity presented by the 7,800 hectare Lake Wairarapa. Harvest of mallards has varied over the period 1987-98 between 14,000 and 45,000. In the same area over the same period the harvest of Greys has varied between 1,000 and 3,000.

Generally, better hunting seasons follow wet winters and springs, particularly in successive years, when widespread water provides optimal feeding opportunities for ducklings. Poor hunting years tend to follow dry winters and springs where duckling survival is poor. Here too a succession of such years can seriously hinder population recovery. In Wellington East though, hostile weather conditions at Lake Wairarapa are believed to exert a strong influence on the number of ducks harvested.

Hunter harvest is a major form of post fledging duck mortality. From 1986-90 Manawatu banding data it is estimated that the chance of a duck being killed by hunting at any time during its life is between 30 and 60 percent. Over harvest, where hunting mortality is in addition to natural mortality (as opposed to instead of), in one game season could prevent a higher number of ducks entering the next game season. Alternatively, even if hunting mortality is not additional to natural mortality, and when the population levels are low, harvest would be excessive if the number of breeding pairs was below the subsequent breeding seasons environmental carrying capacity. Thus hunting would inhibit population recovery. In this situation, the most effective management response would be to reduce hunting mortality by lowering bag limits and/or reducing the season length.

C5. PARTICIPATION

By far most game bird hunting licence holders in Wellington Fish and Game region hunt Mallards and their hybrids. Duck hunting is the main reason most Wellington game bird hunters buy a licence.

Since 1980 the number of people buying a game bird hunting licence has fluctuated between 3,900 and 5,018 (Table C3), representing about 0.75% of Wellington Fish and Game region's population of 579,274 (1996 census). The percentage of the population participating in game bird hunting varies markedly within the region, with a lower proportion of Wellington metropolitan residents but a higher proportion of small town residents. Market research carried out for Fish and Game New Zealand in 1995 profiled game bird hunters as typically rural focused people with patterns of employment sensitive to fluctuations in the rural economy.

It is believed game licence sales tend to be higher when hunters perceive the numbers of ducks are higher than average. Whilst 1987-1998 licence sales and harvest are not positively correlated, licence sales built to peak during 1979-82 when duck numbers were the highest they have ever been, and have slowly but steadily fallen since. Complicating such a relationship is the fact that falling licence sales have lagged falling duck numbers. They will also likely lag any duck recovery. The progressive decline in game licence sales indicates that a participant once lost is difficult to recapture.

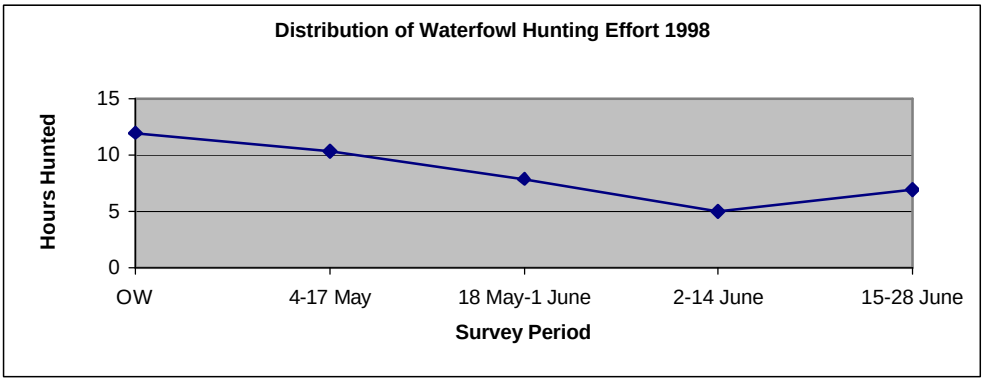
As shown in Table C2, each licence holder spends 25 to 30 hours per season hunting waterfowl, which represents about six outings per season.

Year	Total Game Licences Sold	Hours Hunted per Licence
1990	-	-
1991	4,171	-
1992	4,273	23.6
1993	4,466	29.8
1994	4,344	30.4
1995	4,279	23.8
1996	4,174	26.1
1997	4,343	26.6
1998	4,252	25.0

Table C2. Relationship between Game Licences Sold and Hours Hunted, Wellington Region, 1991-98

There is a clear pattern in the timing of duck hunters' efforts. As shown in Figure C1 below, the average time each duck hunter spends hunting is highest at opening weekend (12 hours) falling well away after that, but with a final surge of effort on the last weekend of the season.

Figure C1: Mean Number of Hours Hunted for Waterfowl per Active Hunter per Survey Period 1998 Game Season



Most game bird hunters learned their sport as a Junior from a parent. The demographics of recent game bird hunters' ages can be tabulated as shown in table C3.

Year	Total Adult Whole Season and Young Adult Whole Season Game Licences	Total Junior Whole Season Game Licences	Juniors as a Percent of Adults plus Young Adults
1980	4,740	142	3.0
1981	4,734	247	5.2
1982	4,774	244	5.1
1983	4,732	250	5.3
1984	4,404	176	4.0
1985	4,173	170	4.0
1986	4,127	222	5.4
1987	4,230	204	4.8
1988	4,146	229	5.5
1989	4,223	224	5.3
1990			
1991	3,840	212	5.5
1992	3,969	172	4.3
1993	4,073	185	4.5
1994	3,935	188	4.8
1995	3,872	212	5.5
1996	3,731	210	5.6
1997	3,887	221	5.7
1998	3,783	223	5.9
1999	3,660	232	6.3
2000	3,491	204	5.8
2001	3,396	203	6.0
2002	3,531	203	5.7
2003	3,537	207	5.9

Table C3. Relationship between Junior and Adult plus Young Adult Game Licence Holder Numbers, Wellington Region, 1991-2003

Junior licence holders are those aged between twelve and fifteen, while Young Adults and Adults are everything from sixteen years to their late seventy's. If all Juniors start at twelve years old, and they all go on to be Adult licence holders for fifty years, then a proportion of Juniors to Adults of 8% would be required, which is one third more than what we actually have. Conversely, if our present roll of Juniors is to be the only source of future Adults, then at their present level they would sustain Adult sales of 2,500, which is substantially less than current numbers. In fact, the connection between Junior licence holder numbers and adult licence holder numbers is more complex; while trends in Junior recruitment are healthy, retention of adults may be more important issue.

In 1983 the average age of licenced gamebird hunters was 37.14 years. In 1998 this lifted to 39.47 years thus, the average age increased by 2.33 years over 15 years. This rate of ageing is less than that recorded for the New Zealand population as a whole; its average age increased by 2.7 years over 15 years (1981-1986).

Licence sales do not account for the total number of duck hunting participants, as an additional 5 – 10% may hunt illegally without a licence and a further 10% may be occupiers of land that are not required to hold a licence to hunt ducks on that land. To

this must also be added the sometimes significant number of licence holders from other Fish and Game regions who hunt within the Wellington region.

Participant Satisfaction
From the national survey work and our own information sources, we consider hunter opinions to be reflected generally as follows:

- Mallard and their hybrids are easily the most preferred species game licence hunters wish to hunt, being twice as popular as the second most preferred species, pheasant.
- They enjoy game bird hunting very much.
- While getting a limit bag is something to aspire to, it is all the other components of the hunting experience, such as companionship, training and working dogs, seeing birds and having the opportunity, being in the outdoors, that combine to make it most satisfying.
- Limited access to good places can be an important barrier to some hunters. A recent survey found 11% of hunters have major difficulty getting access. However, the survey also found these hunters put in very little effort trying to find places to hunt. Interestingly, the median of those having major access difficulty was 19 years of hunting experience (range 1-53 years), indicating that difficulty of access is not particularly a feature of novice hunters, but more typically a situation that arises later in a hunters career.
- The Wellington Fish and Game Council's supply of information of all kinds to hunters could be improved, and licences are regarded by many hunters as rather expensive.

While the Council has some indicative data on components of the hunting experience, there is a paucity of information quantifying this and importantly, understanding levels of hunter satisfaction and how this may be improved.

Most duck hunters are very committed to the pursuit of their sport; once they have the bug, they tend to stay involved. Limits to participation are more likely to apply to people who have not participated before; the anti-gun and anti-blood sports lobbies, and the ever widening range of alternative uses for people's leisure time and discretionary dollars are all pressures acting against retaining adult gamebird hunters.

C6. RECENT MANAGEMENT

Much of Wellington Fish and Game Council's activity in recent years has been focused on the management of Mallards and their hybrids, their habitat, and their hunting as follows:

a) **Population Assessment** Annual autumn counts of dabbling ducks from aircraft flying preselected transect lines, to provide a basis for assessing trends in overall regional populations.

b) **National Hunter Survey** Wellington Fish and Game Council participates fully in Fish & Game's nationally coordinated annual telephone survey of randomly selected licence holders to assess harvest and participation.

c) **Season Regulations** At the end of November each year the Council assesses all its available information, both structured and informal, to make draft recommendations to the Minister of Conservation on what the coming game season regulations should be. Recommendations are finalised in late January.

The 2003 season conditions provided for Mallards and their hybrids to be subject to a 10 bird bag limit per hunter per day for an eight week season from early May to late June.

d) **Gamebird Dispersal** The dispersal of unwanted congregations of Mallard Duck when landholders notify Council of a problem, which is usually either crop damage or fouling of sites that have other uses. Fish & Game staff arrange dispersal by gas gun, shot gun, or such other method as may be appropriate in the circumstances.

e) **Resource Management Act** The use of formal planning and resource consent procedures to seek protection of waterfowl habitat from drainage and inappropriate development.

f) **Habitat Management** The maintenance of water levels, clearance of drains and clearance of raupo to enhance both waterfowl habitat and hunting opportunity at certain wetlands along the eastern margin of Lake Wairarapa.

g) **Habitat Enhancement** Assistance by way of advice and even cash grants have been made available to landholders to build or improve the quality of dabbling duck habitat on their properties.

h) **Habitat Inventory** A detailed assessment of the extent, location and condition of waterfowl habitat was undertaken by Wellington Fish and Game Council in the Wairarapa and Manawatu in 1997.

i) **Access** The Council administers waterfowl hunter access by permit onto Conservation wetlands in the Wairarapa and Manawatu, issuing over 600 permits most years.

j) **Training** The Foxton Waterfowl and Wetlands Club, in consultation with Fish & Game, runs a new hunter training programme every year at the Council's own Lake Omanu wetland near Foxton.

k) **Information** The Council prepares an annual game bird hunting supplement to Fish and Game New Zealand magazine, sending it without charge to all whole season game licence holders in our region. Regional newsletters are prepared and distributed, and information for hunters is provided through newspapers in the lead up to game seasons.

l) **Publicity** Newspaper and radio coverage, especially during the lead up to opening weekend, is provided both to encourage participants and to remind the general public about duck shooting.

m) **Compliance** Warranted Fish and Game rangers check duck shooters for licences and compliance with season conditions in the field; the Council prosecutes offenders.

C7. MANAGEMENT ISSUES and OPTIONS

C7.1 HYBRIDISATION

Exploratory DNA testing of Grey Duck and examination of duck body parts, has shown a high degree of hybridisation with the Mallard. Classification of Grey Duck as an endangered species, owing to the impacts of hybridisation, could lead to reduced hunting opportunities. Hybridisation in the Wellington region is so extensive there is nothing practically to be done, except ensure habitats favoured by Greys are preserved.

C7.2 INDIGENOUS STATUS OF GREY DUCK

Grey Duck are an indigenous species, and there are people who will wish to see native bird species protected from harvest. Wellington Fish & Game Council will manage the harvest of this species in line with any relevant National Policies determined by New Zealand Fish & Game Council.

C7.3 CONFLICT WITH FARMERS

Congregations of Mallard Duck, in particular, can do considerable damage to certain crops both at early seedling stage and approaching harvest, causing acute irritation to the farmers involved. Council must manage this conflict.

C7.4 ANTIHUNTING OPINIONS

There are people who are opposed to gun sports and duck shooting for a variety of reasons, and a significant expansion of public acceptance of their views would threaten the ability of sportsmen to hunt ducks. The Council must assist its licence holders to present a responsible, well managed and clean public image for

their sport, in order to maintain public acceptance of the legitimacy of game bird hunting.

C7.5 LEAD SHOT

While lead shot is cheap and effective, it can be toxic in wetland environments, particularly when it is ingested by waterfowl as gizzard grit. Accordingly, the use of lead shot at wetlands is being phased out, and regulations are being progressively applied to require the use of such non-toxic alternatives as steel shot in these areas.

C7.6 FIREARMS REGULATIONS

Every time a violent crime is committed with a firearm, there is a further hardening of public and political opinion which may lead to further restrictions on the availability and use of firearms. While the Council is highly supportive of measures to reduce violent crime, a consequence of more restrictive firearms regulations is that procuring and owning firearms becomes more expensive and difficult, eroding both retention and particularly new recruitment of duck shooters. Council supports responsible representation of licence holders' interests at forums debating tighter firearms regulations.

C7.7 COMPLIANCE

While Fish and Game ranger checks on about ten percent of the region's licence holders each year indicate a rate of compliance with regulations of about ninety five percent, there are nevertheless a few each year who hunt without licences or in contravention of regulations. Council must seek to ensure compliance with its regulations, otherwise there is no point in making them, and it must seek to protect its only source of revenue, which is licence sales. A spate of Court decisions in recent years involving derisory fines and high legal costs to the Council when prosecuting offenders, makes the prospect of the upcoming automatic fine regime particularly welcome.

C7.8 ACCESS

Game bird hunter opportunity could arguably be singled out as the most important result that the Council can deliver. A key component of this is access, and the Council must strive to identify and make known such access as may be available to duck shooters.

C7.9 HABITAT

Lack of quantity and quality of suitable habitat for ducks (i.e. ponds) has been widely perceived to apply a major limitation to the general availability of duck hunting opportunity. Recent inventory work has provided a basis for rational analysis of this. If opportunity is being hampered by inadequate duck habitat, then Council must continue to seek to protect, and to encourage enhancement of those habitats.

C7.10 POPULATIONS

Ensuring that there are "enough" ducks is a key component of delivering hunter opportunity. How many ducks there are, and how many are considered to be "enough", are variable and not currently able to be precisely defined. Population surveys are critical in defining sustainable population levels in order to maximise hunter opportunity, and provide a transparent accountability for the results of our management of wild duck populations.

C7.11 PARTICIPANT SATISFACTION, RECRUITMENT AND RETENTION

To recruit and retain gamebird hunters, and provide value for money, it is crucial that Council understands the various components that comprise the gamebird hunting experience, the relative importance that hunters give these, and what services Council should provide to maintain and/or better that experience. It is probably the most fundamental requirement of Council and one of the least understood.

C8 INFORMATION NEEDS

We consider that there are four components of an integrated wildlife management system. These are:

- Where is it? *(Fish and Game Inventory)*
- Where do we want to be? *(Fish and Game Management Plan)*
- How will we get there? *(Fish and Game Annual Operational Work Plan)*
- Did we make it? *(Fish and Game Monitoring Strategy)*

With respect to Mallard and Grey Duck to meet management objectives, Council needs to monitor:

- Population Change. Annual population autumn trend counts.
- Hunter Harvest. Participate annually in the National Gamebird Harvest Survey.
- Recruitment. Annually monitor duck recruitment.
- Survival Rates. Periodically monitor survival rates to assess harvest impact.
- Habitat Change. Periodically monitor duck habitat.
- Participant Satisfaction and Change. Fish & Game is conducting surveys to increase its knowledge of the attractants and detractants of the hunting experience, and their relative importance to hunters. Council will need this information to enable it to decide what management action may be necessary to maintain and improve these factors, with a particular regard to retaining and recruiting participants.

C9. MANAGEMENT OBJECTIVES

C9.1 GOAL: SUSTAINABILITY OF DABBLING DUCK AS A HUNTING RESOURCE

C9.1.1 Objective. The Wellington regional population of Mallard Duck and Grey/Mallard Duck hybrids is managed to remain relatively stable over time.

C9.1.2 Objective. Hunter harvest of Mallard Duck and Grey/Mallard hybrids will be controlled so it is not the cause of any population's demise.

C9.2 GOAL: THE ACCOMMODATION OF THE NEEDS OF OTHER USERS OF DABBLING DUCK HABITATS

C9.2.1 Objective. The dispersal or control of congregations of Dabbling Duck where they cause unacceptable damage to farmers' crops is undertaken in a timely and cost effective manner.

C9.2.2 Objective. The identification and accommodation of the needs of other users of Dabbling Duck habitats.

C9.2.3 Objective. That a positive relationship with the Wellington Fish & Game region's Iwi be sought in relation to the management of Dabbling Ducks.

C9.3 GOAL: THE MAXIMISATION OF RECREATIONAL OPPORTUNITIES FOR DUCK HUNTERS

C9.3.1 Objective. 90% of dabbling duck hunters have a satisfactory hunting experience.

C9.3.2 Objective. The availability of hunter access to private and public lands is at a level that does not impede the satisfaction of duck hunters.

C9.3.3 Objective. The management of hunter access and the allocation and management of maimai sites shall be undertaken by Council, where a mutually acceptable written agreement to this effect between the Council and the landholder or land administering authority can be negotiated.

C9.3.4 Objective. Game licence sales are at a level that will sustain effective management of the sport.

C9.3.5 Objective. Not less than 85% of the Wellington regional general public knows and accepts the interests of dabbling duck hunters.

C9.3.6 Objective. Not less than 85% of hunters will be satisfied with the availability, quality and extent of information available.

C9.3.7 Objective. Hunters will be aware of appropriate ethical standards.

C10. IMPLEMENTATION

Wellington Fish and Game Council will prepare season conditions each year based on consideration of the following factors;

- Autumn population trend counts.
- Preceding winter – spring rainfall.
- Recorded trends in hunter participation, success rate, and satisfaction.
- Recorded trends in harvest.

On the basis of these factors, it will be determined whether the harvest regulations for an upcoming game season are to be

- Generous, with the likelihood of an abundance of Dabbling Duck available.
- Moderate, with average numbers of fowl available.
- Restrictive, with the population being sufficiently low to warrant a restriction on harvest.
- Very Restrictive, with the population likely to be so low as to warrant tight restrictions on bag limits and season length.

Wellington Fish & Game Council has developed this approach during the first few years of the twenty first century, and expects over the next few years to further calibrate the respective sets of regulations against the determining factors.

D SHOVELER

D1 LOCATION

Shoveler are widespread throughout New Zealand, and within the Wellington Fish & Game region they occur frequently at Lake Wairarapa and along the west coast.

D2 POPULATION

Banding studies have shown that shoveler are highly mobile, with birds often moving the full length or breadth of the country within a year. Shoveler can therefore be considered to form a single national population that is widely dispersed throughout suitable habitats. They are a New Zealand native species that is recognised as indistinguishable from its Australian counterpart, and there are believed to be regular immigrations of Australian birds into New Zealand.

The national population of shoveler began to be regularly and systematically assessed in a coordinated way by Fish & Game New Zealand in 2000, and meaningful assessments of the relationship between numbers counted and actual population levels cannot be made for a few years yet. However, the national population of shoveler has been assessed at between 100,000 and 150,000 birds, and is believed to be stable, while an annual national harvest of about 14,000 birds is also stable.

They have a comparatively high natural mortality rate, leading to an almost complete turnover (95%) of population every four years, which is quicker than for any other wetland gamebird in New Zealand. However, there is no indication that the population, either nationally or regionally, is declining.

D3 HABITAT

Shoveler have a large spoon-shaped bill containing very fine lamellae which they use to filter food particles as small as 1 mm from the open waters of lakes and ponds and from bottom sediments in shallow water. They feed extensively on microscopic zooplankton present in open waters, but also eat small aquatic plants such as *Lemna*, the seeds of aquatic plants and also those of terrestrial plants that are blown onto water, aquatic insects, midge larvae and freshwater snails. Shallow eutrophic freshwater lakes and ponds are therefore their preferred feeding habitats. However, adequate feeding opportunities do not last all year round at any particular site, which may explain this birds extreme mobility. The relative scarcity of shallow, eutrophic freshwater wetland habitats also appears to be a factor limiting the overall abundance of shoveler in New Zealand.

In winter and early spring shoveler form large flocks on specific lowland lakes in order to pair for breeding. Pairs then leave to establish breeding territories along farm drains, or in small ponds or temporarily flooded wetlands. Nesting and juvenile rearing is carried out

very secretively and the presence of adequate vegetative cover is an important habitat requirement. Nesting occurs in long grass, rushes and tussock clumps and the average clutch is 11 eggs (less than the 13 for mallard). Breeding occurs later than for other ducks and the breeding season is short, peaking in late October to early November. Females appear to return to their birthplace to breed.

Ducklings are reared on small overgrown farm ponds and around the margins of permanent shallow lakes, although farm drains with dense, rank grass margins are favoured. Ducklings spend much of the day hiding in vegetation, but emerge at night to feed. Ducklings take 6 to 8 weeks to fledge, and it is estimated that each breeding pair raises 3 to 4 ducklings on average. It is thought that failed breeders do not attempt to re-nest. After breeding, adult shoveler gather at traditional lake sites for the moult, where they seek refuge in areas of dense vegetation.

D4 HARVEST

Shoveler are hunted in all Fish & Game regions, but make up only about 1.4% of the total national waterfowl harvest. The harvest of shoveler can show significant year to year variation within individual regions, but typically the bulk of the national harvest is taken in the Auckland-Waikato, Eastern, Hawkes Bay, Wellington and Otago regions. Nationally the shoveler harvest shows strong stability from year to year, indicating that the population is stable and that recent harvest levels are sustainable.

Harvest is assessed every year as part of Fish & Game New Zealand's National Gamebird Hunter Harvest Survey, and trends in numbers harvested in the Wellington Fish & Game region are shown in Table D1.

Table D1 Wellington Region Shoveler Harvest, 1987 – 2002

Year	Shoveler Harvest Estimate	95% Confidence Interval
1987	1,896	1,334 - 2,458
1988	4,112	2,642 - 5,581
1989		
1990	2,472	1,343 - 3,601
1991		
1992	3,398	2,054 - 4,742
1993	2,080	990 - 3,170
1994	880	271 - 1,489
1995	2,838	1,360 - 4,316
1996	1,490	742 - 2,237
1997	2,999	1,416 - 4,581
1998	1,615	1,015 - 2,569
1999	1,607	1,063 - 2,428
2000	1,687	1,040 - 2,737
2001	641	142 - 416
2002	1,548	1,076 - 2,228

Thus the Wellington Fish & Game region's harvest of shoveler has averaged 2,090 birds per season over the last sixteen years, with the year's harvest exceeding 3,000 only twice and falling below 1,400 birds only twice during that time.

There are several features of shoveler behaviour that limit their harvest by hunters, as follows;

- Their small size, very rapid flight (over 100 k.p.h.) and erratic landing behaviour make them a difficult target.
- They are not easily called in to a set of decoys.
- They fly very early or very late in the day, often outside legal hunting hours (6.30 am to 6.30 pm).
- They are often the first ducks to take refuge at sea or in sanctuaries once the game season begins.

D5 PARTICIPATION

Shoveler make up a minor portion of some waterfowl hunters' bags in the Wellington region. Comparatively large numbers of them at Lake Wairarapa make them an attractive opportunity there, and they can be a late evening bonus for a sharpshooter along the Manawatu coast. Shoveler weigh in at little more than half the weight of a mallard, and accordingly are not particularly sought after for the table. They are nevertheless a valued hunting species as a component in a hunter's bag.

D6 RECENT MANAGEMENT

The management of shoveler in the Wellington Fish & Game region has focused on bag limits and trend counts in recent years. Bag limits were brought into line with the practice in many other regions in the late 1990's, removing them from a reasonably generous composite bag limit and replacing this with specific limits of 5 at Lake Wairarapa and 2 for the rest of the region. While on the face of it this was a significant reduction, in fact it reflected what many hunters actually achieve; very few hunters previously took more than 5 shoveler at Lake Wairarapa or more than 2 anywhere else.

Trend counts were started in 2000, as part of a nationally coordinated approach by Fish & Game New Zealand to the management of this nationally distributed species.

D7 CONFLICTS AND OPPORTUNITIES

D7.1 INDIGENOUS STATUS

Shoveler are indigenous to New Zealand, and there are people who wish to see native bird species protected from harvest. Our view, that the harvest must only be undertaken within limits that ensure the sustainability of the target species, apparently does not satisfy the

objectives of these people, and resulting conflict needs careful and sensitive management. At the very least, we need information systems capable of allowing a demonstration of the sustainability or otherwise of harvest levels.

D7.2 POSSIBILITY OF OVER-HARVEST

Shoveler exist as a single, comparatively small national population, and harvest by hunters appears to contribute significantly to post fledging mortality. Over-harvest, even in one region, could reduce bird numbers in other parts of New Zealand. It is thus appropriate for shoveler to be managed in a nationally coordinated framework, to prevent the possibility of over-harvest, which has been demonstrated in the past.

D7.3 HABITAT DECLINE

Shoveler require shallow, eutrophic lakes and ponds for feeding, as well as lakes, ponds and drains with dense riparian cover for breeding and moulting. The removal of riparian cover and the drainage of wetlands to facilitate farm development have the potential to reduce shoveler numbers.

D8 INFORMATION NEEDS

We have a reasonable ongoing source of information on Harvest and Participation through Fish & Game New Zealand's National Gamebird Hunter Harvest Survey. Other information requirements are as follows.

D8.1 HABITAT INVENTORY

Important habitats for shoveler within the Wellington Fish & Game region need further identification.

D8.2 POPULATION MONITORING

The annual coordinated trend counts of shoveler, undertaken by all Fish & Game Councils, need to be continued to build a reliable framework for the assessment of harvest sustainability.

D9 MANAGEMENT OBJECTIVES

D9.1 GOAL: SUSTAINABILITY OF SHOVELER AS A HUNTING RESOURCE.

D9.1.1 Objective Shoveler populations will be managed to remain relatively stable over time.

D9.1.2 Objective Hunter harvest of shoveler will be controlled so it is not the cause of any population's demise.

D9.1.3 Objective Research, monitoring, and harvest regulation of shoveler will be conducted in national collaboration.

D10 IMPLEMENTATION

Wellington Fish And Game Council's annual plans will each year provide for a program of work which, within resource and budgeting constraints and reflecting the Council's priorities, will deliver the objectives stated in 9 above.

D10.1 ONGOING COMMITMENTS

D10.1.1 The harvest of shoveler and the success of shoveler hunters will continue to be annually assessed through the National Gamebird Hunter Harvest Survey. (9.1.2)

D10.1.2 Trend counts of shoveler will continue to be undertaken within Fish & Game New Zealand's coordinated program.(D9.1.1)

D10.1.3 Opportunities that are available for the assessment of shoveler habitat in the Wellington Fish & Game region will be taken.(D9.1.1)

D10.1.4 Season conditions that regulate shoveler harvest to deliver the sustainability of shoveler as a hunting resource will annually be recommended to the Minister of Conservation.(D9.1.2)

D10.1.5 National strategies for research, monitoring, and harvest regulation will be advocated. D9.1.3)

E. PARADISE SHELDUCK

- *Tadorna variegata*

E1. LOCATION

Widespread throughout Wellington Fish and Game region, particularly in the north, and appears to be continuing to expand into new areas as well as increasing in numbers in areas where it is already well established.

E2. POPULATION

The Paradise Shelduck is a New Zealand endemic species that breeds only in New Zealand. Prior to European colonisation of New Zealand the Paradise Shelduck appear to have been neither widespread nor numerous. Now they are widespread and numerous throughout New Zealand and are thriving. Land use changes from predominantly bush and wetland to pasture interspersed with small lakes and ponds seem to admirably suit this species. The North Island population stems from a liberation of Southland birds at National Park during World War 1.

The Paradise Shelduck is biologically somewhere between a goose and a duck. From the goose side they are long-lived, mate for life, and don't breed until they are at least two years old. From the duck side they have large clutches and high duckling mortality but being delayed breeders, their rate of replacement is slow compared to ducks.

Adults are very sedentary, travelling little more than thirty kilometres, and that is only to a moult site. It is unusual for non-breeders to travel more than fifty kilometres and less than five percent will travel more than one hundred kilometres. Females have a strong homing instinct, males do not.

The Paradise Shelduck are flightless during the three to four week moult. Moult sites are traditional and individuals will return to the same moult site each year. Non-breeders moult first in December/January, breeders in February and failed breeders any time between.

The Paradise Shelduck are grass eaters and particularly favour young newly sown grass. They will feed on grain crops too, often causing problems to farmers. While capable of breeding as two year olds, about a third will wait until they are three years old. Only territory holders will breed and once a territory is claimed it is theirs for life. However, 10-15% of territorial pairs will not attempt to breed. Nesting begins in early August and nest sites can be holes in the ground, in trees, hollow logs, or even under buildings. Average

clutch size is ten eggs. Incubation is by the female alone and takes about thirty one days. They are poor nesters. Around a third of all nests will fail to hatch. Also, seldom do all eggs hatch. They are also poor re-nesters and few will try. About twenty percent of all broods die out. Of the remaining about sixty percent will survive. Combining all losses, only about 2.5 - 3.0 ducklings will fly per breeding pair in any given year. Ducklings are reared on water, and insects are an important food source in the first two or three weeks of life. To fledging takes about eight weeks. More than one brood can be reared on a pond, but this is by different parents and usually at different times.

Williams (1972) estimates that thirty six percent of the breeding birds die each year and that shooting (in heavily shot areas) accounts for between twenty five and fifty percent of these deaths. Juveniles are more heavily shot. Up to fifty percent die in their first year, and of the survivors about forty five percent die next year. Only about twenty percent will survive to breed.

Two thirds of the population breed at age two, the remaining at age three. Between ten and fifteen percent of breeders will not breed in any one year. Between twenty five and thirty percent will be failed breeders in any one year. The average number of ducklings raised to fledging (from attempted breeding pairs) is 2.5-3.0. Mortality between fledging and eighteen months is high - about forty five percent. Under "heavy" hunting pressure during the 1960's (ten birds per hunter per day, one month season, about the same number of licences being issued then as at present), an estimated 1.7 eighteen month old birds per breeding pair were required to maintain a stable population. The population at the time was declining. In the 1960's Taihape population, an estimated twenty five to thirty five percent of all deaths in a year were caused by hunting, which was enough to cause population declines. However, the setting of bag limits and season lengths now reflects productivity, which allows greater assurance of the sustainability of populations.

The size of the population of Paradise Shelduck in Wellington Fish and Game region has not recently been assessed, but its overall trends are subject to annual monitoring.

E3. HABITAT

For flock sites, Paradise Shelduck prefer wide, open pasture areas in close proximity to concentrations of territorial pairs, and usually beside a stream or river. Territorial pairs prefer pasture with one or more ponds or river sections, or next best, swampy seepage's as substitutes. Not all ponds are suitable. Preferred ponds are those on hillsides or on flats; those in gullies are avoided and hilltop ponds not liked. Preferred ponds all have panoramic views. Other pond characteristics, such as water clarity, size, depth, food content, marginal vegetation – are apparently not considered important for pond selection. The majority of pairs have only one pond in the territory. Where more than one pond is occupied in the territory, they are usually close and in sight of the pair's main roosting site. Feeding mainly takes place in swampy soaks and gullies. The distribution of these is believed to be a key determinant of territory size.

The quantity of Paradise Shelduck habitat available has not been assessed. There appears to be no shortage of farmed pasture, which the birds favour. The bird's preference for moult sites is open water of more than one hectare in area.

E4. HARVEST

Estimates of annual harvest of Paradise Shelduck in the Wellington Fish and Game region have been made since 1987, latterly through the National Gamebird Hunter Survey. The results of these assessments are shown in Table E1.

Year	Estimated Total Annual Harvest	95% Confidence Interval
1987	2,446	1,829 - 3,063
1988	7,088	5,389 - 8,786
1989		
1990	3,952	2,039 - 5,962
1991		
1992	6,166	2,808 - 9,524
1993	8,456	3,643 - 13,269
1994	14,859	-1,789 - 31,507
1995	8,398	5,128 - 11,668
1996	6,908	4,237 - 9,580
1997	8,956	5,544 - 12,368
1998	10,135	7,611 - 13,496
1999	12,449	9,061 - 17,102
2000	11,589	9,102 - 14,754
2001	10,266	
2002	12,761	10,284 - 15,834

Table E1. Annual Harvest of Paradise Shelduck in Wellington Fish and Game Region

The confidence interval for these assessments is rather wide for reliable management, and the harvest survey methodology for Paradise Shelduck would need to be refined if better sensitivity is to be applied to the management of this species.

E5. PARTICIPATION

Gamebird hunters in Wellington Fish and Game region regard Paradise Shelduck as their third most highly preferred species to hunt, after Mallards and Pheasants. Most hunters bag at least one parry per season, making this bird a significant gamebird resource in this region.

E6. RECENT MANAGEMENT

Wellington Fish and Game Council has managed Paradise Shelduck in recent years as follows:

a) Counts of birds at moult sites in January were resumed in the mid 1990's after several years without population assessment for this species.

b) National Gamebird Hunter Survey has recorded harvest of Parries in Wellington Fish and Game region since 1991, with comparable regional data having been compiled before that back to 1987.

c) Season regulations in the last few years have provided for Parries to be subject to a 10 bird daily bag limit throughout the region, with a season duration of eight weeks in May and June.

d) Dispersal or culls of flocks of Parries are carried out as required when the birds congregate to bother crops of new pasture.

E7. CONFLICTS AND OPPORTUNITIES

E7.1 CONFLICT WITH FARMERS

A few pairs of Parries, browsing the paddocks and hills, are not regarded as a problem by most farmers. However, mobs of several hundred birds moulting on and around a pond, or congregated on a newly mown hay paddock shortly after moulting, have caused problems for farmers, leading to requests for assistance to remove the birds, and even rumoured illicit culling operations. We cannot expect the farmers whose properties are the habitat mainstay of this gamebird species to carry this burden unaided, and the Council's assistance in arranging dispersal or culls, where warranted, will be a continuing consequence of maintaining the present high regional population.

E7.2 INDIGENOUS STATUS

While Parries were deliberately introduced to the North Island as a gamebird species, they are nevertheless indigenous to New Zealand, and there are people who wish to see native bird species protected from harvest. The resulting conflict needs to be managed, with a focus on the sustainability of the regional population in the face of the managed level of harvest.

E7.3 COMPETITION FOR HABITAT WITH OTHER WATERFOWL

As populations in the Wellington Fish and Game region grow, we receive increased anecdotal reports of a pair or two of parries displacing (i.e. chasing

away) several pairs of dabbling duck species from breeding sites at ponds. This will need to be managed to the extent that it conflicts with the sustainability of population levels of the other duck species involved.

E7.4 GROWING POPULATION LEVEL

If the regional population of Paradise Shelduck grows ahead of the toll taken by harvest and by natural mortality, and unless harvest levels are increased to a level that will keep populations in check, competition for habitat and conflict with farmers can be expected to grow significantly.

E7.5 POSSIBILITY OF OVER-HARVEST

Paradise Shelduck have a much slower breeding rate than dabbling ducks, and once over-harvest occurs, numbers can take a long time to rebuild. This has happened in the Wairarapa, where population decline attributed to over-harvest in the 1970's took perhaps a decade to recover to a level where harvest in reasonable numbers has been consistent from year to year.

E7.6 ANTIHUNTING OPINIONS

There are people who are opposed to gun sports for a variety of reasons, and a significant expansion of public acceptance of their views would threaten the ability of sportsmen to hunt all gamebirds, including Paradise Shelduck. The Council must assist its licence holders to present a responsible, well managed and clean public image for their sport in order to maintain public acceptance of the legitimacy of gamebird hunting.

E8. INFORMATION NEEDS

E8.1 POPULATION

Population assessment methodology is adequate, and autumn population size should continue to be annually monitored to give a reasonable level of confidence in our assessments of the impact of harvest management measures.

E8.2 HARVEST

Harvest assessment through National Gamebird Hunter Survey is adequate, but refinement would be a pre-requisite for any more detailed regulation setting system.

E9. MANAGEMENT OBJECTIVES

E9.1 GOAL: SUSTAINABILITY OF PARADISE SHELDUCK AS A HUNTING RESOURCE

E9.1.1 Objective. Paradise Shelduck populations will be managed to remain stable over time.

E9.1.2 Objective. Hunter harvest of Paradise Shelduck is managed so as not to be the cause of any population's demise.

E9.2 GOAL: THE ACCOMODATION OF THE NEEDS OF OTHER USERS OF PARADISE SHELDUCK HABITAT

E9.2.1 Objective. The dispersal or control of populations of Paradise Shelduck where they cause unacceptable damage to farmers' crops, pastures and water supplies are undertaken in a timely and cost effective manner.

E9.3 GOAL: THE MAXIMISATION OF RECREATIONAL OPPORTUNITIES FOR PARADISE SHELDUCK HUNTERS

E9.3.1 Objective. The harvest of sufficient Paradise Shelduck by licence holders each year to keep the regional population in check without recourse to unsportsmanlike methods.

E10. IMPLEMENTATION

Wellington Fish and Game Council's Annual Plans will each year provide for a programme of work which, within resource and budgeting constraints and reflecting the Council's priorities, will deliver the objectives stated in E9 above.

E10.2 ONGOING COMMITMENTS are

E10.2.1. Regional Paradise Shelduck populations will continue to be assessed by annual counts at the region's significant moult sites (9.1.1)

E10.2.2. Harvest of Paradise Shelduck will continue to be assessed through the National Gamebird Hunter Survey (9.1.2)

E10.2.3. Game Season Conditions will be set annually that will allow and encourage hunters to harvest Paradise Shelduck to the greatest extent compatible with sustaining the regional population (9.1.2, 9.3.1)

E10.2.4. Unwanted congregations of Paradise Shelduck will be dispersed or culled as required (9.2.1)

E10.2.5. Participation in Paradise Shelduck hunting will be actively promoted (9.3.1).

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F. CANADA GOOSE

- *Branta canadensis*

F1. LOCATION

While Lake Wairarapa is a focus for the Wellington Fish and Game region's population of Canada Goose, the birds also range widely through the Wairarapa, as well as through the region's west coast, from the Kapiti Coast north through the Horowhenua and well into the Rangitikei valley.

F2. POPULATION

Canada Goose were first introduced into New Zealand from the United States of America in 1905, when they established strongly in the South Island. They were established in northern Hawke's Bay in 1970 by liberation, but did not expand their range.

They were liberated in the Wairarapa in small numbers (ten to twenty per year) from 1977 to 1984; all these birds were sourced from Lake Ellesmere, and were permanently pinioned before release onto farm ponds. Since 1986 there has been a dramatic increase in the Canada Goose population at Lake Wairarapa; from about thirty birds at that time, 3,100 were counted in 1997. This increase has been greater than could be attributed to local breeding, implying recruitment of birds from other regions. Nevertheless, these birds appear to form distinct regional or subregional populations, with little recorded movement of birds between populations or sub-regions.

Aerial population counts of moulting birds are carried out at Lake Wairarapa in late January of each year. The possibility of other moult sites will continue to need to be checked via farmer contact.

YEAR	CANADA GOOSE COUNT	
1987	400	
1988	430	
1989	600	
1990	1300	
1991	1100	
1992	1230	
1993	1480	
1994	1830	
1995	2300	*
1997	3100	
		* estimate

Table F1. Population Counts of Canada Goose at Lake Wairarapa

Liberations of Canada Goose west of the ranges occurred on a haphazard basis in response to requests from landholders for a pair or two for their lake, lagoon or pond. They established slowly, with a counted Manawatu-Horowhenua population of about two hundred birds in 1998, increasing to several hundred by 2003.

Canada Goose are long-lived (up to 25 years) and late maturing (three years of age). Behaviourally they are similar to Paradise Shelduck. Very territorial, pairs form to breed, raise their young and then congregate to moult. Non-breeding birds flock. They are ground nesters. The female alone incubates for the twenty eight days while the male defends her. Hatching to fledging takes about eighty days. The family unit is maintained for most of the year.

F3. HABITAT

Canada Goose are pasture grazers, and are likely to be found anywhere. They are normally found in association with freshwater wetlands, and particularly with larger bodies of water. Their specific habitat requirements are not well understood in the Wellington Fish and Game region.

They nest and raise their young close to wetlands. Like other waterfowl, the young require a high protein diet in their first few weeks and mortality during this time can be

high. Large bodies of water are used for roosting, moulting and the flocking of non-breeding birds.

Habitat factors that could limit bird populations are unknown. We are not aware of either upward or downward changes in the quality or quantity of their habitat. Canada Goose are perceived as a significant pasture-consuming pest by some farmers.

F4. HARVEST

Until recently Canada Geese were allowed to be hunted only in the Wairarapa, with the 2003 season extending from the beginning of May to mid July with a 15 bird bag limit, and a summer season of February and March to increase hunter opportunity. Canada Goose were brought onto the licence west of the ranges for the first time in 2003, following increasing instances damage to pastures.

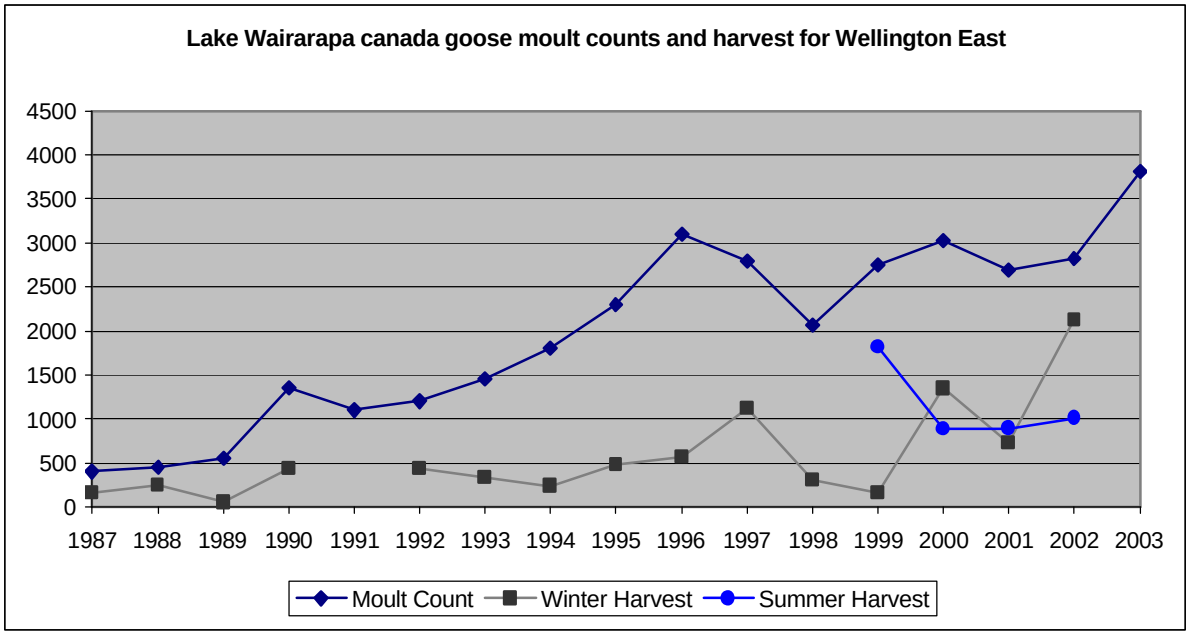
Tables F2 and F3 show a fluctuating Canada Goose harvest, including a total population steadily increasing.

Table F2. Estimate of Winter Canada Goose Harvest at Lake Wairarapa

YEAR	NUMBERS HARVESTED
1987	161
1988	252
1989	no survey
1990	437
1991	no survey
1992	433
1993	331
1994	236
1995	365
1997	639

The source for this data is Fish & Game's National Hunter Survey. It records only winter season harvest; reliable information on summer season harvest has only been recorded recently.

Figure F1. Population Counts and Harvest Results at Lake Wairarapa for Canada Geese



F5. PARTICIPATION

In 1997 Wellington Fish & Game Council interviewed a sample of its game licence holders and established that of 3,949 adult, young adult and junior licence holders, 545 (95% confidence interval is 316-774) hunters hunted Canada Goose during the 1997 winter game season, representing 14% of our licence holders. As a result of specific canvassing, we also established that there is a "hard core" of about eighty hunters who particularly and specifically hunt Canada Geese.

Canada Goose hunting requires a wider range of skills for success than is the case for other waterfowl. Co-ordinated and mobile teams of hunters who take the trouble to study where the birds are feeding and use good camouflage can be very successful; "as good as it gets" was one hunter's opinion of his recent summer hunt.

F6. RECENT MANAGEMENT

This Council has tried since Canada Goose were introduced into the Wairarapa in 1977 to balance extended recreational hunting opportunity on the one hand against farmer complaints of pasture damage on the other hand. Current management involves:

1) Annual population counts at Lake Wairarapa and elsewhere at moult sites, during January.

2) Annual harvest assessment through the National Gamebird Hunter Survey.

3) Dispersal or culling of unwelcome gaggles when farmers notify a problem.

4) Setting season conditions which provided in 2003 for a 15 bird daily bag limit during an eleven week winter season, and a twenty bird daily bag limit during a seven week summer season.

The table below shows the progressive easing of restrictions on the hunting of Canada Goose, reflecting the increasing Lake Wairarapa population of the birds.

Table F4. Changes to Wellington Region Canada Goose Regulations in Response to Increasing Bird Numbers

YEAR	CANADA GOOSE COUNT AT LAKE WAIRARAPA	REGULATION RESPONSE
1987	400	First year on game licence, one per day
1988	430	
1989	600	Increased to twenty birds per day as part of the total composite bag
1990	1300	
1991	1100	Summer season February/March; twenty birds per day
1992	1230	
1993	1480	
1994 1995	1830 2300*	
1997	3100	Unpinned magazine shotguns used for summer season
	*estimate	

Even before Canada Goose were established in the Wairarapa, the potential for conflict between the birds and farming interests was recognised. In 1979 the Wellington Acclimatisation Society adopted policy to maintain future goose population at a level that would provide reasonable hunting opportunity, while minimising conflict with farmers.

In 1990 the Society resolved to attempt to maintain the Lake Wairarapa population below 1,500 birds. Goose grazing on farmed pastures has extended from five lakeside properties in 1992 to almost all lakeside properties in 1997. By 2003, complaints are received several times a year of goose grazing on farmland throughout the Wairarapa and North into the Tararua district. Specially permitted shoots have been required in several areas.

Where complaints are received of Canada Goose grazing on farmland, the Wellington Fish and Game Council takes immediate action to organise disturbance by day and night hunting of the target areas. This has been very effective in discouraging geese from returning, and only one or two repeats are required before no birds return. More frequent disturbance over a greater area has been needed since about 1997.

F7. CONFLICTS AND OPPORTUNITIES

F7.1 CONFLICT WITH FARMERS

Farmers in the Wairarapa, into southern Tararua district, and more recently on the region's west coast have expressed serious concern at the damage done by these birds on their properties since about 1997. The bird population must be managed below an acceptable threshold level if farmer support for this species and the access to allow hunting opportunity is to continue, and if the Canada Goose is to remain a managed gamebird and not revert to being designated a mere agricultural pest.

F7.2 HUNTER OPPORTUNITY

Canada Goose in the Wairarapa and increasingly elsewhere are a marvellous opportunity for our region's hunters; Manawatu and urban Wellington hunters are attracted to Lake Wairarapa to pursue these birds in greater numbers even than Wairarapa hunters.

F7.3 ORGANISED EVENTS

Council has eased restrictions, increased bag limits, and lengthened the season in response to the recorded increase in bird numbers. The next step for Council, should its response be required by continued population growth, will be for Organised Hunting Events, to combine the satisfaction of farmers needs with the maximisation of hunter opportunity.

F8. INFORMATION NEEDS

Harvest assessment for both winter and summer seasons within close confidence limits, and a careful check that our January moult counts are providing an accurate assessment of the entire regional population, are improvements to our present information systems that will be increasingly needed.

F9. MANAGEMENT OBJECTIVES

F9.1 GOAL: SUSTAINABILITY OF CANADA GOOSE AS A GAMEBIRD RESOURCE

F9.1.1 Objective. The maintenance of counted populations of not less than four hundred Canada Goose, at both Lake Wairarapa and throughout the Wellington West hunting district, in January every year.

F9.2 GOAL: ACCOMMODATION OF THE NEEDS OF OTHER USERS OF CANADA GOOSE HABITAT

F9.2.1 Objective. The containment of the counted Canada Goose populations in the Wairarapa south of Mt Bruce below a total of 2,000 birds, and throughout Wellington West below a total of 2,000 birds, in January every year.

F9.2.2 Objective. The removal of gaggles of Canada Geese, where they cause unacceptable damage to farmers' crops or pasture, in a timely and cost efficient manner.

F9.2.3 Objective. The maintenance of the discreteness of existing Canada Goose populations, by prohibiting further releases of birds into adjacent areas.

F9.3 GOAL: THE MAXIMISATION OF RECREATIONAL OPPORTUNITIES FOR CANADA GOOSE HUNTERS

F9.3.1 Objective. The harvest of sufficient Canada Goose by licenced gamebird hunters to enable population level control to be achieved without recourse to unsportsmanlike methods.

F10. IMPLEMENTATION

Wellington Fish and Game Council's Annual Plans will each year provide for a programme of work which within resource and budgeting constraints and reflecting Council's priorities, will deliver the objectives stated in 9 above.

F10.1 PROJECT COMMITMENTS are

F10.1.1. A check on the accuracy of January moult counts for Canada Goose will be undertaken. (9.1.1, 9.2.1)

F10.1.2. A summer harvest survey, and refinement to the winter harvest survey, for Canada Goose will be undertaken (9.1.1, 9.3.1)

F10.2 ONGOING COMMITMENTS are

F10.2.1. Annual aerial counts of Canada Goose will be undertaken, as close to the peak moult period as practicable, at Lake Wairarapa and any other sites found (9.1.1,9.2.1).

F10.2.2. Harvest of Canada Goose will be assessed through the National Hunter Survey and other surveys as required (9.3.1)

F10.2.3. Season regulations will be set to manage the Wairarapa and Wellington West Canada Goose populations respectively within stated Objective limits. (9.1.1; 9.2.1)

F10.2.4. Gaggles of Canada Goose that are the subject of farmer complaints will be removed as required. (9.2.2)

F10.2.5. Populations of Canada Goose in excess of stated Objective limits will be reduced to that level by organised culls (9.2.1)

F10.2.6. Licenced gamebird hunters will be given first priority for any reduction of populations of Canada Goose that may be required. Organised culls, whether by helicopter or by boat and net, will only take place if licenced hunters have been unable to achieve target reductions within specified times. (9.2.1,9.2.2, 9.3.1)

G BLACK SWAN

- *Cygnus atratus*

These birds were introduced from Australia by the Acclimatisation Societies, although the introduced population is thought to have been augmented by wild arrivals in the late nineteenth century. Black Swan today live in four geographically separate populations in New Zealand. Nationally, swan numbers peaked in the late 1960's, when the Wahine Storm destroyed feeding grounds sending numbers plummeting. The National population has slowly rebuilt since then, with steady growth during the 1990's.

G1. LOCATION

Black Swan are highly mobile, but are concentrated within the Wellington Fish and Game region at Lake Wairarapa and on the dune lakes along the west coast. The birds in the Wellington Fish and Game region are part of the middle New Zealand population that extends over the Nelson-Marlborough region.

G2. POPULATION

Black Swan are relatively long lived birds, maturing at about four years of age. In 2003, a band was recovered from a shot bird that had been banded at Lake Wairarapa in 1974, making it at least 29 years old. Not all adults breed - in fact only about thirty percent will breed in any one year, and of these only about 15-25% will produce young, of which between 40% and 80% will survive to fledging. Most old birds do not breed. Non-breeders flock together and spend the summer at Farewell Spit, moving north to winter. Breeding birds are believed to stay in the area in which they breed. They are both colonial and solitary nesters - the former on large water bodies the latter on small water bodies. Colonial nesters breed later (September onwards); solitary nesters earlier (July onwards). Cygnet survival is much better from solitary nesters than colonial nesters who creche their young. It takes between four and five months before cygnets fly. Survival rates for adult black swan, banded as juveniles at Lake Wairarapa 1975-88 average 0.84 (range 0.49 - 1.41). This means that there is an eighty four percent probability that any black swan out there now will still be alive this time next year.

This Council annually assesses the black swan population of its region by aerial counts of birds on lakes during January; the birds being big, black, and of modest numbers make this technique quite reliable. The results of these counts are given in Table G1.

Only about sixty percent of the birds moulting at Farewell Spit are believed to be from Wairarapa and Marlborough, and Okarito and Waikato birds are believed each to comprise ten percent of the flock. Others come from Manawatu, Hawke's Bay, Rotorua

and Ellesmere. We have traditionally made the assumption that the Farewell Spit birds are mainly part of the central region population, but this is now in doubt, and could further add to the problem of regulating a sustainable harvest rate.

TABLE G 1. ANNUAL BLACK SWAN POPULATION COUNTS IN WELLINGTON AND NELSON-MARLBOROUGH REGIONS
(Number of adult birds counted)

YEAR	WAIRARAPA	MANAWATU	NELSON/MARL.	TOTAL
1977	9,519	671	11,955	22,145
1978	6,894	725	11,260	18,879
1979	7,659	539	9,707	17,905
1980	6,727	498	11,545	18,770
1981	4,060	531	11,755	16,346
1982	3,545	704	11,569	15,818
1983	2,748	797	9,940	13,485
1984	2,668	380	6,960	10,008
1985	3,196	695	8,055	11,946
1986	3,280	816	10,520	14,616
1987	5,691	1,052	9,790	16,533
1988	4,557	1,000	10,517	16,074
1989	3,726	1,074	10,280	15,080
1990	3,138	820	12,468	16,426
1991	4,080	990	10,210	15,280
1992	4,080	1,174	13,925	19,179
1993	3,750	699	11,475	15,925
1994	4,083	853	12,400	17,303
1995	3,268	1,091	15,070	19,429
1996	2,911	1,015	13,158	17,084
1997	3,108	1,301	9,950	14,359
1998	2,274	824	9,181	12,279
1999	2,817	962	12,888	16,667
2000	3,199	876	11,890	15,965
2001	3,292	1,093	9,767	14,142
2002	4,097	644	7,186	11,927
2003	3,070	1,470	14,984	19,524

G3. HABITAT

Generally swans use lakes and the larger ponds (those over two hectares). They require expansive water for moulting during the summer. All adult birds moult, and are flightless for about five weeks, during which time they seek safety in numbers on big waters. Not all birds moult at exactly the same time, and the moult of the entire population is spread over about three months.

Swans are a grazing species, and need relatively shallow water in which to feed. They prefer feeding in or under water, on plant matter; aquatic plants are favoured, but farmed pasture is also quite acceptable. Broods, as with other waterfowl species, depend on a high protein diet of aquatic insects and weed and grass seeds. As ponds become increasingly eutrophic, algal blooms will prevent light and oxygen reaching rooted submerged plants, and the resultant loss of macrophyte production will force swans to graze pasture instead.

G4. HARVEST

The estimates for the number of Black Swan harvested are as follows:

Year	Estimated Total Swan Harvest, Wellington Region	95% Confidence Interval
1987	3,726	2,885-4,567
1988	4,092	3,044-5,140
1990	2,498	1,441-3,460
1992	3,956	2,477-5,435
1993	4,617	2,283-6,951
1994	5,356	875-9,837
1995	2,658	1,495-3,821
1996	2,558	1,549-3,568
1997	3,803	2,153-5,454
1998	3,428	2,195-5,353
1999	2,566	1,678-3,925
2000	4,094	3,077-5,447
2001	1,417	292-2,123
2002	3,068	2,242-4,200

Table G2 Wellington Region Black Swan Harvest, 1987-2002.

Between 2,000 and 5,000 are shot annually in the Wairarapa. A further 300 to 2,000 are taken in the Horowhenua/Manawatu/Rangitikei. Nelson/Marlborough also harvest between 300 and 500 per season. If harvest, divided by the number counted, indicated

the harvest rate, then rates of about 22%, 32%, and 33% have occurred in 1992, 1993, and 1994 respectively. Using the survival rate (0.84), such high harvest rates are impossible (almost every death has been as a result of hunting, or more are killed than are available). The explanation for this must be that the number counted is less than the actual number. We know this is so, but not by how much - i.e. the proportion of counted birds to real population level is not known. If, say for 1994, we underestimated the count by fifty percent and there were 25,651 birds available to the gun, then the harvest rate would still have been 23%. At this rate, hunting mortality has to be reducing the mean survival rate estimated by Barker and Buchanan. If we are underestimating the count by more than half, the count would have to be regarded as unreliable, and thus the setting of harvest restrictions would similarly be unsound. The juvenile recovery rates averaged 0.10 (range 0.03 - 0.19) (Barker and Buchanan 1993) indicate that harvest rates would be about 15-20%. Juvenile survival rates would probably be quite low at this rate.

If one assumed an average recovery rate for adults of about 0.08, then about fifty percent of the deaths incurred each year are from being shot. For a late maturing, low producing species this is high. We do not have an estimate of adult recovery rate (the information is in the DOC banding office), however we do know the juvenile recovery rate is 0.10. Juveniles are more susceptible to hunting pressure, but this is the reported rate; the unreported rate and crippling loss (birds shot and not retrieved) must be added. If, for adults, the harvest rate was 0.10, an alarming 63% of the deaths are being caused by shooting each year. Even if the harvest rate was 0.06, then 38% of deaths are from hunting - still high. We can not calculate what the corresponding figure would be for juveniles as we do not have a survival rate.

The only other explanation for the high harvest rates could be an over-assessment of harvest by the National Gamebird Harvest Survey.

According to the counts, the population has varied considerably over the past nineteen years. The above data suggest the population is going to go into a serious decline. Unless we are underestimating the count by, and at a minimum, more than fifty percent or even one hundred percent, then there is very great hunting pressure on the species. If we are underestimating the count by either not getting sufficient coverage or observer error, then the counts are of dubious value. It is therefore urgent that the counts be validated, i.e. the proportion being observed estimated via a capture/recapture study.

The Wellington Fish and Game Council decided, in 1989, to manage swan numbers in the central New Zealand region between 14-16,000 birds at a harvest rate of twenty five percent. This target was believed to be the right balance between hunter opportunity and landowner conflict (unacceptable pasture damage). The harvest rate of twenty five percent across all years is probably unrealistic.

G5. PARTICIPATION

Black Swan are a minor component of most hunter's bags, but are nevertheless a welcome and valued variation to the smaller and more numerous birds that are mostly targeted. There is no information on the number of licence holders specifically targeting Black Swan, although tight bag limits and limited seasons giving harvests of 2,500 to 5,000 birds suggests at least 1,000 participants, representing twenty five percent of our licence holders.

G6. RECENT MANAGEMENT

Wellington Fish and Game Council has managed Black Swan in recent years as follows:

a) Annual counts of total populations at all known roosting lakes.

b) Season conditions have provided as follows (2003 season)

Lake Wairarapa: Three birds per day for the first nine days of the season.
Four birds per day for the last eight weeks of the season

West of the Ranges: One bird daily for the first nine days of the season.
3 birds daily for the last four weeks of the season.

G7. CONFLICTS AND OPPORTUNITIES

G7.1 HARVEST ESTIMATES AND POPULATION COUNTS

These appear to be out of balance, giving the possibility of over hunting that would cause a population decline, which in turn could take many seasons to correct. The study methodologies both need checking.

G7.2 COMPETITION WITH OTHER WATERFOWL

As solitary nesters, male swan are very territorial; on small ponds they may chase out other waterfowl. They are certainly aggressive during the breeding season. Also, the point has been raised that swan grazing of the macrophyte beds (rooted aquatic plants) either reduces or eliminates these beds, thus denying duck broods the rich invertebrate fauna that inhabit them.

The key issues regarding competition are two. First, the probability of such competition having an overall measurable effect, and second, the management philosophy in responding to either a real or perceived threat. That is, to consider reducing one species of game bird in favour of another. Dr. Kerry Potts did his PhD on the feeding ecology of Mallards and Black Swan at Pukepuke Lake. He did not observe feeding competition between Swan and other waterfowl.

G7.3 HABITAT LOSS

As swans use larger water bodies, and these are less likely to be drained than smaller shallow ponds, such loss is not believed to be significant. However, loss by eutrophication could be more significant.

G7.4 CONFLICT WITH FARMERS

Anything more than a dozen birds can dirty a pond and make a mess of the nearby pasture, in some instances warranting a hurry-along for the birds involved.

G7.5 HUNTER OPINION

There are a number of hunters with two key opinions about swans; that they comprise a nuisance by either decoying or competing with the dabbling ducks that are the preferred gamebird, and that they are not much good to eat. While we have little factual evidence of either of these short-comings, (they make excellent casseroles), these opinions act against the sustained management of Black Swans as gamebirds.

G7.6 POTENTIAL FOR OVER-HARVEST

As big targets that are not highly regarded by some hunters, there is scope for substantial over-harvest to reduce the population.

G8. INFORMATION NEEDS

There is a need for re-calibration of our present methods of population assessment and harvest assessment. We need a more reliable model for assessing the impact of hunting on survival rates than we currently have available. This work is crucial to the ability of this Council to effectively manage the harvest of Black Swans to ensure sustainability.

G9. MANAGEMENT OBJECTIVES

G9.1 GOAL: SUSTAINABILITY OF BLACK SWANS AS A HUNTING RESOURCE

G9.1.1 Objective. The maintenance of a mid New Zealand (Wellington and Nelson/Marlborough Fish and Game regions) Black Swan population of 14,000 to 16,000 birds.

G9.1.2 Objective. Hunter harvest of Black Swan will be controlled so it is not the cause of any population's demise.

G9.2 GOAL: THE ACCOMMODATION OF THE NEEDS OF OTHER USERS OF BLACK SWAN HABITAT

G9.2.1 Objective. The dispersal or control of populations of Black Swan where they cause unacceptable damage to crops, pastures, water supplies, or habitat values for other wildlife.

G9.3 GOAL: THE MAXIMISATION OF RECREATIONAL OPPORTUNITIES FOR BLACK SWAN HUNTERS

G9.3.1 Objective. Provision in Game Season Regulations to enable a harvest of up to twenty five percent of the counted mid New Zealand Black Swan population each year.

G10. IMPLEMENTATION

Wellington Fish and Game Council's Annual Plans will each year provide for a programme of work which, within resource and budgeting constraints and reflecting the Council's priorities, will deliver the objectives stated in 9 above.

G10.1 PROJECT COMMITMENTS are

G10.1.1. Improve the reliability of regional Black Swan population assessment methodology (9.1.1)

G10.1.2. Improve the reliability of assessment of the impact of hunting on Black Swan survival rates (9.1.2)

G10.2 ONGOING COMMITMENTS are

G10.2.1. Annual population counts of Black Swan at all known congregation sites will be undertaken (9.1.1)

G10.2.2. Harvest of Black Swan will be assessed annually through the National Gamebird Hunter Survey (9.1.2)

G10.2.3. Game Season Conditions will be set annually to allow hunters to harvest up to, but not more than, twenty five percent of the counted mid New Zealand Black Swan population (9.1.1, 9.1.2, 9.3.1)

G10.2.4. Unwanted congregations of Black Swan will be dispersed as required (9.2.1)

REFERENCES

Barker R.J. and I.A. Buchanan. 1993. Estimating adult survival rates of New Zealand black swans banded as immatures. J. Wildl. Manage. 57(3): 549-555.

H. PUKEKO

- *Porphyrio melanatus*

H1. LOCATION

Pukeko are an indigenous swamp hen with distinctive blue plumage and a bright red beak. They are widespread in and near marshes and waterways throughout the Wellington Fish and Game region.

H2. POPULATION

There are believed to be tens of thousands of pukeko widely distributed throughout the region, although we have no structured database on pukeko populations. These birds are one of the native species that has most successfully adapted to the forest clearance and farm development that have characterised North Island land use changes over the last two hundred years. The birds are inquisitive, and apparently successful breeders despite the depredations of cats and mustelids. Groups of birds are common, ranging from a hen with a clutch of gangly legged chickens through to mobs of fifty stalking swamps, paddocks near drains, and even roadsides.

They avoid salt water, but prefer low-lying high rainfall areas, and are thus more common, and locally abundant, in western areas of the Wellington Fish and Game region.

They are capable of moving great distances - up to 250 km and commonly 50 - 100 km and will cross mountain ranges. In contrast, some populations are reportedly very sedentary.

Like Black Swan, they are both communal and solitary nesters. As many as nine birds will share territory, including its defence, and share in the incubation and raising of the young. Usually these birds are related. Where they are unrelated, group organisation is poor to chaotic leading to poor nesting success. Unrelated groups appear to be wanderers collecting together in the inferior territories.

The breeding season is very long - early August to March although spring-early summer is the peak. Nests occupy a wide range of sites in damp places with surrounding vegetation, although the tops of rushes are a favourite. A hen will lay about six eggs. Up to eighteen will be laid by different hens in communal nests. Incubation takes 24 days. It is common for Pukeko to have two broods a year, and even three is not unusual. The chicks of the first brood will help raise the chicks of the second brood. Solitary pairs are usually more successful at raising chicks than the communal parents and, in one study, raised on average four chicks per pair as opposed to one chick per group. Mortality in the first two weeks is very high and remains high for up to three months.

Many territories dry up during the summer displacing the birds, which then flock around permanent water bodies. It is at this time that they can cause trouble to landowners. Pukeko feed on any plant matter and many animals including worms, spiders, insects, snails, small fish, frogs, small birds, and skinks. They will occasionally predate other ground nesters eggs.

The regional Pukeko population status is not specifically known, but is considered on the available evidence to be stable. Loss of breeding territories is considered to be the most significant downward pressure on population levels.

H3. HABITAT

Pukeko breed in swamps and in the long grass beside drains, streams and ponds. Their long legs and wide spread toes enable them to negotiate soft wetlands that are too thick to swim in, but too thin to support the weight of most animals. The birds range out from their "home" wetlands to graze nearby farmlands and wastelands, concentrating on attractive vegetation for their diet; their fondness for several horticultural crops make them pests in some circumstances.

We have no systematic inventory of pukeko habitat, and while most of our region's pre-European wetlands have been removed or substantially reduced, there appears to remain sufficient habitat at the margins of drains, streams and ponds to sustain a large enough population to cause farmers nuisance at times.

H4. HARVEST

The National Game Bird Hunter Survey indicates annual harvests of Pukeko in the Wellington Fish and Game region have declined markedly between 1987 and 1995.

TABLE H1. WELLINGTON REGION HARVEST ESTIMATES FOR PUKEKO

YEAR	ESTIMATED REGIONAL HARVEST OF PUKEKO
1987	2091
1988	1276
1990	2188
1992	937
1993	554
1994	821
1995	882
1996	558
1997	1,410
1998	990
1999	1,504
2000	729
2001	566
2002	802

It is not believed that this trend of declining harvest reflects any decline in population of pukeko, but rather it appears to reflect a declining interest in them by gamebird hunters.

H5. PARTICIPATION

The Pukeko is not a particularly sought after gamebird. Few hunters actively target pukeko, although they are harvested in significant numbers each game bird hunting season.

H6. RECENT MANAGEMENT

Wellington Fish and Game Council's recent involvement with pukeko has seen a daily bag limit of five birds for an eight week season covering the entire region. Pukeko are regularly the target of Permits to Disturb for farmers bothered by the birds' attention to crops, especially horticultural ones.

H7. CONFLICTS AND OPPORTUNITIES

H7.1 INDIGENOUS STATUS

As an indigenous species, the pukeko has raised the interest of some people who wish to see all native species protected from any form of harvest. Our view that a harvest must only be undertaken within limits that ensure the sustainability of the target species apparently does not satisfy the objectives of these people, and the resulting conflict needs to be managed. At the very least, we need information systems capable of demonstrating the sustainability or otherwise of harvest levels.

H7.2 CROP PREDATION

In certain circumstances pukeko in respectable numbers can damage crops, which in turn triggers a protective response from farmers and householders alike. Brussels sprouts, strawberries, domestic vegetable gardens, wetland enhancement plantings, and even rows of haylage bales have all come to the Pukeko's attention, to the considerable ire of the people concerned. The birds do not scare away readily, and the culling of offenders is normally the only effective treatment for the problem. This can necessitate the issue of Permits to Disturb at any time from before Christmas until the game season starts in May. The problem is not unmanageable, and our present methods to deal with it appear to be effective and sustainable.

H7.3 PERCEPTION

That pukekos' inquisitiveness is commonly interpreted to be stupidity, and that making a reasonable meal of one is a culinary challenge, are both popularly ingrained attitudes that render the prospect of any marked escalation in hunting effort unlikely.

H8. INFORMATION NEEDS

We have a reasonable ongoing source of information on Harvest and Participation through the National Hunter Survey. We still need to establish systems to supply reliable information as follows.

H8.1 POPULATIONS

An assessment of population densities in selected representative areas is needed. This initial assessment could then be check monitored every few years as required to monitor trends. It would allow regular assessment of the impact of harvest on the population.

H9. MANAGEMENT OBJECTIVES

H9.1 GOAL: SUSTAINABILITY OF PUKEKO AS A HUNTING RESOURCE

H9.1.1 Objective. Pukeko populations will be managed to remain relatively stable over time.

H9.1.2 Objective. Hunter harvest of Pukeko will be managed so as not to become the cause of any population's demise.

H9.2 GOAL: THE ACCOMMODATION OF THE NEEDS OF OTHER USERS OF PUKEKO HABITATS

H9.2.1 Objective. The dispersal or culling of unwanted congregations of Pukeko where farmers complain of crop damage.

H9.3 GOAL: THE MAXIMISATION OF RECREATIONAL OPPORTUNITIES FOR PUKEKO HUNTERS

H9.3.1 Objective. Hunting of Pukeko is available to gamebird hunters.

H10. IMPLEMENTATION

Wellington Fish and Game Council's Annual Plans will each year provide for a programme of work which, within resource and budgeting constraints, and reflecting Council's priorities, will deliver the Objectives stated in 9 above.

H10.1 PROJECT COMMITMENTS are

H10.1.1. A Pukeko population data base will be established (9.1.1)

H10.2 ONGOING COMMITMENTS are

H10.2.1. Game Gazette Notices will provide appropriately for Pukeko (9.1.2)

H10.2.2. Unwanted congregations of Pukeko will be dispersed or culled as required (9.2.1)

I. UPLAND GAME

This group comprises

- Pheasant (*Phasianus colchicus*)
- California Quail (*Lophortyx californicus*)
- Australian Brown Quail (*Lophortyx synoicus*)

I1. LOCATION

Widespread if rather sparse throughout the Wellington Fish and Game region, with greatest concentrations on the region's west coast sand dune country.

I2. POPULATION

Pheasant

Introduced from the United States of America in the 1860's, the Pheasant has become well established in warm, dry areas with good scrub cover, in particular in the Gisborne, Rotorua, and Northland areas.

European and North American pheasant are polygamous, mainly due to heavy hunting pressure (three to five hens per cock). In New Zealand in the 1950's, pheasant had an even (50:50) sex ratio, until the onset of hunting.

At breeding: (1950)
67% seen in pairs
23% 1 cock with 2 hens
10% 1 cock with 3 to 4 hens

Near monogamy in pheasants is associated with low populations, widely spaced birds, and low production. Dense vegetation (grass, scrub) is needed for nest sites - blackberry is a favourite. Peak nesting is October to December. Pheasants very rarely produce two broods in a season. Incubation is twenty three days; birds can fly short distances after twelve days, and are fully fledged at five to six weeks. In the 1950's it was found that 86% of nests were destroyed by man (hay mowing the main culprit) and only 3% by predators. Less than 50% of the brood were found to survive to twelve weeks. 40% survived to maturity (three or four per brood). 84% of chick deaths occur in the first month. New Zealand production is half that of European and North America. (3 to 4 cf 6 to 8). In an assessment at that time of the survival of game farm reared birds, only about 5% of the released birds were recovered. Recovery of reared birds was improved up to 13% by releasing birds sixteen to twenty weeks old.

In earlier years Wellington region's west coast provided abundant good quality habitat, and populations of Pheasant were augmented by annual releases of birds from the

Wellington Acclimatisation Society's hatchery at Paraparaumu until the mid 1960's. However, steady development of most of the previously scrubby sand country into more productive farmland has reduced available habitat, and populations of Pheasant are now lower than most pheasant-hunters are happy with.

Clubs and individual pheasant hunters continue to raise small numbers of Pheasants to release into the wild, but these releases are not known to have augmented overall population levels.

A total regional population of the order of 5,000 Pheasant is believed to exist, although there has been no systematic programme of population assessment. This estimate is an educated extrapolation from reported annual harvest figures, and has very limited value for management purposes.

Current pressures on population levels are believed to be Habitat, Predators, Poison, and Harvest in that order. While there are significant local variations both up and down, the overall regional population is thought to be in gradual decline. The birds nest on the ground and are accordingly prone to predation by cats and mustelids.

Flush counts and crow counts are techniques by which localised population estimates may be assessed, but these methods have not been employed systematically in Wellington in recent years.

California Quail

Introduced from the United States of America in the 1870's, these birds have established well in warm, dry areas in the Central North Island, Marlborough, and Central Otago.

Quail are spread sparsely throughout the Wellington Fish and Game region, with greatest concentrations in the west coast sand dune country. Breeding is from September to March, peaking in November to January.

Williams (1952), in his extensive study of quail in Central Otago, found population densities of about one bird to 0.5ha based on number of birds in the covey and the covey's range. Densities were higher in the winter as the covey's range shrank. Quail numbers apparently fluctuate four yearly, and are synchronous with independent populations. There were large differences between years in the ratio of juveniles to adults. There was no evidence that shot populations declined or unshot populations increased. Mortality rates though, for the shot population were lower than the unshot population and it was concluded that the higher mortality must be compensated for in some way. Mortality rates between 1953 and 1964 were (shot population): Adult males, 68%; adult females, 70%; juvenile males, 74%; and juvenile females, 72%. For the unshot population they were: Adult males, 46%; adult females, 54%; juvenile males, 71%;and juvenile females, 72%. Nest success over the years, from fifty- nine nests, was 62.7%. 18.6% of nests were deserted and 18.6% predated. It was speculated that post hatching

mortality is the most important variable controlling population size. It appears numbers will "explode" if habitat conditions are near optimum.

Specific population assessment in the Wellington Fish and Game region has not been carried out for many years. The population of California Quail is believed to be shrinking under pressure from loss of suitable habitat, pest poisoning operations, predators, and harvest in that order of importance.

Brown Quail
Now thought to be confined to a very few coveys in the west coast sand dune country. The population of this species has declined virtually to the point of extinction within Wellington Fish and Game region.

I3. HABITAT

Pheasant and Quail need scrubby vegetation and reasonably warm, dry ground to thrive. Such habitat is to be found mostly in coastal sand dune country, where light grazing of unimproved pastures by domestic livestock, in combination with thickets of boxthorn and lupin has provided good habitat for Pheasant and Quail in the past. There is comparatively little of such land now left undeveloped, although small numbers of upland gamebirds have successfully survived in ungrazed windbreaks, woodlots and hedgerows, ranging over developed farmland to feed. Besides, lupin and boxthorn are currently classified as pest plants, and their removal is actively advocated by authorities.

Pine forests are the other significant habitat type, with perhaps the first seven years of a twenty five to thirty year timber crop cycle providing good upland game habitat, while trees are small and canopy is open.

The extent and quality of upland game habitat have not been systematically assessed, and our information on this is subjective. Of about four hundred square kilometres of coastal sand dune country along the region's west coast, less than five percent is farmed (managed) in a way that is ideal for upland game. The trend is for the extent of preferred scrubby cover to continue to reduce as farmers optimise commercial use of their land. In the late 1980's the yellow lupin root virus severely reduced the occurrence of lupin in sand dune areas, and the depletion of this important cover and food species has also had a major adverse effect on populations of upland game. On the other hand, there is a discernible move to convert poorer quality farmland, whether on the coast or on inland hill country, from increasingly difficult livestock farming to pine forestry, and this is a positive trend for upland game habitat.

We believe that lack of suitable habitat in the warmer and drier parts of our region is the main limitation to sustaining higher regional populations of these birds. The Resource Management Act does not enable us to prevent farmers from developing their farms, and

because gamebird hunting rights are not legally saleable, few farmers are prepared to forego extra farm production in order to maintain areas of upland game habitat. The purchase and appropriate management of suitable land as upland game habitat by this Council has not been seriously entertained because of likely high costs. Private commercial upland game preserves have been established in other regions, and if questions as to their legality can be resolved then we may see them in Wellington region in the future as well.

I4. HARVEST

Before 1988 an annual Pheasant harvest approaching 2,000 birds was the norm, but between 1993 and 1999 most annual harvest totals were below 1,000 birds. The first three years of the new century have seen a quiet improvement in harvest, but it is still little better than half what it was twenty years ago. Similarly, Californian Quail harvests have dwindled from more than 1,200 birds per year in 1987 to exceed 250 birds only four times since 1992. (See Figures I1 and I2).

Figure I1: Trend in Pheasant Harvest 1987 - 2002, Wellington Fish and Game Region

Year	Estimated Regional Harvest of Pheasant
1987	1,912
1988	1,834
1989	
1990	1,412
1991	
1992	1,417
1993	753
1994	408
1995	1,270
1996	752
1997	680
1998	1,221
1999	958
2000	1,131
2001	1,147
2002	1,406
2003	

Figure I2: Trend in California Quail Harvest 1987-2002, Wellington Fish and Game Region.

Year	Estimated Regional Harvest of Quail
1987	1,287
1988	905
1989	
1990	741
1991	
1992	223
1993	0
1994	67
1995	29
1996	314
1997	54
1998	558
1999	72
2000	534
2001	1,052
2002	112

I5. PARTICIPATION

In the 1998 game season, 886 Wellington game licence holders were estimated to have hunted upland game at least once. This represented 21% of our game licence holders. Pheasant are regarded as Wellington licence holders' second preferred quarry, after mallard, with California quail rating fourth, behind paradise shelduck.

Hunter success rate since 1988 has fluctuated around 0.12 birds shot per hour hunting them, with that rate exceeding 0.15 birds per hour three times in the last ten years, and being less than 0.08 birds per hour twice during that decade.

Upland game hunters find their opportunities either on private land, about which we have very little information, or on the "public" lands along the region's west coast where the

Council has administered a permit system in order to manage access on behalf of the land administering authorities. Of the 550 permits issued to Wellington licence holders in 1998 game season, we estimate that about one third (say 200) were actually used for hunting. This implies that another 700 hunters are finding their opportunities in places where access is not subject to a Fish & Game-issued permit.

I6. RECENT MANAGEMENT

Wellington Fish and Game Council has managed upland game in recent years as follows.

a) Harvest is annually assessed through the National Hunter Survey.

b) A permit system has been operated by Fish & Game, in a joint effort between the Wellington and Taranaki regions, to enable upland game hunters to have access to several west coast pine forests.

c) Season conditions in recent years have provided a daily bag limit of two cock pheasant, and five California quail, during a fourteen week season from May to August.

I7. CONFLICTS AND OPPORTUNITIES

I7.1 LACK OF SUITABLE HABITAT

There is limited ground in Wellington Fish and Game region with upland game habitat values, and economic need drives much of this into an intensity of pastoral use that is not compatible with the birds' needs.

I7.2 LIMITED ACCESS AND OPPORTUNITIES

We believe more hunters would hunt upland game if there were more opportunities readily available.

I7.3 DECLINING HARVEST

Although hunter success rate has remained within a sustainable range, total birds harvested has declined markedly, evidently reflecting reduced numbers of hunters but probably also reflecting reduced numbers of birds.

I7.4 SUSTAINABILITY

The sustainability of our region's upland game populations, which in turn sustain the upland gamebird hunter's sport, is the most at risk of any of our gamebird species, indicating that more intensive management than has previously been applied would be useful, if it could be afforded.

I7.5 HUNTER DEMAND

There is no shortage of hunters wishing to hunt upland game in Wellington region, and we should anticipate a high rate of uptake of any opportunities the Council may be able to make available.

I7.6 RELEASES

Some hunters rear and release pheasants into the wild to augment wild populations and to enhance hunter opportunity, and the Council is occasionally urged to do likewise. It is unlawful to release captive upland game without authorisation, and Fish & Game co-operates with the Department of Conservation, seeking to ensure that any releases are properly authorised.

I7.7 PEST POISONING

Pest poisoning operations by Department of Conservation and Regional Councils have been believed by hunters to have a severe impact on local upland gamebird populations. However, other hunters have noticed increased pheasant populations in the lower Rangitikei district in recent years, where intensive pest poisoning has been undertaken, and the reduction in predators is subjectively believed to have contributed to this. Needless to say, the poisoning operations are regarded as essential by those undertaking them.

I7.8 UPLAND GAME HUNTING PRESERVES

These are commercial operations, where hunters pay to have access to privately reared and released birds. Fish & Game New Zealand is developing a view on the future of these enterprises, seeking to balance the good hunting that can undoubtedly be offered, against the organisation's wish not to see the development of any private property right in sportsfish or gamebirds. Their advantage is that they can channel hunters' fees into habitat and population enhancement, and thus provide hunter opportunity, in a way that Fish & Game can not afford. Their disadvantage is that they become the moral precedent for similar approaches to other gamebird species and trout.

I7.9 FARMING CONFLICTS.

There is an unfortunate incompatibility between preferred upland game habitat on the one hand, and modern farming practices and some conservation goals on the other hand. The weed species that make such fine cover and feed for the birds pose threats to intense farm production and remnant native plant communities, while well managed pasture on its own is not much use to pheasants.

I8. INFORMATION NEEDS

I8.1 POPULATIONS

A programme of monitoring the size of autumn populations of upland game should be established.

I8.2 HABITAT

An assessment and quantification of net regional changes in upland game habitat between the 1950's and the present, using aerial photography, would provide a sounder basis for assessing the impact of habitat change on the populations of these species than is currently available.

I8.3 HARVEST

Harvest of upland game by licence holders is currently assessed annually through the National Hunter Survey; the methodology of this survey would have to be refined if more reliable harvest estimates were required.

I8.4 PARTICIPATION

An improved system of upland game hunter identification and monitoring would be required for any improvement to the overall management of these species.

I9. MANAGEMENT OBJECTIVES

I9.1 GOAL: SUSTAINABILITY OF UPLAND GAMEBIRD POPULATIONS IN THE WELLINGTON FISH AND GAME REGION

I9.1.1 Objective. Hunter harvest of Upland Game will be controlled so it is not the cause of any population's demise.

I9.2 GOAL: THE ACCOMMODATION OF THE NEEDS OF OTHER USERS OF UPLAND GAMEBIRD HABITATS

I9.2.1 Objective. The needs of other users of upland gamebird habitats are established.

I9.2.2 Objective. The release of upland game birds from captivity into the wild will be regulated so as to

a) maintain as large and healthy a wild population of gamebirds as possible;
b) maintain public awareness that gamebirds are not to be captured, kept, or released without proper authorisation;
c) not compromise indigenous biodiversity;
d) not compromise the circumstances of locally resident wild gamebird populations;
e) not contribute to the exacerbation of any local opinion that the species involved will become a nuisance;

f) ensure that gamebird hunting opportunities for licence holders are enhanced.

I9.3 GOAL: THE MAXIMISATION OF RECREATIONAL OPPORTUNITIES FOR UPLAND GAMEBIRD HUNTERS

I9.3.1 Objective. Not less than 80% of upland game hunters find the provision of access, and their hunting experience, to be satisfactory.

I9.3.2 Objective. Information on the availability of upland game hunting opportunities is available to licence holders.

I9.3.3 Objective. If Upland Gamebird Hunting Preserves are to be allowed by law, they will provide no conflict with the opportunities provided by the hunting of wild populations.

I10. IMPLEMENTATION

Wellington Fish and Game Council's annual plans will each year provide for a programme of work which, within resource and budgeting constraints, and reflecting the Council's priorities, will deliver the objectives stated in 9 above.

I10.1 PROJECT COMMITMENTS are

I10.1.1. A programme of autumn population counts of upland game will be established (9.1.1)

I10.1.2. An assessment of net regional changes in the extent, location and quality of upland game habitat over the last fifty years will be promoted (9.1.1)

I10.1.3. Improvements to 1998 methods of harvest assessment and hunter identification and monitoring will be developed (9.1.1, 9.3.1)

I10.1.4. Opportunities for maintaining and improving upland game hunting will be investigated (9.3.2)

I10.2 ONGOING COMMITMENTS are

I10.2.1. Autumn population counts of upland game will be undertaken (9.1.1)

I10.2.2. Hunter surveys for the purpose of harvest assessment (9.1.1) and hunter satisfaction assessment (9.3.1) will be carried out.

I10.2.3. Season conditions will be set annually at levels designed not to decrease upland game population levels below 1998 levels (9.1.1) while allowing the highest number of hunters to achieve satisfying hunting (9.3.1)

I10.2.4. Access for upland gamebird hunters onto publicly accessible lands will be negotiated and managed (9.3.1)

I10.2.5. Council's habitat and access advocacy work will acknowledge the needs of other users of upland game habitats (9.2.1)

I10.2.6. Information on the availability of upland game hunting opportunities will be prepared and made available (9.3.2)

I10.2.7. Upland Gamebird Hunting Preserves will be regulated to ensure no conflict with wild population hunting opportunities (9.3.3)

REFERENCES

Willaims G. R. 1952. The california quail in New Zealand. J. Wildl Manage. Vol. 16 (4): 460-83.