# Farm Refuges for Native Waterfowl

***Text and photographs by Clifford Young.***

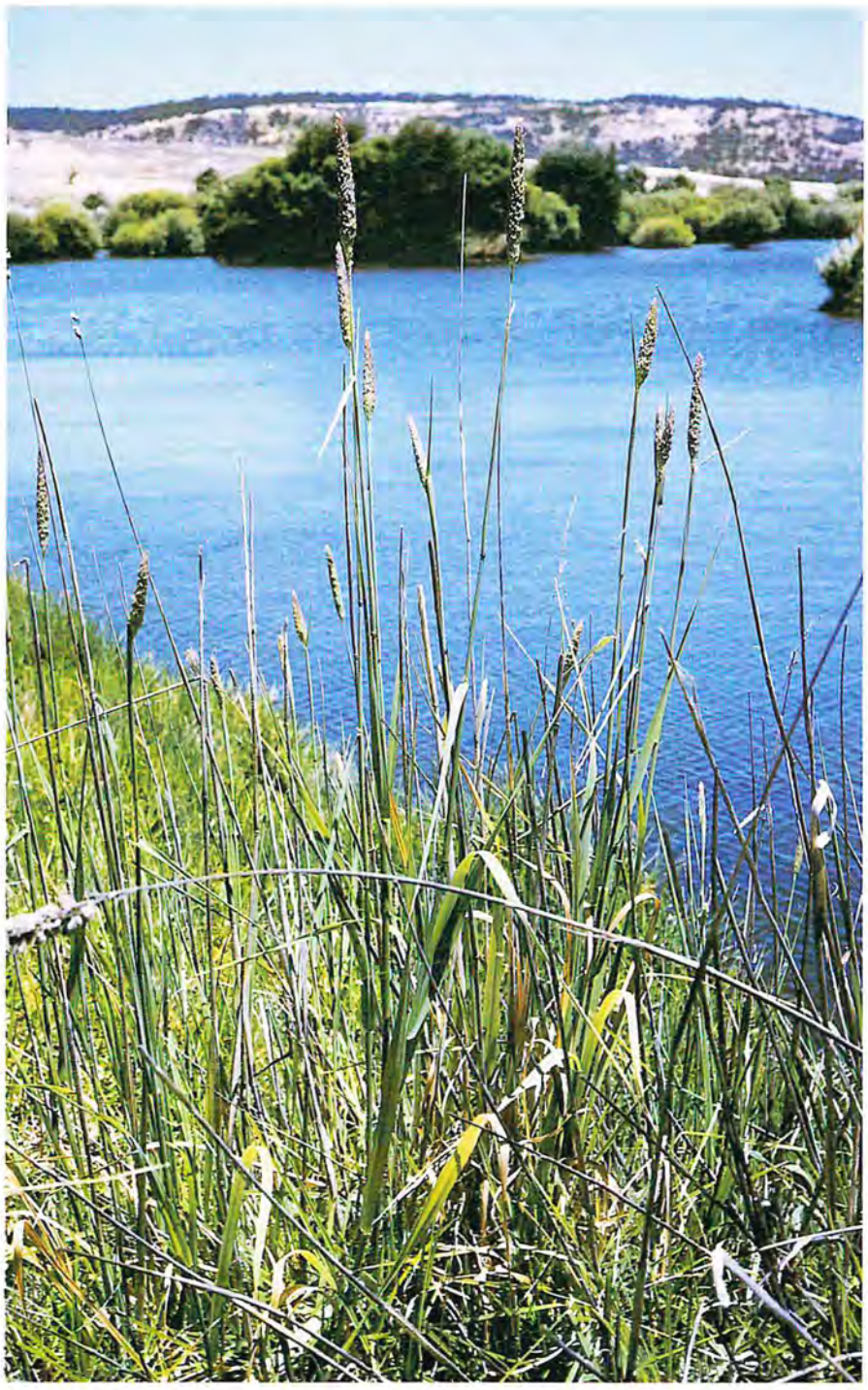
It is a complex world. In their natural state, all living things, from the tallest trees to the smallest animals and insects, live in a constantly changing state of interaction between one another. The process of life is never-ending but the changes take place slowly in accord with the gradual evolution of the physical world. That is, until man. Man with his mining, man with his agriculture. Within a few short lifetimes, the whole evolutionary timetable of the world has been thrown out of gear and with it the time necessary for the natural adaptation of the rest of the living kingdom.

Happily, many people have recognised the problems brought about by man's activities, particularly through land clearing and the accompanying destruction of habitat so vital to wildlife. Although farming and mining are necessary activities, much can be done to minimise or rehabilitate disturbed areas of wildlife habitat at relatively little cost.

A prime example of successfully combining farming with wildlife can be seen at 'GlenAvon', an historic property along the banks of the Avon River near Toodyay, Western Australia. Owned by the Masters family for several generations, the property has been developed to function efficiently and economically while at the same time providing useful habitat for birdlife, particularly waterfowl.

The key to the system on 'GlenAvon' is a pair of large water storage dams nestled within walking distance of the farm's residence, and fed by a series of diversion channels. Besides providing a more-than-adequate supply of good water for the farm's stock and, in the past, irrigation for lucerne, the dams are a haven for many species of waterfowl and other birds. The pleasure of being able to look out over the dams with their lush vegetation and plentiful birdlife, without so much as putting a foot outside the farmhouse door, is an added bonus.

In addition to running the farm, Jim Masters, an ardent birdwatcher, has kept careful note of the species frequenting the dams and over the years has recorded almost every



species of duck found in the south-west of the State. These have included Teal, Black Duck, White-eyed Duck, Maned Geese, Mountain Duck, Bluebill Duck, Musk Duck, Blue-wing Shoveller and even some Pink-eared Duck. Other waterbirds which have used the dams include Coots, Little Grebes, Blue Herons, White Egrets, White-necked Herons, yellow-billed Spoonbills and a variety of migrant waders. Fringing vegetation around the dams has also proved attractive to other forms of birdlife commonly including Magpies, Willy Wagtails, White-winged Trillers, Rufous Whistlers, Silvereyes, Magpie Larks, Western Warblers, Splendid Wrens, Reed Warblers and a few Little Grass Birds.

All very well and good you may be saying to yourself, but at the same time thinking you cannot afford to spend the time nor the money developing facilities for birds when you have a farm to run. Wrong. According to Jim Masters, the extra time and money required to make a dam, particularly a new dam, more attractive to wildlife is very small provided some thought is given to the problem beforehand. In fact, a better dam for all round farm use may result. The following information on farm dams and their modifications for waterfowl is based on information supplied by Jim Masters which, in turn, is based on practical knowledge and experience gained by him over a period of more than 20 years.

**Dam Design**

Before planning any dam there are several points to consider. Firstly, find out the annual average volume of water discharge from the farm's catchment and, secondly, the quality (i.e. salinity) of this water. However, be careful with the latter as sample average readings of salinity of inflow do not always give the full story. They need to be related to the volume of inflow as, for example, the salinity of surface discharge usually falls as the volumes increase after rain.

Having covered the above points you will have learned a great deal about water discharge for your own particular situation. Do not build any dam for water storage unless sufficient water of suitable quality (i.e. salinity under 800 parts per million for plants or under 2 000 parts per million for most stock animals) is available for 12 months of the year. Remember salinities may double over summer. The figures given above apply for agricultural use.

▲ Many dams dry out over a long summer but in the process can provide good feeding habitat for wading birds such as this Banded Stilt.

For wildlife refuge and breeding, or for flood control purposes, salinities may be double those given above, reaching as high as 8 000 parts per million in late autumn without causing too much harm. However, it should be noted that dams designed for this purpose with such high salinities must be provided with a bottom outlet for flushing whenever surplus water is available, and preferably at least once a year.

A general rule to follow is not to build the capacity of any dam to a volume greater than one quarter of the known average volume of discharge of its catchment. Experience, in the Avon valley at least, has shown a probability of completely filling the dam nine years out of ten on this basis. Do not try to be too greedy, it is self-defeating for your own ends as well as being detrimental to the whole environment.

**Excavated Dams**

A common design, the excavated tank dam more often than not has less effective water storage than the amount of earth removed. At best, only a 1:1 ratio can be achieved so the method is not very cost effective. If it is fenced off against stock, water must be pumped out into troughs, adding further to the cost of the operation. Such disabilities offer little economic incentive for farmers to develop them as wildlife refuges and shelter belts. They are also subject to frequent flood siltation and stock pollution.

**Dammed Creeks**

Dams in creeks and open valleys can be built with ratios of storage of water to earth moved of up to 3:1 on some sites. Although they can usually be provided with a bottom outlet quite cheaply, allowing fencing with an outside gravity-fed water supply, the general design allows little protection from flood siltation or pollution without elaborate and costly flood bypass systems. They are also very subject to increasing salinity from a general water table rise in the surrounding valley. Although they are a risky proposition for farm use, they can prove effective as wildlife refuges and breeding places for waterfowl having large areas of gently sloping margins with shallow water. Small islands for nesting can be easily provided and will provide some protection from ground predators such as cats and foxes.

**Semi-turkey nest dams**

These dams offer the same possibilities for wildlife as dammed creeks with the added benefit of allowing more control of water levels. Semi-turkey nest dams are placed outside of main valley situations and natural water discharge lines of large size. The general principle to recognise about these dams is the possibility of moving water around

An excellent example of a farm dam modified for waterfowl. The small islands are separated by deep water from each other and the dam banks, are well vegetated and have gently sloping margins to help waterfowl walk out of the water. This is 'GlenAvon' near Toodyay.

▲ Jim Masters at the controls of one of several simple diversion gates on his property which together control the quantity and quality of water flowing into the farm's dams. This particular gate, when closed, banks up the water level behind it and diverts it into the grill-covered dam inlet (see below). The gate is closed only after any salty surface water has been flushed through.

▼ The same diversion gate as above seen from 'upstream'. The dam intake on the extreme right carries good quality water to the dam. The natural watercourse carries saltier and surplus water under the railway to the left of the tree in the background.

▼ Another diversion gate higher up the watercourse on the same farm as above. Here, the creek is deeper and the water flow faster necessitating different engineering techniques. The planks above the creek are lowered via a crank (left) and the water diverted through the grill on the left to a diversion channel system which takes the water to the dam.

sloping ground away from direct discharge lines. In doing so you are keeping water as high as possible for as long as possible, thus providing height for water storage above natural ground surfaces. This in turn assists the provision of a bottom outlet back to the natural discharge lines. The dams can be placed in any man-made contour or grade-banks system or, by using small weirs in creeks, redirecting the water from natural discharge lines. For an average effective farm dam depth of three metres, even landscape with a fall of five metres in one kilometre has potential. These dams have many advantages including complete control of water intake (both quantity and quality). In turn, this means most siltation can be controlled thus giving the dam a greatly increased life span. Other benefits include virtual immunity from flood damage, more potential dam sites, low annual maintenance and, most importantly, a high ratio of water storage. Ratios of 12:1 and better have been achived for farm dams of this sort.

On 'GlenAvon', Jim Masters has built two semi-turkey nest dams, a large one and a smaller one, side by side. Both dams were constructed by pushing up turkey nest walls around an old swamp bed and in this way it was not necessary to lower the original bottom level. Natural bottom outlets were thus able to be employed for periodic drainage. Both dams are fed by a series of diversion channels moving water as necessary from a natural creek draining the farm's catchment. The whole system operates on a vertical head of about eight metres over a distance of approximately one kilometre, a situation few farms in the wheatbelt would not be able to duplicate.

The main dam was built 21 years ago as a source of good quality water for irrigation and has a surface area when full of about five hectares. Its maximum depth is four metres but throughout most the year the average maximum depth is about two metres. The adjoining dam is much smaller and considerably shallower. When full, the maximum depth is less than two metres and this dam usually dries

▲ Thickly vegetated island and dam margins protect earthworks from erosion and provide feed and cover for many species of waterfowl. Wherever possible, only local tree species have been planted.

▲ In a dam, shallow water is the most important source of food for waterbirds.

out over summer. Both dams have gently sloping margins, a feature which Jim Masters says is most important to waterfowl. In a dam, shallow water is the most important source of food for waterbirds. Light and warmth can penetrate shallow water, encouraging the growth of aquatic plants and insects which in turn are eaten by the birds. Shallow water will also support the growth of rushes and reeds which provide food, shelter and nesting sites for many species of waterfowl.

In practice, Jim has found that the most successful plant around dam perimeters has been kikuya grass. This grass is easy to establish and spreads rapidly around the dam banks providing a food source and essential protection against erosion. It has the added advantage of being tolerant of dry situations, such as the dam drying up over summer, for periods of up to 12 months. Lower down along the water's edge, cooch grass covers much of the dam's margins. This grass will tolerate short periods of complete immersion when dam levels are at their highest.

Where denser cover is required, Jim has allowed clumps of cumbungi and the imported African grass, Elephant grass, to take hold. Here however, Jim has warned that care needs to be taken, particularly with cumbungi, as the plant grows rapidly and can colonise all shallow margins of the dam in a very short time thereby crowding out other useful plants and creating a nuisance. Elephant grass is particularly well suited for planting on islands within the dam as it provides excellent shelter and nesting habitat.

Islands are very important to the successful establishment of wildlife on a farm dam. If properly orientated they provide shelter to ducks on windy days, the ducks and their young keeping close into the lee created by the islands to prevent being blown the length of the dam. They are

▼ When planning a dam to encourage waterfowl, islands should be orientated to provide shelter against the prevailing winds.

▲ Light and warmth can penetrate shallow water, encouraging the growth of aquatic plants and insects which, in turn, are eaten by waterfowl such as this Black Duck.

▼ A Little Grebe's nest made of floating vegetation and anchored in the lee of a small island on a modified farm dam. Nesting material for other species of waterfowl can include loose hay if there is insufficient natural vegetation.

also utilised as predator-free nesting sites. Some points to keep in mind when constructing islands include the need to provide gently sloping sides, both to allow the ducks to walk out of the water on to the islands and also to provide additional shallow feeding grounds, and to ensure there is deep water between the island and the shore to discourage potential land-based predators from making the trip. As with the dam edges, artificial islands should also be vegetated against erosion and to provide nesting cover, although for the latter use, Jim Masters has had some success by just providing small bales of hay for nesting purposes. Trees also provide welcome shade and resting and nesting sites for many species of birds and waterfowl. Generally, the best trees to grow are those that are found locally as these will most readily adapt, provided of course that they will tolerate moist conditions. On 'GlenAvon', most of the trees around the dams and on the islands are either floodgums or Melaleucas. Here again, some care is required not to plant trees too close to the dam walls as they may weaken the walls, nor to plant them too thickly around the whole dam as this would obstruct flight lanes to and from the water surface.

Many species of aquatic plants inlcuding algae and duckweed which provide food for waterfowl will probably colonise suitable farm dams naturally. At 'GlenAvon', the small islands have also been vegetated naturally, with the exception of their tree cover, by seeds floating across the water or being carried over by wildlife.

Although the modified dams at 'GlenAvon' have taken many years to take on their present appearance, Jim Masters says the time and effort involved was more than worthwhile. Not only has the value of his property increased as a result of the improved dams and diversion channel system, but the pleasure involved in watching the day-to-day and year-to-year activities of the birdlife attracted to the dams is immeasurable.

Further information and technical advice on modifying existing farm dams or designing new farm dams for the benefit of wildlife can be obtained from the Department of Fisheries and Wildlife. Contact Jim Lane or Grant Pearson at the Western Australian Wildlife Research Centre, Woodvale on (09) 405 1555.