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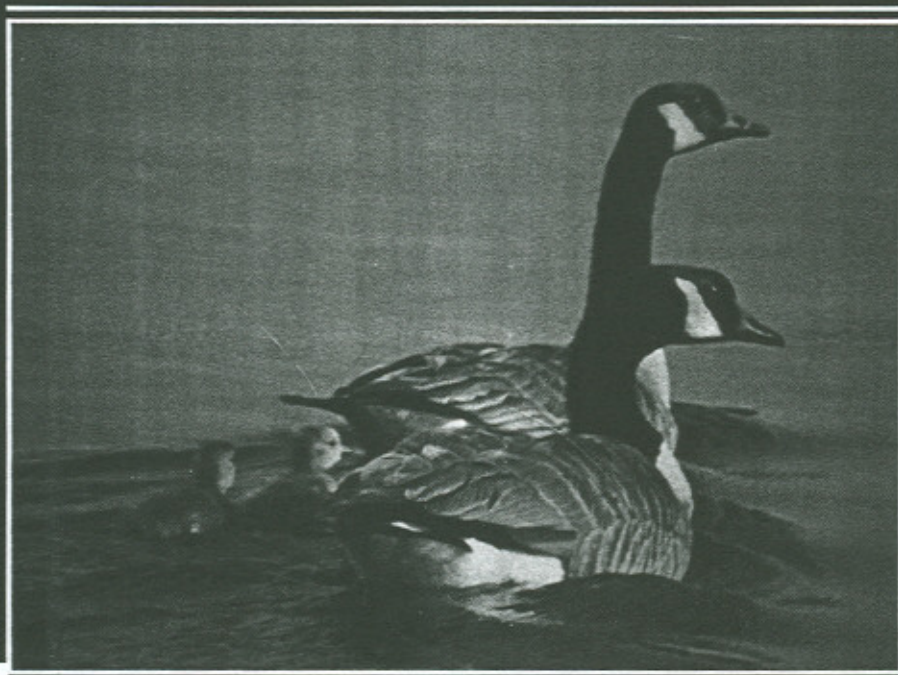
Québec Region

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Région du Québec

HOW TO RAISE MIGRATORY WATERFOWL IN CAPTIVITY



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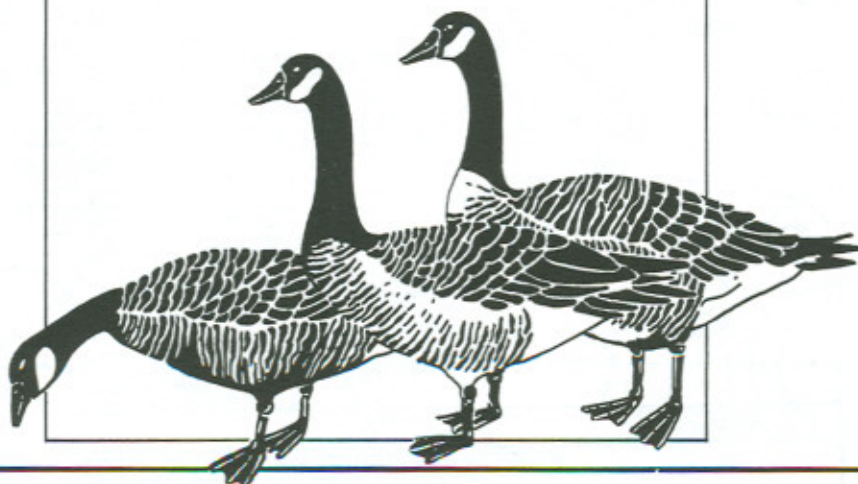
Preface

The Canadian Wildlife Service is pleased to present this document which is intended as a guide for those interested in raising waterfowl.

This edition is a practical summary of the experiences and research of many breeders whose enterprises have been successful.

Michel Cloutier, Wildlife Technician, prepared this document through a "N.E.E.D. Canada 1983" project.

The Director



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Foreword

Raising of waterfowl in captivity is becoming increasingly popular. In 1976, there were 480 avicultural permit holders in Québec; in 1983, there were 675.

Waterfowl breeders may be found in all the administrative regions of Québec. The highest concentrations are in: Region 06 (Montréal), with 28% of waterfowl breeders; Region 04 (Trois-Rivières) with 25%; and Region 03 (Québec City), with 22%. The lowest concentrations are in Region 08 (Abitibi-Témiscamingue) and Region 09 (Côte-Nord), which each have 1% of waterfowl breeders.

Québec waterfowl breeders may be subdivided into four broad categories:

- 1st category for recreational purposes only (birds kept as domestic pets);
- 2nd category for recreational purposes, but also for small scale business and personal consumption;
- 3rd category for commercial purposes (wholesalers);
- 4th category for educational purposes (zoos).

Acknowledgements

I wish to thank Mr. J.A. Saint-Pierre, project supervisor, for his thoughtful comments and advice, as well as C.A. Drolet and S. Lemieux who edited this paper.

The Québec waterfowl breeders I have met, particularly Mr. Ian Breakey, graciously shared their time and experience with me. I thank them for it.

I also wish to thank Ms. E. Honschar and Ms. C. Auger, who produced this document on a word processor.



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1. Background

1.1 Avicultural permits

Any person in Canada wishing to keep migratory birds in captivity must request permission from the federal government (Canadian Wildlife Service).

In order to obtain birds, the breeder must contact other waterfowl propagators of migratory birds who, like himself, hold permits. The law strictly prohibits taking migratory birds or their eggs from the wild, except under a permit issued by the Minister.

An avicultural permit expires on December 31 of each year. On or before January 31 of the following year, the aviculturist must produce a report of his activities for the year. In addition, a permit holder is required to submit to an inspection by conservation officers at any time.

For further information, refer to the Regulations on Migratory Birds.

1.2 Selecting stock

When purchasing waterfowl or other migratory birds, it is important to select wisely the breeder from whom you will buy. You must ascertain that the birds are kept properly and they are in good health, so as not to contaminate those you already have.

Healthy waterfowl have smooth, clean plumage at all times and glide easily over the water. They are alert and vigilant regarding activity around them. When paddling or swimming, their plumage remains shiny and will never appear soaked or water-logged.

To ensure the purchase of good specimens that are truly typical of wild waterfowl, you must be sure they have the colouration and other characteristics of the species; avoid cross-bred or hybrid birds.

2. Rearing Facilities

2.1 Pond construction

In order to propagate waterfowl of high quality, it is essential to have a constant supply of fresh, clean water.

If you have to dig an artificial pond for your waterfowl, it is desirable to construct one which appears as natural as possible. A pond with irregular contours and small bays will be much more attractive and natural for mating waterfowl than a pond with regular contours. In addition, if it has small islands covered with patches of vegetation, it will provide good nesting sites, because waterfowl will find safety from certain predators.

Fig. 1



Erosion of pond shoreline by waterfowl or due to frequent variations in water level.

Frequent variations in water level, and/or splashing by waterfowl, are the two factors which contribute most to erosion of the shoreline of a pond (Fig. 1). In order to solve this problem, we recommend placing a border of stones around the edge of the pond (Fig. 2).

Stream entrances to and from the pond must be arranged in such a way as to prevent ducklings from getting out, and predators from getting in. Metal rods 2.5 cm (1") apart, or a wire mesh (Fig. 3) may be used. With this type of installation, a constant watch must be kept to ensure that pond inlets and outlets do not become obstructed, thus producing flooding.

Fig. 2



Band of stones placed around the edge of the pond in order to prevent excessive erosion of the shoreline.

Fig. 3



Wire mesh is installed at pond inlets and outlets to prevent ducklings from escaping and predators from entering.

2.2 Pen construction

Any pen or pond intended for use by waterfowl should be enclosed by antipredator fence of galvanized chain link. A 5 cm (2") diamond chain link or a variable-chain link of 5 × 15 cm (2" × 6") to 15 × 15 cm (6" × 6") may

be used; in either case, it is important to insert a band of mesh about 30 cm (12") high with 2.5 cm (1") meshing around the bottom (Fig. 4). This will prevent ducklings from squeezing through the net, and becoming victims of predation.

A fence 1.5 to 1.8 m (5 to 6') high will effectively prevent access by non-climbing predators.

In order to prevent damage by burrowing animals, we suggest attaching a 1 metre-wide band of wire netting to the bottom of the fence; the band should be folded parallel to the ground, and covered with a few centimetres of soil. This is a low-cost, simple and effective method of protection against burrowing animals.

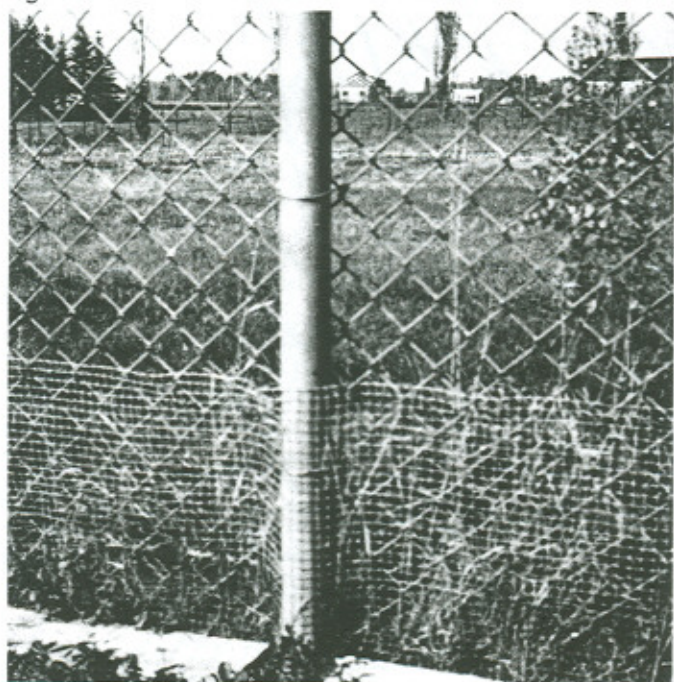
If problems occur with climbing animals, an electric wire similar to that used for cattle may be installed a few centimetres below the top of the fence.

In order to keep owl, hawks and other avian predators away, flashing lights like those used on road maintenance vehicles may be used. If maximum protection is required, a net or wire mesh may be used to cover the entire pen. This should be placed at a height of about 2.15 to 4.55 m (7 to 15'), which will allow the birds to fly freely.

There are several types of netting which may be used:

- poultry netting
- wire netting
- plastic netting

Fig. 4

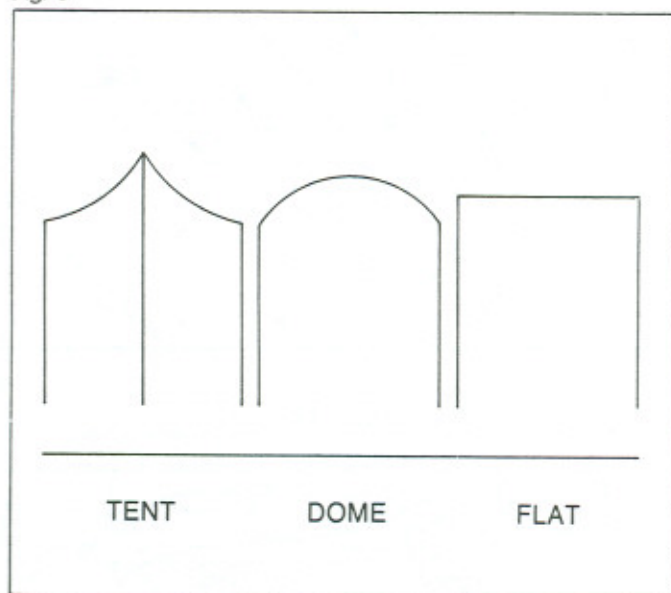


Small-mesh wire netting attached to bottom of fence to prevent ducklings from escaping.

Plastic netting offers more advantages. It is very light and requires a less robust form of support. For a surface area of 93 m^2 (1 000 sq. ft.), it would weigh only 1.25 kg (2.75 lb). It is also resistant and its rectangular mesh is sufficiently small to prevent entry of small birds, which are sometimes attracted in large numbers by uncovered pens and may consume large quantities of feed. Most garden centres sell this type of netting.

Different roof structures may be used to cover pens. Roofing in the form of a tent may be achieved by using poles or a central support. A domed roof may be constructed using hoops of metal or other materials. Also, a flat roof can be constructed (Fig. 5).

Fig. 5



Roof structures which may be used to cover pens.

2.3 Rearing compartments

There are several methods of rearing waterfowl in captivity but they do not all give the same results. Our analysis suggests that the following method is especially effective for rearing goslings and ducklings.

As soon as a clutch is hatched, the mother hen and her offspring should be transported to a small pen, in order to eliminate losses from predation or accidental trampling.

For birds the size of a Canada Goose, we suggest minimum space of $2 \text{ m} \times 2 \text{ m}$ ($7' \times 7'$) for a pair and their goslings (Fig. 6). A compartment of this size, 1 m (3') high should be covered with plywood to protect the young birds from rain and excessive sunlight. Two of the four sides should be covered with 1.3 cm ($1/2''$) wire mesh netting and the other two sides with plywood.

Fig. 6

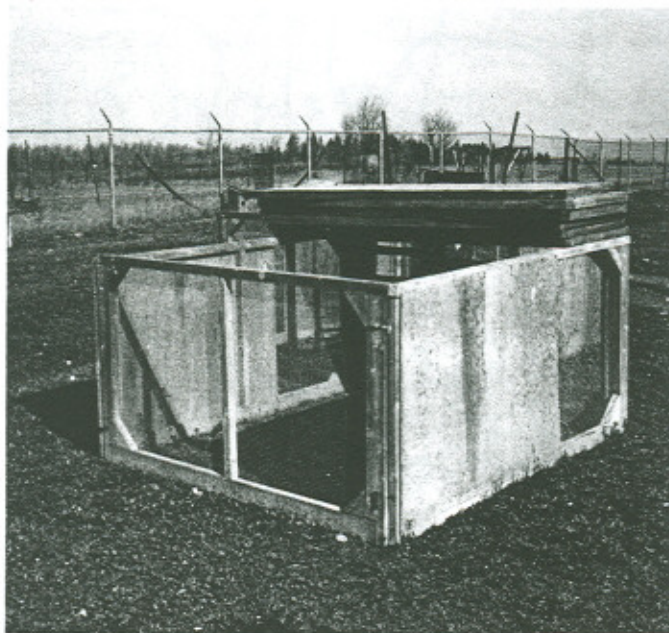


Illustration of a basic pen for raising Canada Geese and other geese.

The suggested compartement, for duck raising is $1.2 \text{ m} \times 2.4 \text{ m}$ ($4' \times 8''$) with a removeable partition in the centre (Fig. 7), making two compartments of $1.2 \text{ m} \times 1.2 \text{ m}$ ($4'' \times 4'$) (Fig. 8), each of which can accomodate a hen and a brood of four or five ducklings. For a larger brood, the removeable partition should be removed and the entire space made available to it. The roof,

Fig. 7



Illustration of compartment for raising ducks.

the back and sides of the compartment which is 0.6 m (2') high, are covered with plywood and only the front with 1.3 cm (1/2") wire mesh netting.

Fig. 8



Interior view of duck compartment, with a wire mesh floor to keep the interior clean.

The floor of the two compartments is made of fine wire mesh, placed about 2.5 cm (1") from the ground. This mesh floor keeps the compartment clean, while allowing grass to grow. Whenever the ground becomes too soiled with droppings, or that the birds graze the grass completely, the compartment is simply moved to another spot.

A basin about 46 cm (18") long \times 46 cm (18") wide \times 13 cm (4") deep should be embedded in the wire mesh in order to make it easily accessible to the ducklings. For greater safety, bricks should be placed at the bottom of the basin for the first few days to make it shallower. If there is not a constant circulation of water through the basin it should be changed at least twice a day.

The birds are kept in this type of pen for a period of three to four weeks. After this time, they may be placed in a larger rearing pen, where they will benefit from greater space and a larger water area, enabling them to develop normally. From this time until the young have adopted a diet similar to that of adults, separate feed troughs should be provided for adults and young, each containing appropriate food and located in close proximity to each other.

Note all the surface areas suggested for breeding pens are the minimum size required.

2.4 Winter facilities

Not all species may be kept outdoors through our severe winters. Thus we propose two types of facilities for different species.

2.4.1 Outdoor facilities

If they have good facilities, Canada Geese, other geese, swan and large dabbling ducks are able to survive the rigours of winter with relative ease. However, they must have a shelter to which they have access at all times. The interior of the shelter is lined with straw to allow the waterfowl to rest comfortably. The straw must be replaced each time it becomes too soiled with bird droppings. The birds are fed inside the shelter, thus avoiding wastage of feed and providing incentive to the birds to use the shelter. In storms or very cold weather, the birds will appreciate this refuge against the cold. Only a small opening is left on the south side of the shelter for entry and exit of the birds, thus protecting the interior from wind (Fig. 9).

Fig. 9



Shelter for waterfowl with a small opening, permitting access to the interior at all times.

In order to avoid losses due to predation, it is preferable to bring the birds indoors for the evening, allowing them to return outdoors in the morning. This eliminates danger from predators, and allows the birds to spend the coldest

hours indoors. To moderate the inside temperature during the night or during severe cold, heat lamps may be installed above the birds. The height of the lamps should be adjusted to prevent the birds from overcrowding.

In the winter, part of the pond should be kept thawed, so the birds may drink and swim.

To keep part of the pond thawed at all times, use a pump to bring the warmer water from the bottom to the surface. This constant water circulation, and the presence of birds dabbling in the water, should keep part of the pond unfrozen. During periods of intense cold, the ice should be broken up by hand when required. If for any reason the waterfowl do not have access to part of the pond, drinking water must be provided.

2.4.2 Indoor facilities

All diving ducks and small dabblers must spend the winter inside a shelter. The ideal indoor temperature, for avoiding condensation on the walls, is 5°C (41°F). All waterfowl, diving ducks in particular, must have a basin of water available large and deep enough for them to swim in. Cleanliness of the basin is assured by constant circulation of fresh water. Depending on the size of the basin and the number of birds using it, it should be completely emptied at regular intervals, at least once per week. Floors and feeders should be disinfected at least every two weeks. If straw is used on the floor, it must be replaced whenever it becomes too soiled with bird droppings.

For ducks the size of the Mallard, we suggest a minimum living space within the shelter of 0.65 m² (7 sq. ft.). If after a few weeks indoors, the birds show abnormal behaviour, such as stress, pecking, or feather plucking, they are probably overcrowded. In this case, the number of square metres per birds must be increased to relieve overcrowding.

Less experienced aviculturists should provide a much larger living space than the one suggested above. A few healthy birds is better than many sickly ones.

2.5 Planting

Fig. 10



Pen surrounded by shrubs are more attractive and natural looking while providing waterfowl the shade require.

It is advisable to enhance the area around the pond by planting and seeding a variety of plants. That vegetation will offer waterfowl places in which to nest or sleep. For certain species, particularly geese, an area of grassy vegetation must be provided where they can graze. These areas will require regular maintenance, because geese select the most tender plants, leaving the others aside.

Shrub plantings will make the area much more attractive, and will provide waterfowl with a more enjoyable and natural environment, while providing shaded areas where they can find protection from the sun (Fig. 10).



3. Waterfowl nutrition

Québec waterfowl breeders have been observed to offer a great variety of feed to their birds. Each has developed his own "menu" over the years.

The diet which we suggest represents a synthesis of the main dietary regimes used by waterfowl breeders.

3.1 Starting diet: Dabbling ducks, Canada Geese, other geese, swans

It is important for all waterfowl to consume large quantities of protein during their initial stage of growth. From birth to the 21st day, they are fed turkey starter feed containing 25% protein. After the 21st day, turkey starter is mixed with turkey growth feed. Waterfowl should also have fine gravel available, which they consume at will. From the 28th day, young waterfowl should be fed entirely with turkey growth feed to the age of about three to four weeks.

For swans, turkey starter mixed with chicken growth feed and mixed grains is recommended. All these feeds should be mixed in equal parts, and this diet should be maintained for a period of sixty to seventy days.

For geese and swans, the diet should be complemented with vegetative matter, which they will consume at will after the age of two weeks. Absence of plant material in their diet will lead to wing deformities which show up as twisted wing tips (Fig. 11).

Fig. 11



Canada goose with a wing deformity due to lack of vegetative matter in its diet.

Table I: DIET FOR DABBLING DUCKS, CANADA GEESE AND OTHER GEESE*

DAYS DIET	0 - 21	21 - 28	28 - 56	56 - 63	63 - ...
STARTING	Turkey Starter	Turkey Starter + Turkey Growth feed			
INTERMEDIATE			Turkey Growth feed	Turkey Growth feed + Game Bird Flight Conditioner and mixed grains	
HOLDING					Game Bird Flight Conditioner and mixed grains

* For geese and Canada Geese, do not forget to supply vegetative matter from the age of two weeks onward.

3.2 Holding diet: Dabbling ducks, geese, Canada Geese, swans

As waterfowl reach their third or fourth week on turkey starter feed, this diet should gradually be mixed with a holding (growth) diet which should be made up of two parts game bird flight conditioner and one of mixed grains. From this stage onward, the holding diet will become the regular ration for raising waterfowl (Table I).

In the case of swans, the starting diet should be maintained for 60 to 70 days, after which turkey growth feed and poultry growth feed should gradually be replaced by game bird flight conditioner. After one week on this mixed regime, the starting diet can be removed, leaving only the diet for raising other waterfowl, that is two parts game bird flight conditioner and one part mixed grain (Table II).

During the egg-laying season, this mixture should be enriched with oyster shells in order to provide the calcium required for egg formation.

3.3 Starting diet (Diving Ducks)

All waterfowl are fed turkey starter at birth. During the first few days, young diving ducklings can be encouraged to feed by placing small pieces of finely cut-up fish in the mixture. Also, crushed hardboiled eggs can be mixed with the turkey starter.

Another method can be used for raising young diving ducks. A few days before the eggs hatch, they are taken from the mother and hatched by a "Bantam" hen *. Once the young are hatched, small pieces of fish are placed on the back of the adopted mother hen, arousing their curiosity and inciting them to eat. The advantage of this method is that the "Bantam" hen will not eat fish intended for the ducklings. Again, turkey starter mixed with crushed hardboiled eggs should be available to them.

This diet is to be maintained for the first three or four weeks, after which they will receive the holding diet.

* Incorrectly called "Bandy hen"

Table II: DIET FOR SWANS*

DIET \ DAYS	0 - 70	70 - 77	77 - ...
STARTING	Turkey Growth feed + Poultry Growth feed + Mixed Grains		
INTERMEDIATE		Turkey Growth feed + Poultry Growth feed + Mixed Grains + Game Bird Flight Conditioner	
HOLDING			Game Bird Flight Conditioner and mixed grains

* Do not forget to supply vegetative matter from the age of two weeks onward.

3.4 Holding diet (Diving ducks)

After three or four weeks on the starting diet, game bird flight conditioner is gradually added. Trout meal can also be added, as well as dog meal, the latter provided in the form of small cubes scattered on the water. In order to avoid loss of food, it is preferable to distribute only the dog meal on the water, because the small particles of trout meal will disintegrate rapidly and fall to the bottom (Table III).

The three ingredients making up the holding diet for raising diving ducks are game bird flight conditioner, trout meal, and dog meal.

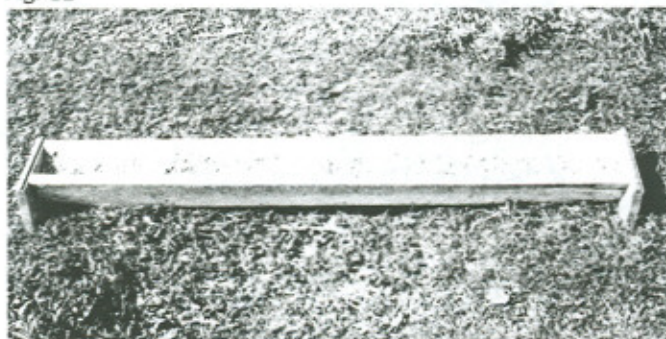
3.5 Suggestions on feeding

Some breeders complement the diet of their birds with leafy green vegetables. This aliment is very much appreciated by Canada Geese and other geese, but it must be given strictly as a supplement to the holding diet, and not as a main diet. Green vegetables deteriorate rapidly and,

therefore, should be distributed in small quantities so that they are rapidly consumed.

Many waterfowl propagators simply distribute feed on the ground, or in uncovered feeders (Fig. 12). In this case, it is preferable to distribute only enough food for the birds' immediate needs so that the feed available is always fresh.

Fig. 12



Uncovered feeder frequently used by waterfowl propagators

Table III: DIET FOR DIVING DUCKS

DIET \ DAYS	DAYS		
	0 - 28	28 - 35	35 - ...
STARTING	Turkey Starter Fish Eggs		
INTERMEDIATE		Turkey Starter Fish Eggs Game Bird Flight Conditioner Trout Meal Dog Meal	
HOLDING			Game Bird Flight Conditioner Trout Meal Dog Meal

Large feeders (Fig. 13 and 14), which require only occasional filling are an efficient means of feeding waterfowl, but a number of criteria must be respected:

Fig. 13



Large feeder which allows birds to feed at will, while ensuring that the food is fresh.

Fig. 14



Illustration of hinged roof permitting access to the feed bin.

- roofing must extend sufficiently beyond the feeder to protect the feed from rain and storms;
- the feeder must be suspended a few centimetres above-ground allowing air circulation to prevent spoilage;

- we suggest putting a suspended wire mesh floor around each side of the feeder: it should be about 9 cm (3 1/2") high and 46 cm (18") wide (Fig. 15).

Feed not eaten by the birds falls through the floor netting, ensuring that wet or contaminated food is not eaten. In this way the risk of illness or disease is minimized.

In addition to regularly cleaning the feeder, the mesh floor and the feed accumulated underneath, the aviculturist should periodically move the feeder to a new location. In this way the birds will eat only dry, clean, and healthy feed at all times.

Fig. 15



Interior view of feeder and wire-mesh floor placed around each side in order to prevent birds from consuming spoiled feed.



4. Breeding

Waterfowl pair before mating. Before the female selects a mate, the courting males expend much effort and energy. Once the pair is established, it will devote itself to nesting and the raising of young.

For the Canada Geese and other geese the pair bond lasts for life, but if a mate dies, another partner may be chosen. The pair bond does not last as long in ducks, usually dissolving after the eggs have hatched. During the nesting and incubation period, the male protects the female from intruders.

4.1 Breeding pens

To breed captive waterfowl successfully, several basic rules must be followed. Pens constructed in a natural environment (Fig. 16) offer many more advantages for nesting than pens constructed in an artificial environment (Fig. 17). Whether nesting occurs in a natural or artificial environment, the pair must have a certain degree of isolation and tranquillity in order to establish its nest.

Fig. 16



Attractive natural site for waterfowl nesting.

During the reproductive season, each breeding pair should be separated from other birds as much as possible in order to avoid conflict and to encourage it to breed. Ideally breeding pairs should be separated from one another in individual pens (Fig. 18). This will give them the calm and space required for productive nesting.

All breeding pairs should have access to a pond or other water area large enough to permit mating which occurs on the water.

Fig. 17



Artificial site with little appeal for nesting waterfowl.

If there is insufficient space to isolate each pair of breeding birds, or if there is a large number of birds, successful breeding is still possible. If several breeding pairs are in the same pen, territorial stress and conflicts between them can be minimized by constructing the pen in such a way as to provide each pair with a small, tranquil isolated area in which to construct its nest.

A good way to visually isolate waterfowl from each other is to use artificial screens, or natural trees or shrubs. These will offer the necessary isolated and tranquil nesting places.

Feeders should also be arranged in such a way as to allow pairs to feed on their own, away from other pairs and groups. This is another factor which will encourage waterfowl to breed.

Fig. 18



Pen and pond divided into several sections to provide each breeding pair with an isolated area for breeding.

4.2 Types of artificial nesting structures

In addition to natural nesting sites, there are several types of artificial nesting structures which may be used. The type of nesting structure varies for each species, according to its nesting requirements.

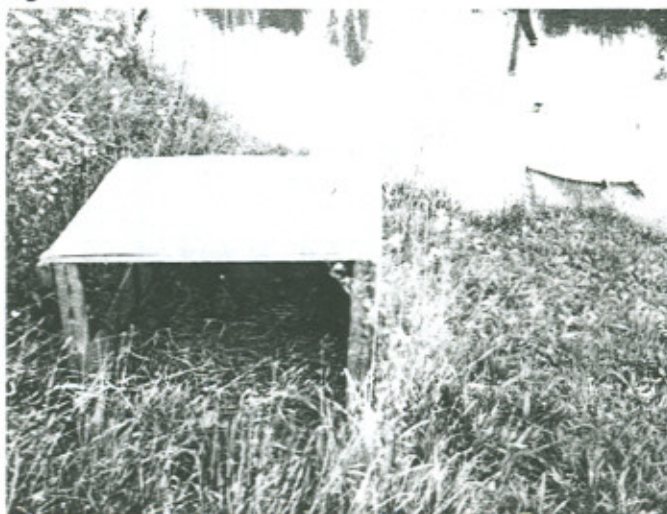
There are two types of nesting structures which are simple to construct, and which are well accepted by Canada Geese and other geese. The first of these is an automobile tire placed on the ground, with straw used as a liner (Fig. 19). It is important to carefully stuff the interior of the tire, so that no cavity remains into which eggs could slip beyond the reach of the mother. The tire should not be too high, as this could prevent adventurous goslings from returning to the nest.

Fig. 19



A nesting structure made from an automobile tire is usually well accepted by geese.

Fig. 20



Types of plywood shelters used for waterfowl nesting.

Fig. 21



Triangular shelter for waterfowl nesting.

Another nesting structure which is easily constructed and well accepted by geese is a triangle made with three bales of hay, the interior of which is lined with straw.

For some species of waterfowl, a simple plywood shelter lined with straw, and installed in a quiet location, will serve as a good nesting site (Fig. 20-21). For hole-nesting duck species such as the Wood Duck, there are several

Fig. 22



Nesting box for Wood duck and other hole-nesting species.

types of nesting boxes. A plywood box hung on a pole (Fig. 22) or placed directly on the ground is one of the most popular and effective. This type of nesting box has the advantage of being durable and easy to construct.

The following basic criteria should be respected when constructing such a nesting box:

- If the nesting boxes are placed in the forest outside the pens, the box opening should be oval rather than round, to prevent predators from entering. Within pens the waterfowl are protected from predators and either a round opening (10 cm (4") in diameter) or an oval one may be chosen;
- The interior floor dimension of the box should be 25 cm × 25 cm (10" × 10");
- The floor of the box should have holes to permit drainage;
- The bottom should be lined with wood shavings or coarse sawdust to provide protection for the eggs (Fig. 23);

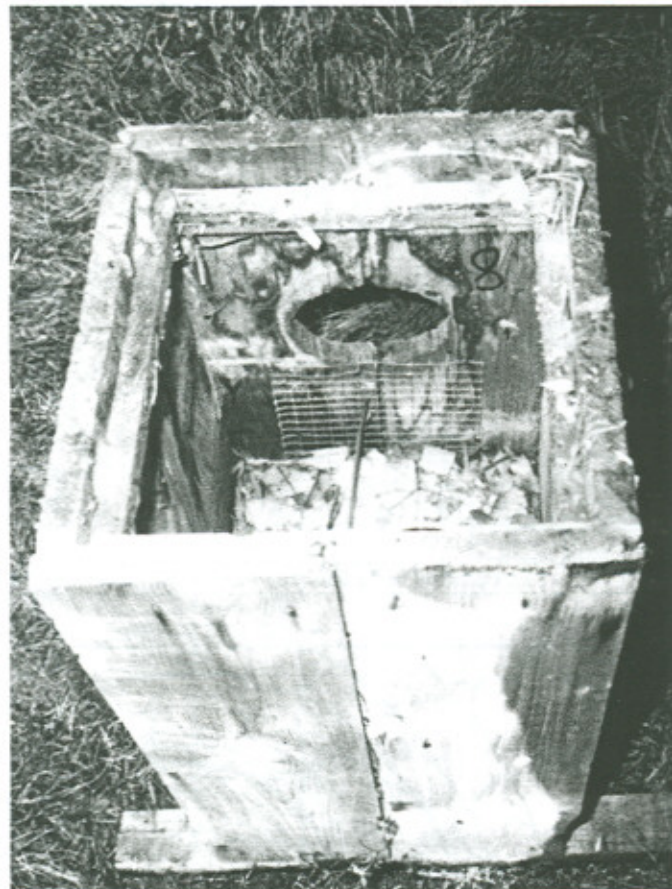
Fig. 23



Interior view of nesting box lined with wood chips.

- Wire mesh should be attached to the interior of the front wall, from the floor to the opening to provide a ladder-like surface to help the young ducklings to climb out (fig. 24);

Fig. 24



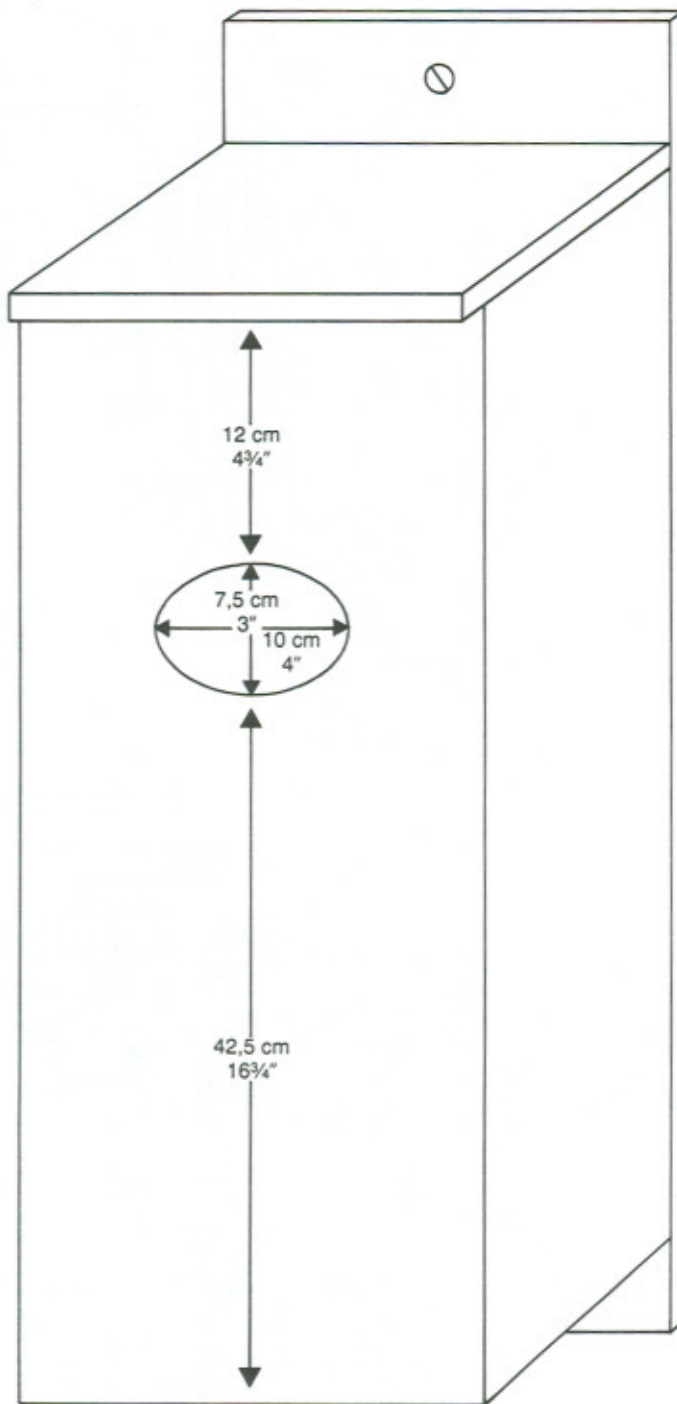
Wire mesh from bottom of nesting box to opening, to provide better grip for ducklings as they climb out.

- The box should have either a side door or a removeable roof to facilitate cleaning.

For ducks such as the pintail, wigeon and gadwall, an easily constructed plywood nesting box may be readily accepted. A rectangular box 91 cm (36") long × 46 cm (18") wide and 30 cm (12") high is simply placed on the ground (Fig. 26). The roof is removeable to facilitate cleaning. One of the ends of the box, and the central divider, has an opening 15 cm (6") in diameter. The opening in the end of the box is located near the floor, while the opening in the central divider is located near the roof. The interior is lined with wood chips to offer the birds a comfortable nesting site.

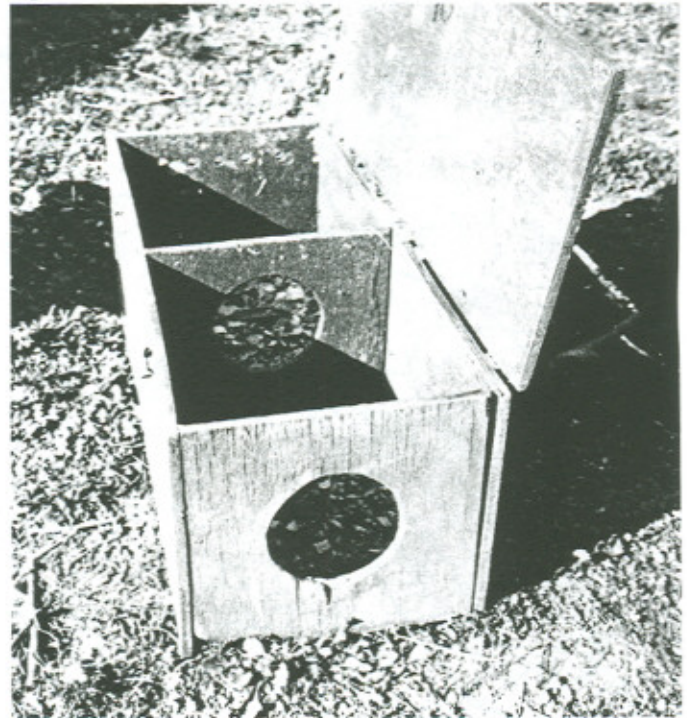
For both types of nesting boxes, a few small holes can be drilled in the walls to provide ventilation (Fig. 26).

Fig. 25



Sketch of Wood Duck nesting box (source: "Aménagement du Canard huppé sur la Réserve de Dundee" by Gilles Chapdelaine, C.W.S., Environnement Canada).

Fig. 26



Artificial nesting box for pintail, wigeon and gadwall ducks.

4.3 Artificial incubation

An incubator is a machine in which temperature and humidity are controlled to simulate natural incubation as efficiently as possible. Few Québec waterfowl breeders artificially incubate waterfowl eggs, most relying on natural incubation. For those wishing further information on this subject, we recommend "Propagation of Captive Waterfowl" by Peter Ward and Bruce D.J. Batt (see sources).

5. Clipping and pinioning

Since most waterfowl breeders keep their birds in open-type pens, it is necessary to prevent them from flying away. Two methods may be used: clipping of the primary wing feathers or pinioning of the wing. Whichever method is used, it is applied to only one wing, putting the bird off balance when it attempts to fly.

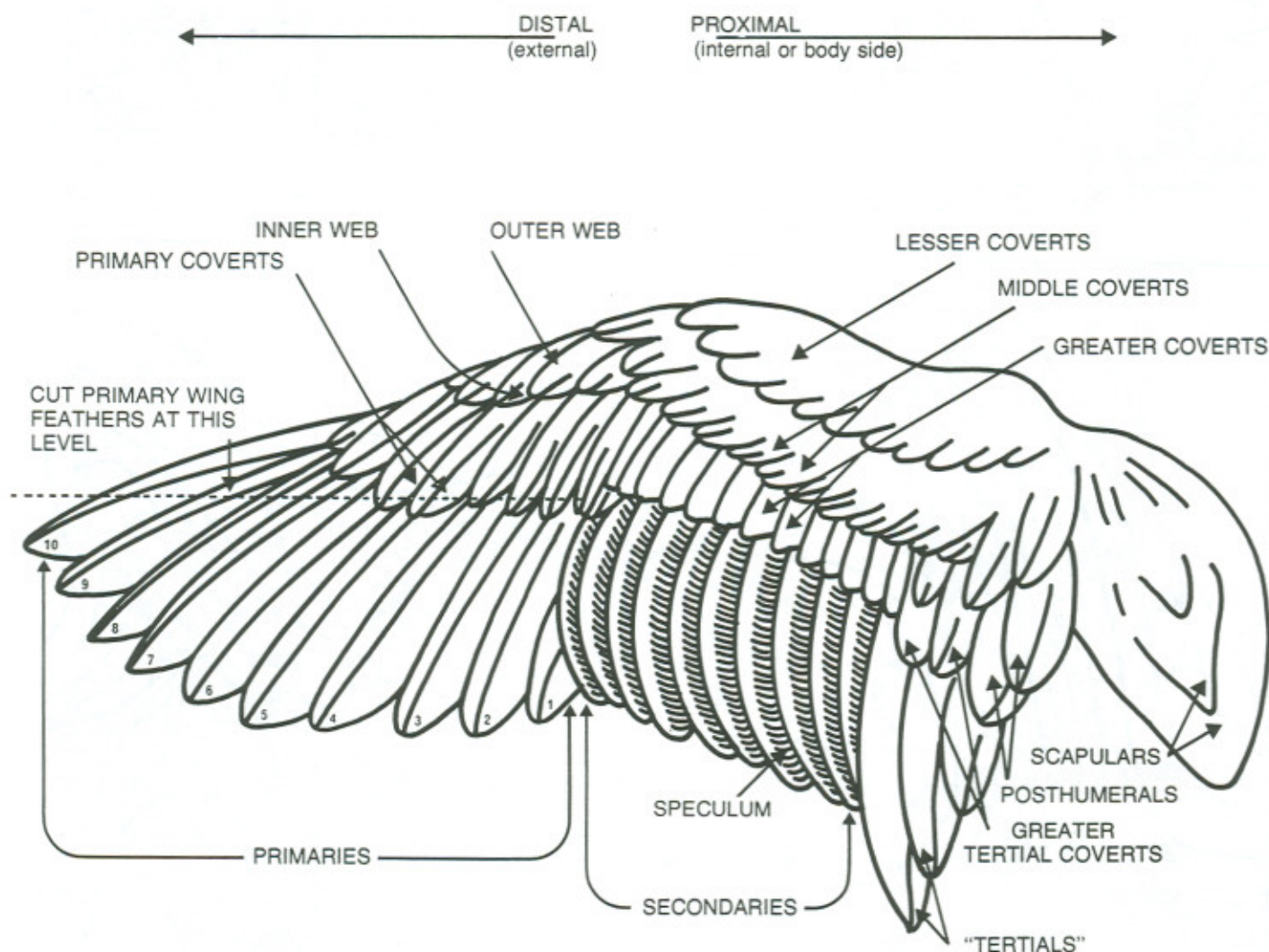
5.1 Clipping

This is simple and easy to do; the primary wing feathers of one wing are cut off (Fig. 27). Clipping should be done at a

time of year when the shafts of the primary wing feathers are hard and white. When cutting, leave about 2.5 cm (1") in order to prevent bleeding. Feathers should not be clipped when blood is circulating inside the quills; at this stage, the primary feather shafts are blue-red in appearance. If the wing is clipped at this stage, the feather will continue to grow in a deformed fashion, which may be sufficient to allow the bird to fly.

The only disadvantage of this method is that clipping must be repeated every year, following the feather moult.

Fig. 27



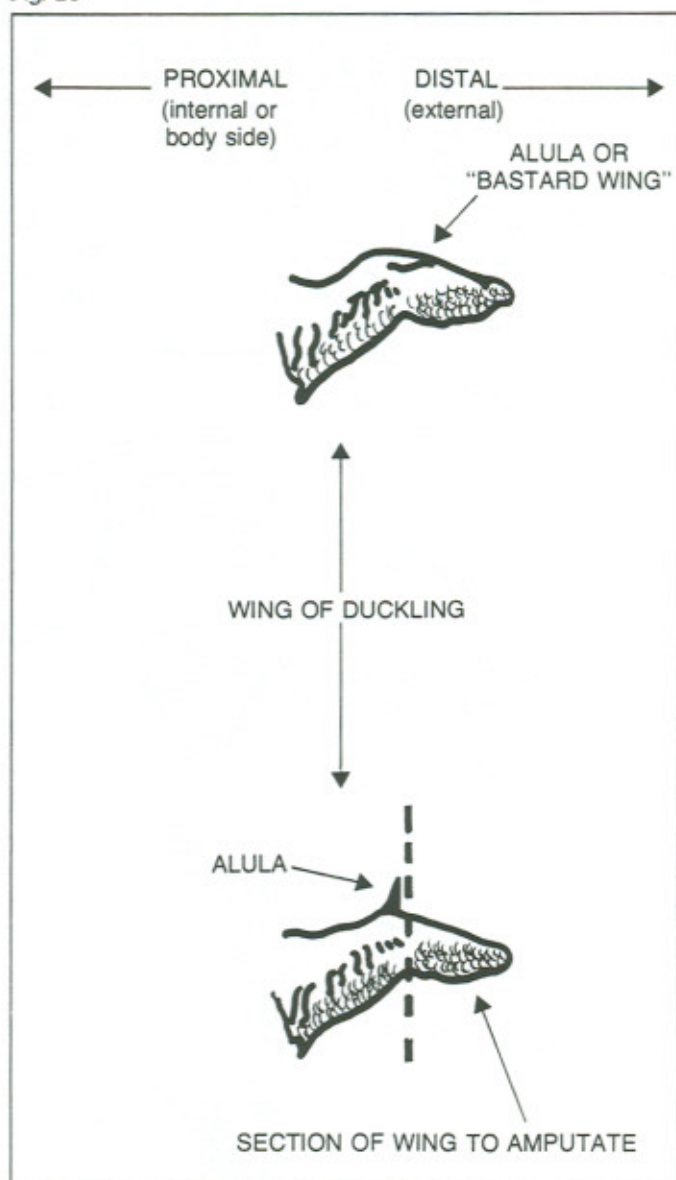
Typical duck wing showing feathers to be cut by clipping primary wing quills. (This illustration is taken from "Special Scientific Report Wildlife", no. 82, March 1964, by Samuel M. Carney).

5.2 Pinioning

Pinioning consists of amputating the part of the wing in which the primary wing feathers are located. This procedure will permanently prevent the bird from flying.

This operation is simple to carry out on a bird a few days to one week old. Use a good pair of surgical scissors, hold them firmly against the alula or "bastard" wing, amputating the extremity of the wing which supports the primary feathers (Fig. 28). At this age, a few drops of blood may appear, but no particular treatment is required and the bird may be returned immediately to the pen.

Fig. 28



Part of wing which must be amputated on a young duckling in order to permanently prevent it from flying (Pinioning).

Pinioning of an adult bird requires much more skill and caution. The operation must be conducted under good hygienic conditions, and requires specialized knowledge and instruments. If you have never carried out such an amputation we suggest leaving the first attempt to your veterinarian who will advise you on how to proceed thereafter.



Sources

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Departement of Agriculture of British Colombia, Waterfowl Propagation Branch, 1975. "Le canard à la ferme familiale", Agriculture Canada 10 pp.

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Appendix 1

Sex determination in waterfowl

For most adult ducks, knowing the sex of the bird poses no problems since the male has a much brighter and more colourful plumage than the female.

The sex of geese, swans and young ducks is more difficult to determine, because the male and female are similarly coloured. The only accurate way of determining their sex is to examine the sexual organs located in the cloacal cavity (anal opening).

Method

To determine the sex, hold the bird on its back with the tail facing away from you. Locate the cloacal cavity with your fingers, and exert pressure around the entire area in order to expose the genital organs. If the bird is male, the penis will protrude. It has a corkscrew shape, and is surrounded by light rings (Fig. 29). Sexing large birds such as

geese and swans requires considerable strength, experience and patience.

Determinating the sex of birds requires practice. A good way to begin is to practice on birds whose sex is already known in this way, the eye will become familiar with distinguishing features more quickly.

Fig. 29

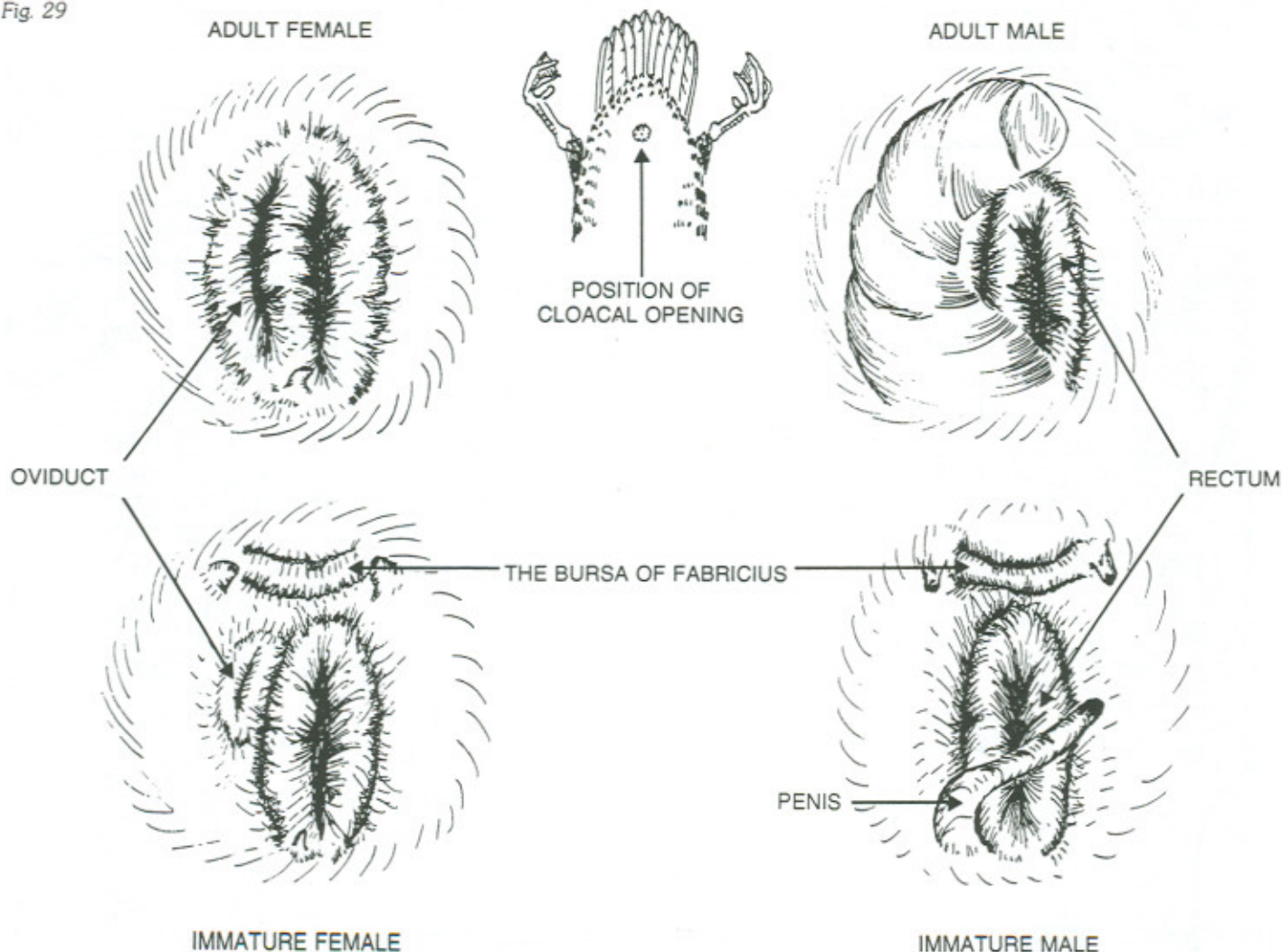


Illustration of male and female sexual organs in juvenile and adult waterfowl (Drawing by Pierre Dupuis).

Appendix 2

Basic requirements for rearing migratory birds

To assist waterfowl breeders, we have summarized the major criteria to rear waterfowl. One of these is the **minimum space required by each bird**. A basic table follows, showing the minimum surface area required by a waterfowl depending on its age and size (Table IV).

Comparing the size of a Mallard duck with a Teal, you will notice that half of the area suggested for a Mallard will be sufficient for a Teal, which is, 0.3 square m. (3.5 sq. ft.).

Table IV: MINIMUM SPACE REQUIRED PER BIRD, DEPENDING ON AGE AND SIZE

MINIMUM SPACE		
age in weeks	duck (size of a Mallard)	goose
1 to 2	900 cm ² (1 sq. ft.)	1 600 cm ² (1.7 sq. ft.)
2 to 4	1 900 cm ² (2 sq. ft.)	3 150 cm ² (3.4 sq. ft.)
4 to 6	2 800 cm ² (3 sq. ft.)	4 600 cm ² (5 sq. ft.)
8 to 10	6 500 cm ² (7 sq. ft.)	9 300 cm ² (10 sq. ft.)
10 to 12	—	11 100 cm ² (12 sq. ft.)
Adult	6 500 cm ² (7 sq. ft.)	11 100 cm ² (12 sq. ft.)

Shelter

- Summertime: the birds must have some kind of shelter for shade (tree, shrub, wall,...).
- Wintertime: the birds wintering outdoors must have **free access to a shelter** for protection against bad weather and cold. This shelter must be large enough to provide minimum living space (Table IV) for the birds. By "shelter", we mean a structure closed in on all sides, the inside of which is lined with straw, wood chips, etc.

Pond

- Water must be of **good quality** (i.e. not cloudy, muddy or polluted).
- **Constant circulation of fresh clean water** is required.
- **The pond must be sufficiently large and deep enough** for the birds to swim.

Nutrition

- Food must be **fresh and clean** (not spoiled, mildewed or rotten), and must conform to the birds' feeding requirements.
- Food must be distributed every day in **sufficient quantity**, or must be available at will. To be sure that sufficient feed is distributed, you may proceed as follows: each time feed is distributed, the quantity is increased until some remains in the feeder at the following meal. Afterward, you may subtract the excess from the quantity distributed, and the birds will have all they need.

Water

- Waterfowl must have **fresh water** at their disposal at all times.
- For birds kept outdoors in winter, lukewarm water must be given at least twice a day when no other source of drinking water is available.

-
- In the summer, all waterfowl must have **access to a pond** at all times; in winter this requirement may be more difficult to fulfil, but breeders should make all efforts to make open water available to their birds at this time.

Shelters

- Indoor structures should provide the suggested minimum space requirements for each bird (Tables IV). If **stressed behaviour is evident**, (pecking at feathers, plumage in poor condition, etc.) **the space allotted to each bird must be increased**.
- The indoor temperature of the shelter should be neither too hot nor too cold. We suggest a temperature of about 5°C (41°F).

Cleanliness

- In the fall, before the birds are brought into the shelter, the entire interior should be cleaned and disinfected thoroughly. To disinfect, the same solutions as those used for raising pheasants or poultry may be used.
- **Feeders and drinking troughs must be cleaned daily, and they should be disinfected at least every two weeks.**
- The floor, whether of concrete or another substance, should be **cleaned daily and disinfected every two weeks**. If covered with straw, the straw should be replaced whenever it becomes **too soiled** with droppings.
- There must be a **constant water circulation** in the indoor water basin, in order to ensure cleanliness. **At least once a week**, it should be completely emptied for **cleaning and disinfection**.



Notes



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