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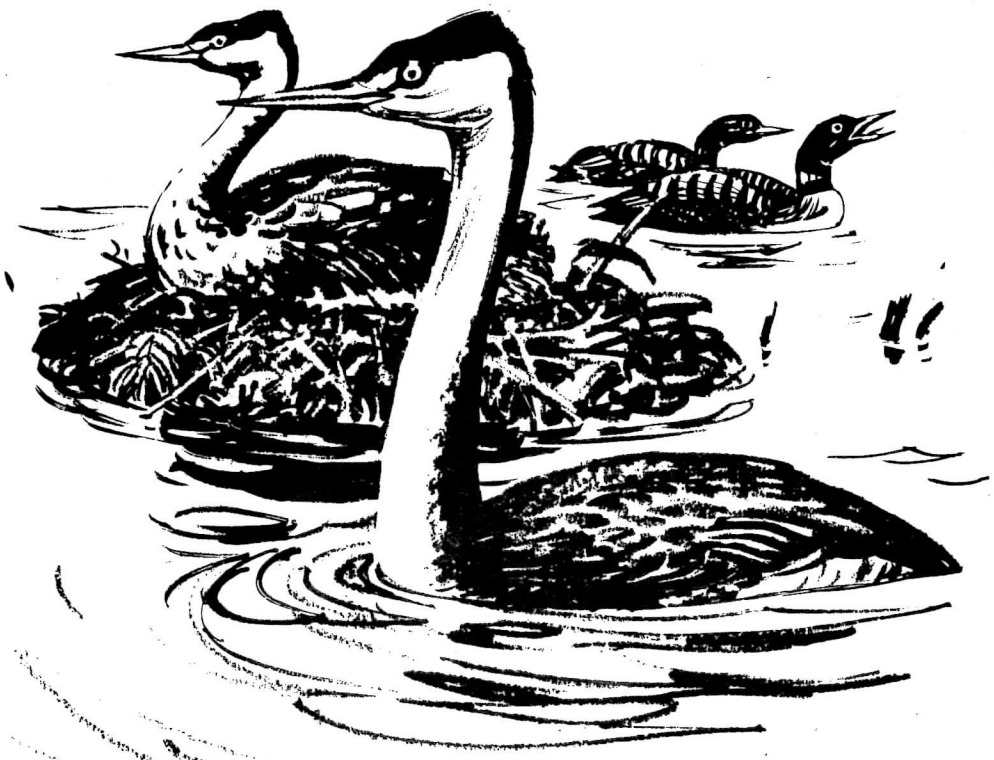


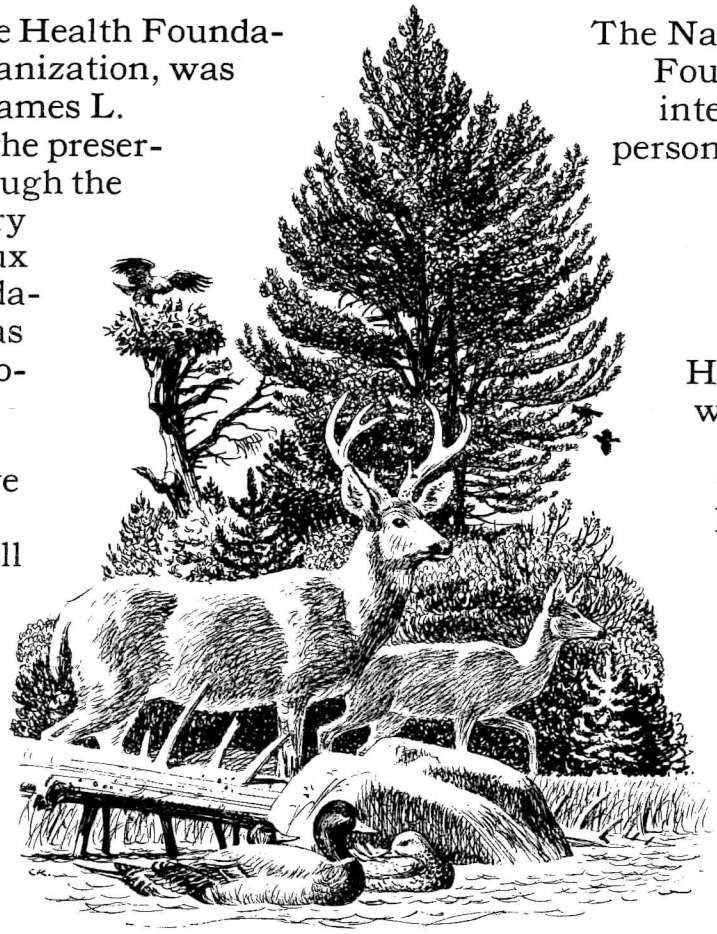
after care of oil covered BIRDS

by JAMES L. NAVIAUX D.V.M.

NATIONAL WILDLIFE HEALTH FOUNDATION

its history and purpose

The National Wildlife Health Foundation, a non-profit organization, was founded in 1968 by James L. Naviaux, DVM, for the preservation of wildlife through the resources of veterinary medicine. Dr. Naviaux has caused the Foundation to be recognized as a leading wildlife advocate as a result of his own legislative, research, investigative and public opinion shaping efforts, as well as direct action such as ecological disaster relief. The Foundation's membership cuts across all lines of age, interest and ideology in support of a common cause.



The National Wildlife Health Foundation welcomes the interest and support of all persons with a sincere desire to preserve a precious legacy of nature, our wildlife, thriving and free. Anyone can help the National Wildlife Health Foundation help wildlife. Financial support is an obvious and vital response, but the Foundation also needs willing hands for public information activities, educational events, research, and –rarely, but regrettably–for rescue and treatment teams when natural and man-made disasters strike.

In seeking to make the discipline of veterinary medicine serve the specific needs of wildlife, the Foundation has adopted the following special goals:

1. To provide effective care for any wildlife needing it.
2. To establish and coordinate a national, cooperative wildlife care program among veterinarians.
3. To devise improved methods and procedures for the care of wildlife, either for individual animals, or, in the event of environmental disasters or disease outbreaks, for animals in numbers.
4. To bring to the general public information on basic husbandry, nutrition and wildlife first aid.
5. To serve as an information center providing educational programs for schools and other groups interested in wildlife and ecology.
6. To assemble a file and bibliography of information concerning wildlife, such as veterinary procedures, population dynamics, disease, endangered species, and sources of emergency funds and supplies.
7. To initiate and support scientific investigation of the diseases of wildlife, wildlife ecosystems and the relationships of wildlife to domestic animals, pets and man.
8. To promote the establishment of a Wildlife Veterinary Center in the San Francisco Bay area, to serve as a national headquarters, educational center, hospital research facility and model for similar centers elsewhere in the United States and the world.

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AFTERCARE OF OIL-COVERED BIRDS

July 1971

Dear Dr. White -
Thought you might like a
copy of our findings -
Sincerely,
James L Naviaux

450 Boyd Rd.
Pleasant Hill, Ca.
94523

James L. Naviaux, D.V.M.
Executive Director, National Wildlife
Health Foundation
Chairman, Wildlife Subcommittee,
California Veterinary Medical Association

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AFTERCARE OF OIL-COVERED BIRDS

Table of Contents

Table of Contents
(continued)

Table of Contents
(continued)

AFTERCARE OF OIL COVERED BIRDS

I. Introduction: Oil pollution in the ocean and the world's waterways has become a major source of contamination of waterfowl the world over. Many thousands of seabirds die each year from this cause. Despite the untold number of man-hours unselifhsly devoted to attempts in saving affected birds, it is a matter of record that most oiled birds are lost. Why? Is there any hope? Efforts will continue to be made for many persons share the feelings we should help repair the damage that man has caused and to help these animals that are highly valued as a part of our international heritage. The three specific causes for these failures are:

1. Previous cleaning methods have resulted in prolonged periods of feather nonfunction - up to six months or longer. Most birds die during the rehabilitation period.

2. Lack of knowledge in the fields of proper husbandry procedures, diseases and pathological physiology of affected birds.

3. Lack of an organized effort to handle the problem. Because there has been no recognized best method of caring for oil-covered birds, authorities have not had the readiness nor the enthusiasm to meet the problem.

The following text is a discussion on present findings and suggested methods of caring for oil birds. A more detailed text entitled "Oiled Seabirds - Contingency Program for Aftercare and Treatment," will soon be available from Thomas T. Crowell, Co., New York, New York. This specifically spells out suggested methods of dealing with large oil disasters involving large numbers of seabirds.

II. Effect of Oil Contamination on Birds: When birds become contaminated by oil at sea they are affected in many ways. As they become coated with oil, the feathers are no longer functional for flight, water repellency or insulation. Many birds will become waterlogged and sink. If they remain afloat, they are helpless in the water, where they cannot seek food and are often themselves objects of prey. The loss of their insulation results in a great reduction of body heat which can be critical. Birds that are picked up from the beaches or water are cold and are in

various degrees of shock. Some toxicity from oil ingestion may further complicate their already very stressed condition. When these factors are understood, it must be realized that these birds are medical cases and must be treated individually as such.

III. Check List of Needs of Affected Birds:

1. Quick recovery from beaches or water and taken to a warm, draft-free environment.
2. Stress minimized and treated by gentle handling and specific medical treatment.
3. Effective cleaning technique which is not over-taxing, disturbing to feather structure and will allow the birds to be released in less than three weeks.
4. Effective husbandry and medical procedures.
5. Efficient method of being released back to the wild.
6. Well prepared effort to meet this problem.

IV. Organization Needed for Major Oil Spills:

For major oil disasters it is important that a "Wildlife Rehabilitation Organization" or some well organized, prepared group be ready to take over all the responsibilities in caring for affected birds. This group should be recognized by all local officials. They would then handle all public information, set up necessary facilities, enlist work force and oversee all procedures for the caring of the birds. (See Appendix for diagram of the suggested makeup of such an organization.) Details to their duties and function are ennumerated in the "Contingency Program Text," by the author.

Such an organization should have at least a staff of six to set up the operations and an Executive staff of six for each care center needed. For specific bird-care procedures there should be at least two workers per 50-75 birds. A great many people are needed and the facility established should consider this fact. Since oil spills can and do occur in any waters involved with oil activities (and it is impossible to predict the location of the next oil spill area) it would seem reasonable to have two Wildlife Supply Storage Centers in the United States, prepared to have materials needed for the care of affected birds.

Because past experience of mamor spills affecting birds has resulted in from 5,000 to 10,000 birds being picked up in attempts of rehabilitation, it would be advisable to have each supply center prepared with materials needed for the care of 5,000 birds. One such facility should be located near each coast of the United States.

V. Cleaning of Oiled Birds:

The proper cleaning of oil from affected birds is the key to the success of any effort to save these waterfowl. Historically, almost every kind of cleaning agent has been used but with unfavorable results. Many cleaning materials are effective in removing the oil contamination from the birds, but no product or method has previously been proven to be effective in leaving the feathers waterproof and totally functional in any reasonably short period of time. It has usually been necessary to have the feathers replaced by a complete molt before normal waterproofing was established. This often takes a period of up to six months or longer. Limited exceptions to this were experienced with the use of mineral oil as a cleaning solvent.

Most cleaning agents fall into one of two major groups: (a) surface tension products, and (b) solvents. The first group works by breaking down the oil into small oil globules and suspending these in a water solution which can then be rinsed away. Solvents work by breaking the oil down into its more simple chemical components, which makes the thicker oil more fluent. It then separates from its previously attached surfaces and flows away.

What are the qualities of an idea cleaning agent for removing oil contamination from oiled birds? To know the answer to this question it is important to know if water repellency of feathers is dependent upon natural feather oils, feather structure or a combination of these factors.

Our present findings indicate that feather structure, and thus feather network (the falling into place of feathers after purposeful ruffling), is the most important aspect of water repellency of feathers, thus agreeing with Rutseke (1960). It seems that the main function of the natural oils is to prevent drying and thus keep the feathers smooth and

flexible. The natural oils may also serve some function in feather lubrication, allowing feather network to occur effectively. We have found that a single feather stripped completely of its natural oils (with the use of a solvent) is perfectly waterproof. This is tested by measuring the contact angle of a drop of water on the feather's surface.

If feather structure is so important in water repellency, it would seem necessary to take all precaution when cleaning birds - not to disturb the feathers any more than necessary. This has proven to be essential.

Surface Tension Agents: If the above is true and perhaps natural oils are not so important, why has cleaning with surface tension agents such as detergents, Polycomplex A-11 and others which do good jobs in removing the contaminating oil, resulted in the birds not regaining their water repellency quality for months? Our findings indicate that this is because it is very difficult to remove all of these cleaning agents from the feathers. We found as much as a 40 percent microscopic film residue on feathers from a cormorant that had been washed with Polycomplex A-11 after the Santa Barbara Oil Slick. This film proves hydrophilic and actively attracts water. If one has ever experienced trying to wash out oil-based paint from a paintbrush with a detergent, he may be better able to appreciate the difficulty in achieving a thorough cleaning with these products. Also many soaps and detergents may have toxic affects on birds and be too harsh on feathers and feather structure. Aqueous systems of washing do cause feather keratin cells to swell and are likely to cause at least some temporary abuse to feather structure.

Solvents: Many solvents, such as mineral oil, solid oil and even products like Kerosene have been used, but with overall poor results. Why? Feather residues prove a major cause for prolonged periods in captivity from the above oils, and toxic aromatics have been lethal from Kerosene and similar solvents containing aromatics.

What are ideal qualities of a cleaning agent? An ideal cleaning agent should be 1) an effective cleaner, 2) non-toxic to birds or workers, 3) non-damaging to feathers, 4) not highly flammable, 5) convenient to use, 6) completely removable, 7) effective in allowing the birds to be returned to the wild in less than three weeks.

Is there such an agent or method which will allow birds to be returned to the wild in a short period of time? Our findings, using mallard test groups, show that this can be done, leaving birds appearing normal in all ways in less than 10 days. Techniques using either surface tension agents or solvents can accomplish this if carefully followed.

Cleaning Methods for Quick Release:

1. SOLVENT - Discussion: This following method is the one of choice as it has given us the most consistent successful results, having birds appearing completely normal within three days. The use of a solvent has several advantages in cleaning oiled birds:
   a) It can be effective in quickly removing even the thickest of bunker oils.
   b) It does not require large quanities of warm water for rinsing as do aqueous (water) systems.
   c) It allows the reapplication of a synthetic oil-wax back on to the feathers.
   d) The solvents are able to be recycled.

   The disadvantages are:
   a) Requires good ventilation.
   b) Requires large volume of cleaner per bird.
   c) Requires effective quick drying technique - thus ample electricity source to operate dryers.
   d) Makes birds "drunk" for various periods of time following cleaning.

   Materials:
   a) plastic dish pans - 10 (12"x14"x5").
   b) Cheveron Isoparaffin #150, approximately 20 gals. per bird
   c) Pur-Cellin Oil-wax Mixture (Dragoco Co., King Road, Totowa, New Jersey). This is to add some natural-like oil back to the feathers. This is a synthetic preen gland oil from waterfowl.

   Preparations:
   a) Set up series of ten plastic dish pans three-fourths filled with Cheveron Isoparaffin #150 (approximately 2 gals./pan).
   b) Place 24cc of Pur-Cellin oil-wax mixture (80% oil and 20% wax) in last bath solution (.3% of volume - 24cc in 2 gals.). Avoid adding too much of this mixture to prevent too heavy "waxing" of feathers.

Note: It is recommended that this setup be outside of building to assure good ventilation. Only set up inside if ample ventilation is possible with fans on work-table and overhead hood to remove fumes away from bird and workers. Though Isoparaffin #150 is not highly flammable, smoking should not be allowed in the cleaning area.

Method:

a) Remove rag wrapping from bird.

b) While having one person holding the bird securely with the wings pinned to the body and a helper holding the beak closed and thus supporting the head, the bird is dunked, with slushing action, several times into the first cleaning pan. The head is not allowed to be submerged. To be certain that the feathers under the wings also get clean, the wings are allowed to be slightly pulled away from the body during the dunking procedure. No attempt is made at any time to forceably brush or rub the cleaner against the lie of the feathers! The head is cleaned with rags dipped into the cleaning solvent using a blotting motion. The application of an eye ointment prior to the head cleaning will help minimize accidental irritation to the eyes. Oil-clogged nostrils can be cleaned with a cotton tipped application stick. During the dunking procedure, much of the oil and solvent has a tendency to accumulate in the rump and tail feathers. Mild squeezing out of these feathers help remove much of the material located there. As a pan becomes quite dirty from this dunking, the bird is then passed on down the line to the next pan of clean solvent. The same handling methods are used. Use as many pans of solvent as needed so that the last pan appears relatively clean (light tea color) after several dunkings. The very last pan will contain 24cc Pur-Cellin Oil-Wax in the solvent to lightly replace the natural oils. All used solvent is replaced into their original containers for reprocessing. All new pans of solvent are used for each bird to prevent toxic effects of used solvents.

c) After the last bath, excess solvent is blotted dry with the use of rags.

d) The bird is then placed in a restricted drying cage or pen while a stream of warm air from a portable blower is directed on him. After 15 to 20 minutes (depending upon the size and how dry the bird is) the bird is moved to its assigned pen. The forced warm air is very effective in helping to achieve evaporation of any residue solvent. A "drunken" attitude can be expected to persist for several hours after the final bath.

Note: This solvent has been carefully choosen and substitutes are not recommended at this time without further studies. Heptane is also another effective and equally safe solvent to be used on the birds but it is highly flammable, and many precautions need to be observed with its usage. Birds look very good after relatively short periods (3 days) when cleaned with heptane.

2. SURFACE TENSION-AQUEOUS SYTEM - Discussion: If carefully and properly used, Polycomplex A-11 can be effective in allowing birds to be released in less than three weeks. Despite uniform procedures, irregular results were obtained in our studies. The explanation for this is unclear but may be related to the effect of this system on feathers, causing some swelling of the keratin cells. Incomplete cleaning seems to be the major reason. This is verified by the fact that our findings demonstrate that those birds that still appeared quite wet four days after their original cleaning, could be rewashed in either more Polycomplex A-11 or better yet, the Isoparaffin #150 solvent or heptane and become water repellent in a few days.

Materials:

a) Plastic dish pans - 6 (12"x14"x5").

b) Polycomplex A-11 (Oceanwide Industries, Inc., 50 Elm Street, Huntington, New York 11743). Approximately 5 gals. per bird is needed.

c) Warm water - approximately 20 gals. per bird.

d) Acetic Acid - 3% solution (240cc glacial acetic acid in 2 gals. water).

e) Rinsing sinks or pans.

Preparation:

a) Set up series of washing and rinsing facilities equipped with running warm water at each rinsing sink. At least three plastic dish pans filled three-fourth full of Polycomplex A-11 will be needed. (approx. 20% solution - 1 qt. + 1½ gals. water)

b) Set up two dish pans of three percent acetic acid for last two rinses.

c) Have rags available for blot drying.

d) Have pens or cages ready with heat lamps or warm air blower.

Method:

a) Remove rag wrappings from bird.

b) The birds are handled in the same manner as previously described. The bird is dunked, with slushing action, into the first pan, allowing the cleaning agent to work well into the oiled feathers. No attempt is made to manually ruff up the feathers! This is a very important point -- not to disturb the feather structure network. Mild squeezing out of the rump feathers will help to remove much of the cleaning agent and oil that has a tendency to accumulate there.

c) After several dunkings in the first pan, the bird is removed to a rinsing sink and is rinsed fairly thoroughly with the use of running warm water (approximately 5 gals. used here). Very cold water, especially in cold weather is contraindicated (not to be used) on these already cold birds. The flow of water is always directed with the lie of the feathers and again, no attempt is made to manually ruff up the feathers.

d) The bird is then returned to another clean plan of Polycomplex A-11 and the same procedure is repeated for washing and rinsing.

e) A third pan of cleaning agent is used (occasionally even a fourth might be needed) with similar rinsing afterwards.

f) After a very thorough water rinsing following the last bath of Polycomplex A-11, the bird is dunked into two consecutive pans of three percent acetic acid solution. This final procedure greatly assists in neutralizing and removing any residue of the Polycomplex A-11. Rinse thoroughly once again in fresh water.

g) Dry bird as well as possible with rags using a blotting and not a ruffling motion. Place bird in pen or cage under a heat lamp or warm air blower.

The washing methods and procedures described here have, as pointed out, several advantages and disadvantages. The solvent method using Cheveron Isopariffin #150 is our best choice at this time (July 1971). It has been very effective, when used on our mallard test groups, in having the birds "beading" water, floating and appearing normal in all respects in less than 72 hours. The birds do go through a limited period of incoordination (drunkeness) but seem to make complete recoveries in a few hours. Long term toxic effects are not known to exist but are possible. We have no such evidence at this time. Only further studies or field experience will demonstrate its effects and/or values when cleaning other species. If the solvent method were to be used indoors because of weather conditions, it would be necessary to have very adequate hood ventilation facilities available to prevent the accumulation of the odorless vapors of Isopariffin #150. Though it is not considered a toxic material or highly flammable, it is wise to avoid any possibilities of danger to workers or to the birds. The Polycomplex A-11 method might be convenient when washing individual or small numbers of birds but the large quanity of water which should be used for thorough rinsing makes it somewhat impractical for major oil spills. If properly planned for, adequate warm water could also be made available for large scale washing with the Polycomplex A-11. In general the solvent is the better cleaner and would be especially indicated where heavy bunker oil is the source of contamination.

As research continues, better methods will most likely be developed. But at the present time the work here by the National Wildlife Health Foundation, looks very encouraging and promising and that it does seem possible to get a quick return of oiled birds back to he wild.

VI. Husbandry Methods and Procedures:

1. Initial recovery of birds from beaches or water:

A. Preparation: Come prepared with the following:

1) Gloves and if possible, goggles

2) A supply of old socks with a slit made in toe end for bird's beak.

3) Rags and tape

4) Cardboard box for every 2 or 3 birds(approx. 20"x16"x15")

5) Old clothes on

B. Procedure:

1) Grasp bird by the neck and have helper (best to work in two's) wrap the bird in rags and hold both wings close to their body, thus preventing wing flapping. Rags can be secured around the birds with tape. The rags will help keep the bird from further chilling until it reaches the washing and care station. Prevent close contact of your face with the head of the bird. Cormorants can inflick severe tearing wounds but most other birds only give firm pecks. Be cautious but not fearful.

2) Slip the sock over the bird's head and have beak protrude through the slip. This has a calming effect, facilitates handling and prevents further ingestion of oil from preening. This procedure does not interfere with the bird's breathing.

3) Place bird(s) in cardboard box with some 1½ to 2" holes made along top margin. It is desirable to place two birds of the same species or general type in each box. Since most of the birds usually affected by oil spills are gregarious, company during transportation has a calming effect. Avoid more than three birds per box, then only if ample room is available in box. Cardboard boxes are best because they allow no drafts and are most often available. Stacking the boxes in more than two layers for transportating should be avoided if sufficient ventiliation is to be available to the birds in the boxes.

4) Transport the boxes containing the birds to the nearest official cleaning and rehabilitation center. It is best that these are within one facility to avoid excess handling of these already very stressed birds.

2. Housing and Caging of Birds: It is very important that the birds be kept in a warm draft-free environment and not kept in large community cages where no individual attention can be given. In the first 5 to 7 day period, the birds have no effective insulation from the cold and dampness and are very susceptable to body heat loss and respiratory infections.

Basic pen unit (see plans). Packaged units ready for immediate construction should be available at Wildlife Supply Storage Centers. These units are designed for:

1) ease of construction-need only to screw sections together
2) easy access to individual birds
3) easy cleaning-removable door sections
4) restriction of flight
5) ease of heating with heat lamps as necessary

Recommend minimun size individual pens to be used for intensive care birds, is 20"x20"x24". Such commercial collapsable poultry cages should be available at the storage centers. These cages placed two levels high, divided by 4'x8'x5/8" plywood sheets, serve very well for these needs. These might also be available for use from local fairgrounds.

3. Materials for Bedding:

A. STRAW - good, clean straw is felt to be best. Despite the fact that Aspirgillosis fungus can grow in wet vegetive material, daily cleaning can minimize this as a problem from the straw. Make certain that moldy straw is not initially used.

B. NEWSPAPER - if used they should be changed twice daily as they get wet readily, thus keeping the birds wet. Shredded newspaper is more effective than flat newspaper and gives added body support but requires a great deal of labor to do the shredding.

C. PINE SHAVINGS - satisfactory but may result in excess drying of tissue of legs and feet and possibly may irritate eyes. Do not use if dusty. Do not use sawdust for it is too dusty and may irritate the respiratory tracts of the birds which are already very susceptible to respiratory infection at this time.

Note: Birds left in unsanitary conditions develop eye lesions from the ammonia given off from the uric acid in feces. Good sanitation is essential.

4. Marking for Identification: Permanent leg bands during the first two weeks in captivity are not considered necessary, but banding is recommended before birds are released. The highest rate of mortality can be expected during the first few days and since stress is so important during this time period, the value gained by banding seems not to warrant the extra handling at this time.

The birds, which are all assigned to specific pens for their after-care, and are kept in small groups, can be leg marked with colored electrician's tape. A particular bird may then be known on its medical records as:

Western Grebe
Ward D, Pen 4
Brown (color of leg tape)

As other markings, such as numbers on leg tapes, embossed labels, colored ribbons and colored wires have proven to have shortcomings, these methods seem not ideal but satisfactory.

5. Feeding Procedure: All birds should be fed twice daily. Force feeding is resorted to the first day of captivity, a few hours (4 to 6) after the washing and initial medical treatments have been given. It normally takes three to four days or longer before most birds begin to adapt to feeding programs in captivity. It must be understood that offering pans of dead fish to completely wild birds would not be an effective method of getting the badly needed nutrients into the birds. They must be taught to eat in their new surroundings.

Food suggestions for the birds:

1) Most birds that resemble ducks (ruddys, scoups, golden eyes, scoters, including coots, etc.), give chick starter mash made into a watery gruel or give dog food pellets soaked in water. It is helpful to get the birds' attention to this food by initially swirling a finger in the gruel while holding the individual in front of the food container. An initial dunking of the bird's beak into this gruel often helps introduce him to what and where the food is. Forced feeding of the gruel is not resorted to.

2) Scoters: These birds, which are mainly mollusk eaters, do adapt to the gruel but will frequently consume 4 to 6 small, thawed frozen fish if offered. This is a recommended procedure. Osterized fish may also be added to the gruel. Any stimulation to get good food consumption is desirable. Two or three fish twice daily will be forced fed the first few days if these birds are not showing signs of consuming their gruel.

3) Grebes, loons, murres, cormorants and other fish-eating birds are most conveniently fed small, thawed frozen fish under 5" in length, such as smelt, white bait, anchovies. Larger fish are too difficult for the smaller birds in this group to swallow. The offering of minows or other small live fish in the drinking water can often be helpful in stimulating early eating in captivity. This procedure is helpful with birds in intensive care.

4) Gulls and coots - bread, pans of dead fish, and gruel are offered. These birds are not forced fed as they seem to catch on without this effort and are difficult to handle.

Note: No grit or sand is needed nor recommended for these birds for proper digestion.

6. Watering of Birds:

A. Have water available free of choice. Fresh water can be used for all species of birds. Salt water is not necessary for pelagic species.

B. The water container itself is very important to assure that the birds can get water from it and that they do not get into it to become soaked and chilled. An ideal container for all birds is a crock or dog dish 8" across the bottom and at least 2½" deep. This should be placed in the pen and a guard placed over it to prevent the birds from getting into it or tipping it over. (See Appendix for recommended water bowl guards which should be available with the other supplies from the Storage Supply Centers.)

Note: It is very important to recognize that grebes and loons have legs far back of their bodies which makes it necessary for them to drink while lying on their breasts. Only a large, flat water container is suitable for these birds.

C. To get birds with long bills started drinking, hold the body of the bird away from the container so that when the neck is extended, the head reaches over the container. This makes it possible for them to scoop in water with their lower beak. All birds should be encouraged to drink by forcing their bills into the water. This should be done several times the first few days to all fish-eating birds until they are familiar with taking water. It is rewarding to see how these birds take off drinking large amounts of water once they get the idea.

It is a strong possiblity that the past high initial mortality rates in grebes and loons has been caused by dehydration.

VII. Common Medical Problems and Treatment:

Discussion: In order that appropriate medical procedures might be instigated, it is important to review the problems that commonly affect oil-contaminated birds. They are:

1. Stress
2. Oil Toxicity
3. Eye Irritation
4. Diarrhea
5. Cloacal Impaction
6. Respiratory Distress
7. Aspirgillosis
8. Thiaminase Toxicosis
9. Arthritis
10. Breast Wounds
11. Lacerations and Fractures

1. Stress: Physiologically and organically, stress can cause a multiple of detrimental effects on the birds, such as:
   a) A reduction in white blood cells, which reduces their resistance to infections.
   b) Erosions of the intestinal tract, which can lead to a generalized infection from bacteria being absorbed into the blood stream.
   c) Fatty degeneration of the liver, which can reduce the birds' natural ability to detoxify toxins.
   d) Secondary kidney changes, which may result in loss of kidney function.
   e) Shock, which causes further reduction in body heat, impairs circulation and often results in death.

Factors that contribute to stress in oil-contaminated birds are many and include the following:

a) Cold and wetness as the result of their feathers having lost their insulation and water-repellency functions. This also leads to hyperventilation of the lungs and air sacs, thus upsetting normal blood chemistry.

b) Reduced food intake coupled with the bodies' effort to maintain body heat causes loss in energy reserves and further stress from physiological effects of starvation.

c) Overcrowding.

d) Poor Husbandry Procedures.

Symptoms: No specific symptoms are characteristic but as the birds are less able to adapt to their stress situation, weakness and lethargy are evident and death results.

Treatment:

a) Make all efforts to handle birds as gently as possible at all times, but especially in the first two or three days when stress takes its greatest toll.

b) Avoid overcrowding by keeping birds in small groups of 5 to 6 per pen.

c) Follow recommended husbandry procedures outlined herein.

d) Medically administer routinely a combination of a broad spectrum antibiotic and steroid twice daily for three days. Experience from birds affected in both Santa Barbara and San Francisco Oil Spills showed that the birds that died of generalized infections were infected by Streptococus, Pseudomonas, Coliforms or Salmonella bacteria species. Sensitivity tests demonstrated that they were most uniformally sensitive to Chloramphenicol and Nitrofurantoin. Many were resistent to the Tetracyclines. Chloramphemicol is recommended with dexamethazone as the steroid. The steroid is used for its anti-stress and anti-inflammatory effects. Despite the fact that many of the birds will be harboring the Aspirgillosis fungus (which is not normally affected by chloramphemicol, and theoretically the steroid will make them less resistant to this fungus) most early deaths from infections can be attributed to the above mentioned bacteria and the effects of

stress. Therefore the author believes that the rational of using the combination of chloramphemicol and dexmethazone in the early period of captivity is sound. The recommended dose is 100mg. chloramphenicol with 1mg. dexamethazone twice daily for average size birds, e.g., grebes. Double the dose for large birds, e.g., loons. After the first three-day period is over, continue the administration of the chloramphenicol alone - without the steroid - at the same recommended dosage level for four more days, after which all routine use of the antibiotics should be discontinued. Birds that are in intensive care should be treated as indicated by the advice of the veterinary staff.

e) Give source of energy to all birds showing weakness or exhaustion after removing contaminating oil. 10cc of honey solution (½ honey and ½ water - warmed) is given orally via a stomach pipet or eye dropper. Note: Acute exhaustion and chilling can frequently be remedied by giving .5cc to 1cc half brandy and half honey with an eye dropper. This is difficult to justify medically, but its value has been seen many times in badly debilitated animals.

f) Start force feeding of two to three fish to all fish-eating birds within the first 12 hours of captivity. Attempt to teach other birds how to eat.

2. Oil Toxicity: Little is known about the pathological effects of most petroleum oils. The heavier crude oils appear to be less toxic than the lighter volatile oils which contain many aromatics. Light oil spills (like kerosene) result in very high death rates in less than 36 hours. No specific symptoms except possibly diarrhea, have been attributed to oil toxicity, but any diarrhea might be very difficult to distinguish from that resulting from secondary enteritis due to stress. Respiratory distress might also be a direct result of oil toxicity.

Treatment: On initial treatment of affected birds, 5cc of milk of magnesia (magnesium hydroxide) is administered orally via a stomach tube (pipet) or an eye dropper to clean out the digestive tract. Diotyl sodium sulfosuccinate (DSS), a cathartic that disperses oil,

can be used instead of the milk of magnesia (5cc of DSS solution of 1 part DSS to 6 parts water).

3) Eye Irritation: Inflammation of the cornea and/or conjuntiva is a common finding. The specific cause or causes are not clear. Similar findings are also common in penipeds (e.g., seals, sea lions) in captivity. Prolonged periods out of water may be an underlying cause. Direct irritation from the oil is a possibility. Good sanitation is indicated to prevent irritation from ammonia from droppings. Most cases respond well to twice daily applications of an antibiotic-ophthalmic ointment for two or three days. Antibiotic-cortisone opthalmic ointments work very well.

4) Diarrhea: This is a common sympton in many birds first in captivity. It is difficult to specifically attribute it to an enteritis from an intestinal infection, toxicity from the oil, or a symptom brought on secondarily by stress or nervousness. Treatment: No specific treatment is given other than the routine procedure of giving the broad spectrum antibiotics and steroid already detailed. Kaolin (Kaopectate), 5cc via stomach pipet, is helpful in prolonged cases.

5) Cloacal Impaction: It is normal for sea birds to pass feces in their environment of water. When in captivity - often with less water intake, reduced exercise on dry surroundings, and a diet that may predispose to constipation - birds may suffer from a problem of constipation. Birds like the grebes and loons which have to lie on their breast and sit on their cloacal opening, because of their legs being placed so far back on their bodies, are susceptable to cloacal blockage. It should be pointed out that it is very normal when performing autopsies on grebes to find what appears to be a gizzard blockage with feathers. This seems to be a normal finding unless there is erosion of the gizzard wall. Characteristically, an impacted cloaca will be very enlarged on autopsy, often filling the back one-third of the abdominal cavity space. The contents are mostly firm with some whitish fluid. This condition has only been observed in the Western Grebe by the author.

Symptoms: Usually no signs will be noted prior to death. The birds frequently will eat normally the night before but will be found dead in the morning. Refusing feed may be an early symptom.

Treatment: Unfortunately, since this problem is only recognized at autopsy, prevention is the best treatment. It is advisable to dunk the tail end of grebes and loons in a water tub once every other day after the third day in captivity. This will usually stimulate elimination as too often does just picking them up. Dry the bird well before replacing in pen.

6) Respiratory Distress: The most common symptoms noted in oiled birds prior to death is difficulty in breathing, with or without evidence of nasal congestion and sneezing. Autopsies of birds that die with these symptoms within the first two or three days rarely will show fresh active gross signs of aspirgillosis infection. There may be some old calcified plaques present on the body tissues. Some will culture clean while others will be positive for any of the bacterial infections mentioned in the discussion of generalized infections secondary to stress. Gross evidence of respiratory congestion is present.

Treatment: The same treatment as discussed for stress is indicated. Many of these cases are preventable with the prescribed treatment program of making all attempts to keep the birds dry, warm and medicated. The steroid further helps to decongest the affected respiratory tissue. Nasal drops such as neo-synephrine .25 or .5 percent (Phenylephrine hydrochloride) is helpful to reduce symtoms of nasal congestion. Cases that continue symptoms after four days of this terapy should be switched to sulmet (sulfamethazine) 1 gr/lb once daily followed by .5 gr/lb once daily for three more days, or erythromycin injections. Avoid injections if possible. Note: Respiratory symptoms in birds kept in captivity for more than three weeks most often will be the result of aspirgillosis infection.

7) Aspergillosis: This is a disease that is very common in wild birds. It most often affects the lungs and air sacs of birds but may cause lesions in any organ or tissue. The caustive agent is Aspergillus

fumigutus, a fungus that has worldwide distribution. Spore counts in the upper air strata indicate the possibility of transmission by air currents and their release from the upper strata by raindrops. The fungus is so common that it can frequently be cultured from apparent normal bird respiratory tracts. It can also almost always be cultured from tonsilar crypts of man. The disease can occur in man but only when he is in an extremely debilitated condition. This would seem that great debility of birds also attributes to clinical cases of the disease. Affected birds do not apparently represent a public health problem. Transmission is through inhalation of spores. Moldy feed or bedding can be a source of infection. Good sanitation is indicated, with frequently cleaning of pens.

Symptoms: Most characteristically, affected birds will show signs of difficult breathing, gasping, droopiness and emaciation. In later stages, diarrhea is not uncommon. Occasionally, ataxia (incoordination) may be a late symptom. Some apparently normal birds will show characteristic whitish moldy plagues in various locations in tissues at autopsy. Some birds with clinical symptoms make spontaneous recoveries with no treatment.

Treatment: No totally effective treatment has yet been described. Antibiotics, as a rule, are not effective. Nystatin (Mycostatin) may be an exception, possibly having some preventative qualities. The author questions its value in the treatment programs for oiled birds, but it may have a place here. Good sanitation, nursing and husbandry procedures plus being able to quickly releases the birds to the wild are factors that will minimize the effect of this disease on these birds.

8) Thiaminase Toxicosis: This is a disease that has been known for some years to affect mink fed raw fish. The disease in mink is called "Chastek Paralysis." The author first recognized the typical symptoms of the disease while caring for oiled birds from Santa Barbara and made a press release of the findings on March 24, 1969. A description of this disease affecting wild waterfowl had not been previously reported.

The disease is caused by the presence of an enzyme called Thiaminase, which occurs in certain species of fish. When such fish are eaten, the enzyme thiaminase destroys thiamine (Vitamin B_1) from the system of the bird. This results in the same type of disease in man known as Beri-beri, which is caused by a lack of Vitamin B_1 in the diet. Species of fish known to contain this enzyme are: Whitefish, smelt, carp, goldfish, creed chub, fathead minnow, white bass, sanger pike, burbot and salt-water herring. Heat destroys this enzyme. Thiamine is needed in nerve metabolism and without it a polyneuritis develops and death follows.

Symptoms: The characteristic signs of the disease are first, loss of appetite and marked constriction of the pupils (especially noticable in the Western Grebe), then staggering, throwing the head backwards, falling over on the bird's side and death. All these symptoms may be noticed within less than six hours. Occasionally only the constricted pupils and weakness will be noted before death. The disease may also be the cause of a large number of deaths with no prior symptoms before death.

Treatment: Having had no previous experience with this disease the author was grateful to have had personal correspondence with Dr. Joseph R. Geraci of the Montreal Aquarium. The following is information on the dosage received from Dr. Geraci: One fish containing thiaminase has the capability of destroying as much as 3 mg. of thiamine and the lost thiamanine needs to be replaced accordingly. Death can result within three days from diets high in thiaminase. It seems that birds in the wild have enough variation in their diets that this disease does not offer a major problem. Specific treatment is to administer 200 mgs. of thiamine daily to loons, cormarants or other large fish-eating birds and 100 mgs. daily to the other fish-eaters. This can be easily done by either forcing the tablets down the throats of each bird (the surest way) or by placing the tablet within the mouth or back muscles of a dead fish before feeding it to the bird. Also soluable Vitamin B_1 can be given in the drinking water and this procedure may be best once the birds are past their hand-feeding intensive care needs.

9) Arthritis: After several weeks in captivity it is not uncommon to see enlarged toe joints and lameness, especially in scoters. The disease somewhat resembles "Bumblefoot" in chickens, but culture are not always positive for bacterial infection and when positive, are mostly coliforms and not staphyloccus sp. The condition may be brought on by a prolonged period of time out of water. This might be an important factor in a species of bird such as the scoter, that spends so much time in water. Excess drying of the tissues of the legs and feet might also be contributing factors. The use of baby oil, A&D ointment or other skin lotion may help the dry tissue condition. The use of the chloramphenicol and dexamethazine is indicated.

10) Breast Wounds: This is another condition that mostly affects scoters as seen in our experience with birds from the San Francisco Oil Spill. This condition was not observed by the author in birds cared for after Santa Barbara. It also was only noted after several weeks in captivity.

Symptoms: A large gapping wound would appear directly over the sternum, exposing the cartilage and chest muscles. Cultures usually were positive for Coliform bacteria. These were most likely secondary contaminants from the pen environment. Pressure necroses on the chest seems most likely to be the cause.

Treatment: Clean wound thoroughly with soap and water. Clip away the matted feathers getting into the wound. Apply nitrofurazone powder at least once a day. Keep cage especially clean and well bedded, not shavings. Consistant deep bedding in the pens might prevent this condition.

11) Lacerations and Fractures: These are treated in the routine manner. The skin over the legs does not hold sutures well. Birds with compound fractures are best euthanized. Broken wings, not compound, are conveniently immobilized by placing an orthopedic stockinet over the body. Holes are cut for the legs and good wing. The stockinet jacket is secured with tape.

VIII. Administration of Medicines:

Medicine given by mouth is the preferred method. Injections seem to add a stress burden and should be avoided as a routine procedure of medication.

1) Liquids given orally in small volumes (.5 to 1cc) is done with an eyedropper and is easy to do. While the bird is held securely by a partner the dropper is filled, then placed deep in at the corner of the beak while the head is held high. Then the rubber bulb is quickly expressed. With very little practice the technique can be mastered resulting in very little spillage. This method is the most commonly used routinely for the administration of antibiotics.

2) Liquids of 10cc to 12cc volume are given with the use of a 12cc disposable syringe to which is attached an 8" plastic pipet. The pipet is made from an insemination pipet used for cattle or horses. The bird's neck is stretched upward and the pipet is directed straight down the esophagus into the proventriculus (stomach). The passage is large and there is little or no concern for the possibility of misdirecting the tube into the respiratory tract. Giving volumes much larger than 12cc with this technique often results in the regurgitation of the fluids back up into the mouth. When this happens, there is some danger of the bird inhaling some of the fluid. Note: It is also possible to use a flexible rubber tube for passage down into the proventriculus but the author believes this procedure represents more of a stress and is not recommended as a routine technique.

3) Liquid medication can also be given in the drinking water but because it is so difficult to be certain that each bird gets a proper dose, this procedure is not used for the administration of antibiotics and/or steroids, but may be used later as a means of giving thiamine or general vitamin supplements.

4) Tablets given by direct oral administration is easy and is the preferred method for the administration of thiamine tablets early in the routine treatment program. The bird's mouth is held open and the tablets are forced into the back of the throat with the fingers. Murres can pinch fairly hard and cormorants have to be respected but

the procedure is easy and not too much of a stress to the bird while being held securely by a partner.

5) Thiamine tablets in fish: Once the fish-eating birds no longer have to be force fed, it is possible to administer thiamine tablets in the first fish offered. The tablet can either be placed down the mouth of the fish or forced into a slot made in the muscles along the back bone. Since many of the birds have a tendency to toss the fish around once it has it in its beak, the tablet if placed in the fish's mouth will have a tendency to be shaken free. If this is the case, the slot in the back muscles will be the preferred site.

6) Injections: If injection, such as Tylosin or Erythromycin are indicated, the breast muscles are the sits of choice. Care needs to be taken not to go too deeply into these already emanciated birds. Only consider this route as a last resort.

IX. Daily Step-by-Step Routine in Caring for Birds:

In Morning:

A) Clean pens and feed and water containers.

B) See that all birds have clean water in their pens and assist birds in drinking where necessary. Keep water level full, especially for grebes and loons.

C) Administer broad spectrum antibiotics and steroid solution, 1cc with an eye dropper. (Use steroid combination for the first three days only, then give the antibiotic solution by itself for the following four days.)

D) Administer 100 mg thiamine to all average sized fish-eating birds, 200 mg to large species such as cormorants, loons or other birds consuming 16 fish or more twice daily.

E) Feed the birds: make chick starter gruel and place it in cages or offer fish where required. If bird does not take fish when offered, force feed two to three whole fish to each fish-eating bird, e.g., grebes, murres, scoters, etc. Give at least three fish to each loon and cormorant. When birds are eating on their own, give them as much as they will take.

F) Treat individually all birds as necessary.

In Afternoon:

Repeat all steps above except only clean cages as needed. The readministration of thiamine is not necessary but may be helpful to stimulate appetite. Excess thiamine is no problem.

X. Releasing Procedure:

Before birds can be considered ready for release they must pass two main tests:

1) They must first be able to float and remain at a normal level in water.
2) The feathers must "bead" the water well when the birds are placed in water and the birds must not be getting excessively wet after being in the water for at least a 15-minute period of time.

It has been noted (Pittman 1971) that normal birds held out of water for as little as seven days will show signs of loss of water repellency when first re-introduced into water. It seems a few days (two or three) of exposure to water, either at free will or periodic forced swimming, is needed for the birds to recover this feather function.

Once these criteria have been met and the birds seem healthy and as normal as possible, a site for release is needed. The earliest possible release will most likely give the birds the best chances of readjusting to the wild. If the birds have been in captivity for less than three weeks, then it should be possible to release them in the same area of their capture, providing of course, that the source of contamination has been cleaned up or is no longer present. The birds can simply be turned loose into the water. If the birds are ready for release, but the original area is still unsafe, then another habitat area as close to the original one, physically and/or geographically, should be choosen.

If the birds have had to be kept in captivity for any prolonged period of time, from four weeks or months, they will probably have to rebuild up their flight muscles and readjust to seeking food in nature. Under these conditions a temporary holding and feeding site will be needed to be established. At this location (which should be at the water's edge of a natural habitat area) the birds can gradually take off on their own once they seem capable.

XI. Further Information Needed and Conclusion:

Further information is needed to be gathered in the field of specific care methods of shore birds, even though shore birds are not usually affected in large numbers like the diving seabirds. Our very limited experience in the aftercare of a Great Blue Heron and an American Bittern were unsuccessful. The birds refused to eat when offered dead or live fish and consistantly regurgitated fish force fed, even after the prior administration of an antispasmodic. Most specific antiemetics are tranquilizers, which lower blood pressure and thus are contra-indicated in stress and shock. In general many more questions need to be answered and more experiences shared, in this perplexing puzzle.

The author, who is mainly a veterinary clinician and not a research scientist, readily admits that many of the recommendations and procedures are based upon clinical experience and not all firm scientifically proven facts. Only further field experience will prove the effectiveness of the program that has been outlined. It is very apparent that readiness is essential and that the project be approached with enthusiasm and with the necessary work force to accomplish the many tasks involved - and try we must to preserve such a precious segment of our lives - Our Wildlife.

XII. Appendix:

A. Outline of Initial Steps in Handling Aftercare of Birds in an Oil Disaster.

1. Organization:

a) Authorities contact or appoint a qualified person to act as Head Coordinator for overall organization.

b) Head Coordinator then calls in temporary Oil Disaster Wildlife Team to set up complete facilities needed and arranges for veterinary staff.

c) Communication Director funnels all calls to proper persons and disseminates needed information to involved public.

d) Rehabilitation and washing facilities are established and equipped by the Building Director and needed supplies are obtained through the Supplies Director.

e) Technical Directors outline means and methods of handling, washing, feeding, watering and medical treatments to staff workers.

f) Rehabilitation center then takes over in the aftercare procedures.

2. Treatment of Birds:

a) Birds recovered from beaches or water.

b) Brought to washing and care centers.

c) Birds are washed and dried as recommended.

d) They are then treated with: 5cc milk of magnesia and 1cc solution containing 100 mg chloramphenicol and 1 mg dexamethazone. If noticably depressed and cold, ½ cc to 1cc of brandy and honey (50-50) may be given, or 10cc honey and water (50-50) warmed. If markedly depressed, birds should be given this initial medication and placed under a head lamp prior to washing.

e) Birds are then placed in pens under heat lamps.

f) The first evening or morning (within 12 hours preferably within 6 to 8 hours after washing) the birds should be forced fed 2 fish, if they are fish-eating birds. Other birds are stimulated to eat as described. If marked depression is noted, 10cc of ½ honey and ½ water (warmed) is administrated via a stompach pipet.

g) Wards of 50 to 75 birds of the same type of species are established with two workers assigned to each ward. Intensive care ward will need twice the workers.

h) A routine daily schedule is then established for cleaning, feeding, watering and medicating as needed.

B. Materials Needed in Readiness for an Oil Disaster.

1. To have Stored and Ready for Immediate Use:

a) Pre-made collapsable pens (84/ 1000 birds)

b) Pre-made collapsable bathing pools (4/1000 birds)

c) Pre-made collapsable washing tables

d) Printed record forms

e) Water and food containers (500/1000 birds)

f) Water and food container guards (one for each food and water container)

2. To have Names of Sources for Immediate Delivery of:
   a) Commercial collapsable poultry cages
   b) Feed - small frozen fish and chick starter
   c) Freezers
   d) Rubber gloves and aprons
   e) Washing pans (dish pans)
   f) Washing solvents
   g) Heat lamps
   h) Dryers (have on hand if possible, may not be immediately available in quanity)
   i) Drugs and materials: (a) general cleaning soap; (b) disinfectant; (c) antibiotics; (d) steroid, and (e) thiamine.
   j) Rags
   k) Bedding material

C. Preparation of Medicines to be Used:

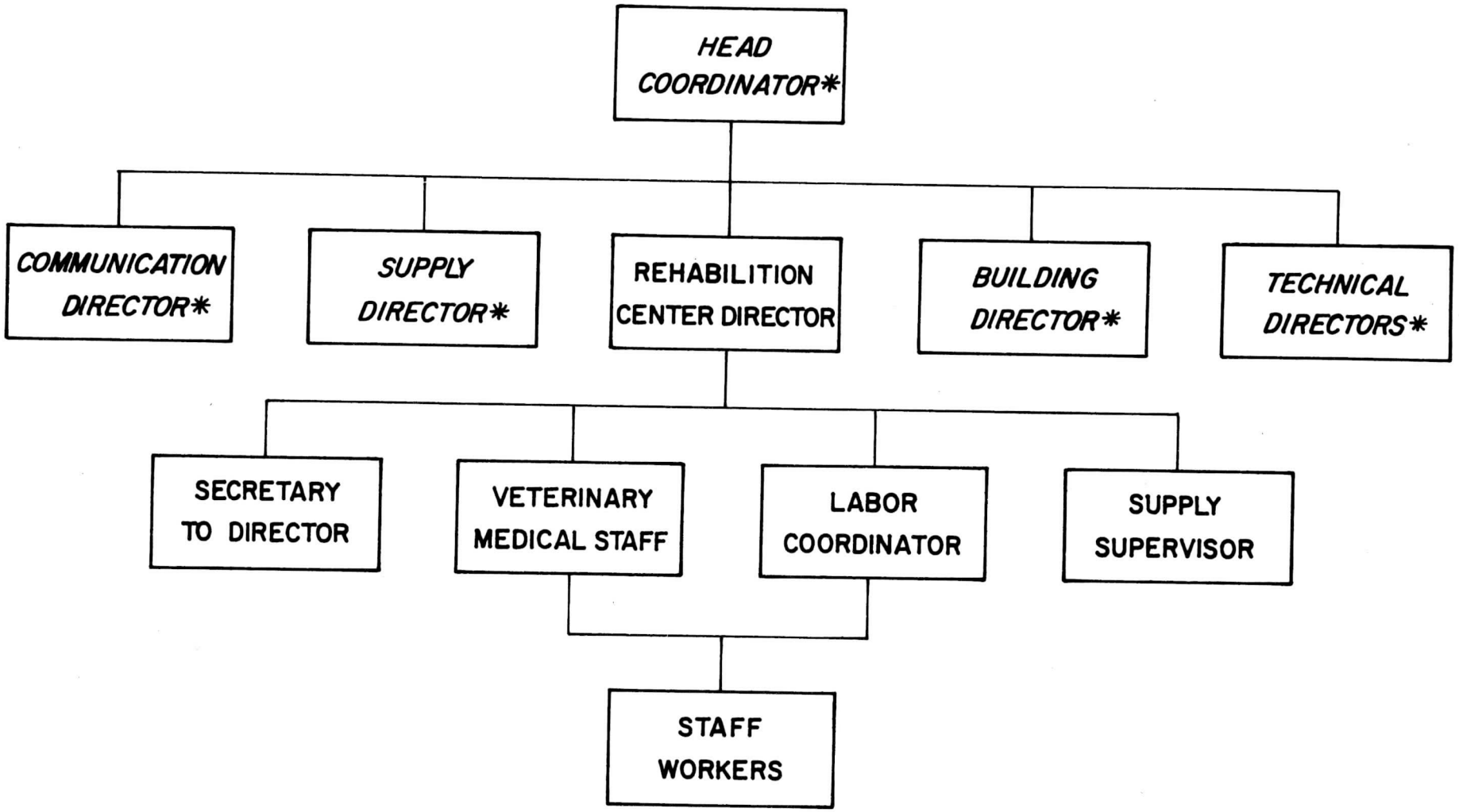
R_x #1 Chloramphenicol and Dexamethazone
100 mg plus 1 mg in 3/4 to 1cc
Note: 1Gm chloramphenicol succinate powder in 250cc water equals 100 mg/.5cc
½ of a 5Gm pkg. of dexamethazone powder(Azium powder by Schering) - 1250 mg in 300cc water equals approximately 1 mg/.25cc
Mix equal amounts of the prepared chloramphenicol and demathazone in 2 oz. eye dropper bottles with an eye dropper that will hold 1cc volume. 1cc of this solution will contain the desired dosage mixture. Average Dose: 1cc twice daily; double this for larger birds.

R_x #2 Chloramphenicol alone - 100 mg/.5cc made up as directed above; Average Dose: .5cc twice daily, doubled for larger birds.

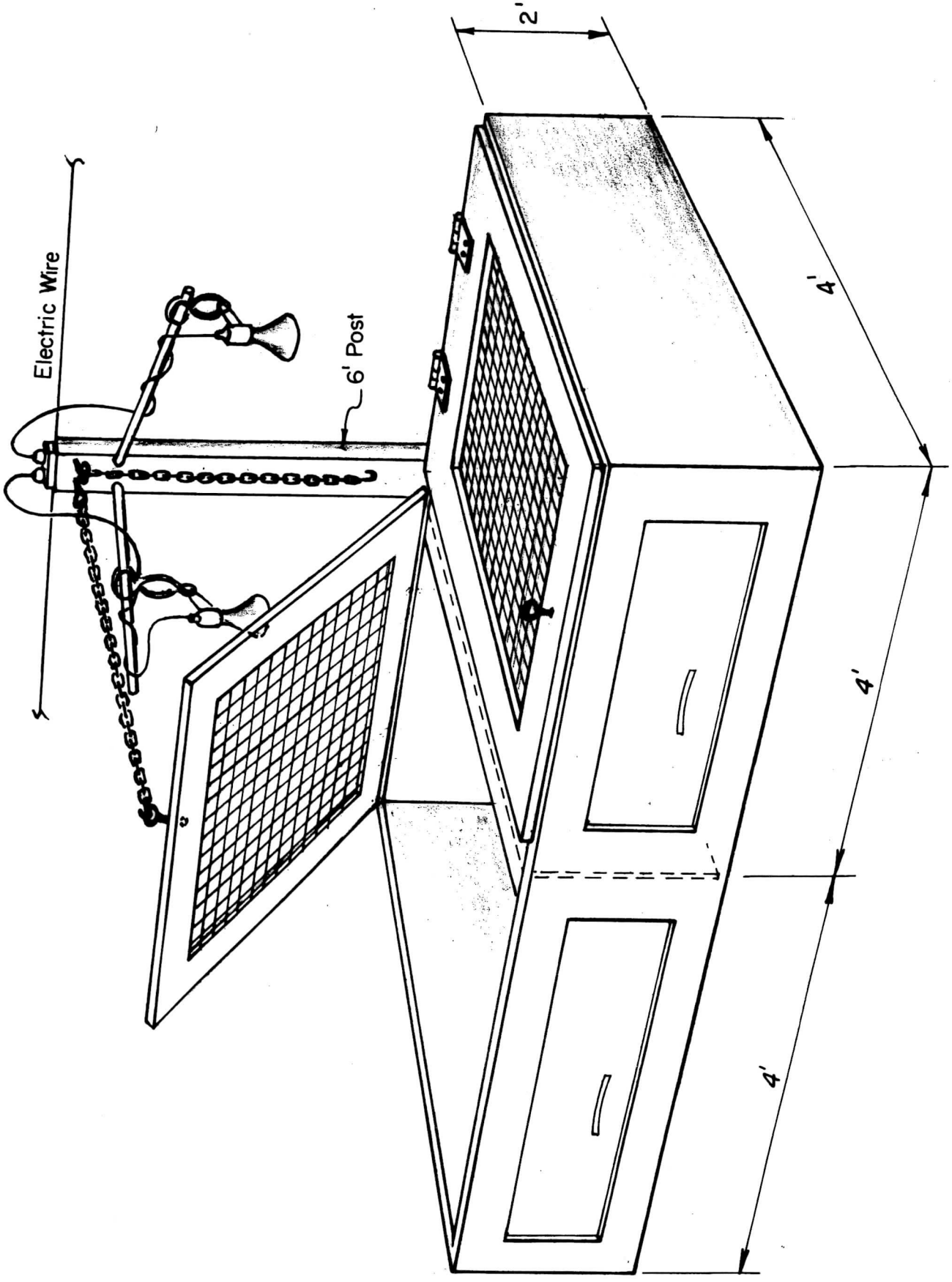
R_x #3 Honey and Brandy 50-50. Make up in 2 oz. eye dropper bottle. Average Dose: .5cc. Indicated for cold depressed birds. Do not over do.

R_x #4 Honey and water 50-50 (warmed). Makeup in 2 oz. eye dropper bottle. Average Dose: 10 to 12cc. Note: More honey per volume can be given where felt desired. Indication: Weakness (for source of energy).

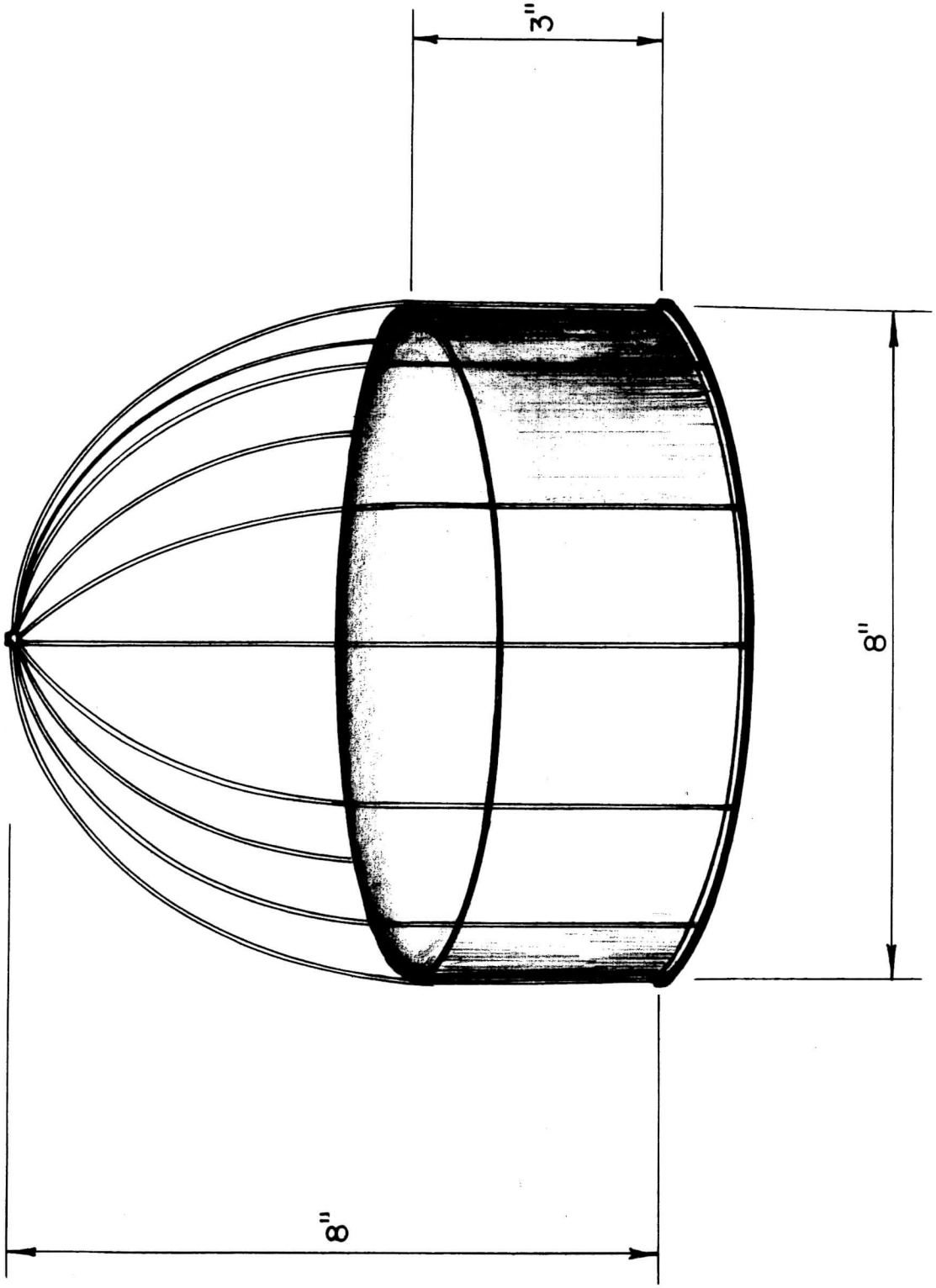
WILDLIFE REHABILITATION ORGANIZATION



* *Temporary to set up operations*



COLLAPSEABLE PEN UNIT



WATER & FOOD CONTAINER GUARD

BIRDS RECEIVED RECORD

Month: **Bird Care Center:**

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Species Totals
Daily Totals																																

TOTAL BIRDS _____

BIRDS DEATH RECORD

Month:

Bird Care Center:

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Species Totals
Daily Totals																																

TOTAL BIRDS _____

IMPORTANT TELEPHONE NUMBERS

NAME	POSITION	PHONE

PERSONNEL

NAME	ADDRESS	WORK AREA	PHONE

SUPPLIES

ITEM	SOURCE	ADDRESS	PHONE

STAFF SCHEDULE

Week _____ thru _____

POSITION	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
CENTER DIRECTOR							
SECRETARY							
SUPPLY SUPERVISOR							
LABOR COORDINATOR							
VETERINARY STAFF							
KITCHEN STAFF							
MIDDAY STAFF							
NIGHT STAFF							

WARD WORKER SCHEDULE

Ward:

Week _____ thru _____

DAY	A.M. Shift 8 to 12		P.M. Shift 3 to 6	
	Name	Phone	Name	Phone
SUNDAY				
MONDAY				
TUESDAY				
WEDNESDAY				
THURSDAY				
FRIDAY				
SATURDAY				

Possible Substitute Workers:

DAILY WARD WORK SCHEDULE

SHIFT	TIME	WORK
A.M.	8 - 9	CLEANING
	9 - 12	FEEDING, MEDICATING, WATERING
MIDDAY	1 - 3	WATERING GEN. MAINTENANCE } By Midday Staff
P.M.	3 - 6	FEEDING, MEDICATING, WATERING
NIGHT	8 - 11	WATERING GEN. MAINTENANCE } By Night Staff

DAILY RECORD

Species:

Band No.:

Ward:

Recovery Location:

Date	Feed		Medicine				NOTES
	# Fish	Other	A	B	C	Other	
a.m. p.m.							
a.m. p.m.							
a.m. p.m.							
a.m. p.m.							
a.m. p.m.							
a.m. p.m.							
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a.m. p.m.							
a.m. p.m.							
a.m. p.m.							
a.m. p.m.							

A = Antibiotic plus steroid

B = Antibiotic

C = Thiamine

NOTE: Circle number of fish eaten if force fed.

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