101201

(6)

EEE BRANCH REVIEW

DATE: IN 8/25 OUT 9/7/78 IN ____ OUT ____ IN ____ OUT ____

FISH & WILDLIFE ENVIRONMENTAL CHEMISTRY EFFICACY

FILE OR REG. NO. Section 18/Monitor: Celery/Florida

PETITION OR EXP. PERMIT NO. IR-4, 6E1794

DATE DIV. RECEIVED N/A

DATE OF SUBMISSION 8/14/78

DATE SUBMISSION ACCEPTED N/A

TYPE PRODUCT(S): (I,)D, H, F, N, R, S Insecticide

PRODUCT MGR. NO. H. Jamerson

PRODUCT NAME(S) Monitor 4 spray

COMPANY NAME Chevron Chemical Company

SUBMISSION PURPOSE Section 18 for use of Monitor in celery (Florida only)

CHEMICAL & FORMULATION O,S-dimethyl phosphoramido thioate -- 40.0%

(contains 4.0 lbs active/gallon at 68°F)

ECOLOGICAL EFFECTS BRANCH

100.0 Pesticidal Use

100.1 Celery (Florida only): For control of Dipterous leaf miners apply 1 to 2 pts (0.5 to 1.0 lb. active) per acre. Apply as needed. Up to 5 applications may be made at 7-day intervals. Do not apply within 21 days of harvest.

100.2 Proposed Section 18

100.2.1 Target Pest:

Vegetable leafminer, Liriomyza sativae

100.2.2 Period of Control Needed:

December through June

100.2.3 Area of Place of Application

Area	County	Acreage
Sanford, Oviedo	Seminole	2500 acres
Zellwood	Orange	
Sarasota	Sarasota	
Belle Glade, Pahokee, South Bay	Palm Beach	8500 acres
	TOTAL	11,000 acres

100.2.4 Method of Application:

Both ground and air.

Note: Approximately 75% of the acreage planted provides for vehicular access that will

permit application by ground equipment. (This equals 8250 acres.) The remaining 25% of the acreage is planted in solid blocks with a total width that necessitates the application be applied by air.

100.2.5 Material to be Used

The applicant states that the maximum volume of material that would be applied is estimated to be one gallon per four acres with a maximum of five applications over an area of approximately 6500 acres for a total volume of 7500.00 gallons. However, when one calculates this estimation out, one obtains 8125.00 gallons. This needs correction/clarification.

100.2.6 Personnel Applying the Pesticide

Certified ground and aerial applicators.

101.0 Chemical and Physical Properties

The reader is referred to the review by N. Cook, 8/30/78, for Monitor^{R} 4, Reg. No. 3125-280.

102.0 Behavior in the Environment

The reader is referred to the review by N. Cook, 8/30/78, for Monitor^{R} 4, Reg. No. 3125-280.

103.0 Toxicological Properties

The reader is referred to the review by N. Cook, 8/30/78, for Monitor^{R} 4, Reg. No. 3125-280.

104.0 Hazard Assessment

104.1 Discussion

The proposed use concerns the spraying of celery in Florida with Monitor^{R} pesticide to control the vegetable leafminer. The maximum recommended rate of 1.0 pound active/acre is to be applied either by ground or by air, and up to five applications may be made at 7-day intervals. The applicant states that the period of application

will be from December through June. The usual practice (according to Dr. Denton, Agriculture Exper. Station, Sanford, Fla.) is to spray Monitor early in the growing season either followed by or interspersed with applications of Permethrin, another pesticide granted for use on celery via a Sec. 18. The use of these two pesticides in combination is designed to delay a resistence-build-up in the target pest since this insect species is highly resistent to most pesticides due primarily to overuse of pesticides. The reason for early spraying of Monitor is because this pesticide has a long preharvest interval (PHI) (21 days) due to its systemic activity in plants.

Note that the use of Monitor on celery will add an additional 11,000 acres of land treated with this pesticide to four counties and to the state (see Table 1, attached). This additional treated acreage is significant, for previously, approximately 13,560 acres were treated with Monitor in these four counties. In essence, therefore, the acreage treated with Monitor in these areas will be doubled.

104.2 Residues

The proposed use provides for the following maximum expected residues, developed as per the articles of Hoerger and Kenaga (1972) and Kenaga (1973).

Vegetation Type/ Insect/Soil Surface	Residues From 1.01 A.I./A
Sparse foliage (short grasses)	240 ppm
Long grasses	110 ppm
Leafy situations	125 ppm
Dense foliage/small insects	58 ppm
Pods/seeds/large insects	10-12 ppm
Fruits	7 ppm
Soil (0.1 inch)	22 ppm

For those organisms consuming leafy materials it is assumed that on the average 58 to 110 ppm Monitor is likely on feed items. For species consuming insects, seeds, and pods, it is assumed that the range of maximum residues is 10 to 58 ppm: seeds (10 ppm), pods (12 ppm), and small insects (58 ppm). On the average, however, 10 ppm or less is likely on seed/pod feed items and 32 ppm is likely on various insects species. This latter value (32 ppm) is derived from articles by McEwen, Lowell C. (1972) and Davis, B.N.K. (1969).[1] Note, also, that all residue values discussed above concern residues likely after one application of Monitor. Relative to repeated applications, a "build-up" of pesticide in/on feed items may occur but this increase should be minimal (see Figure 1, attached). For example, five applications of Monitor at 1.0 # a.i./A every 7 days should provide for an increase in residue from 10 ppm to 13.5 ppm on seeds (based upon ½-life in plants of approximately 3.5 days and an initial expected residue of 10 ppm).

104.3 Likelihood of Exposure to Nontarget Organisms

104.3.1 Toxicity/Hazards

The proposed use provides for maximum exposure and hazards to nontarget avian and, possibly, to mammalian species. The available data indicate Monitor is acutely toxic to rats with an LD_{50} of 13.0 mg/kg. When one correlates this with potential dietary exposure, however, one obtains a theoretical LC_{50} value of 260 ppm [ppm x 5% f. cons./b. wgt. (average f. cons. for adult rats) = 13.0 mg/kg (day); ppm = 13.0 ÷ .05 = 260 ppm]. This value (260 ppm) is unlikely to be reached in the field (maximum expected residue

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[1] $\bar{x}$ of 56, 7.2, 34, 8, and 35 ppm = 32 ppm (see articles).

on short grasses = 240 ppm), and even 1/5 the theoretical LC_{50} value[2] (52 ppm) may not cause significant hazards since rats fed 30 ppm Monitor for two years exhibited little or no mortality attributed to the pesticide. It is unlikely, therefore, that enough residue will occur in the field to cause significant, if any, hazard to nontarget mammals via feeding.

One cannot ignore, of course, the potential for overapplication, the repeated applications recommended, and the different sensitivity of mammalian species to pesticides. Under field conditions smaller species of insectivores and rodents might be affected adversely. Such effects should be more of an acute/subacute nature since it is anticipated that Monitor will degrade fairly rapidly and not provide a chronic hazard. Furthermore, such hazards may be of a dermal nature since Monitor has a low acute dermal LD_{50} to rabbits (118 mg/kg), and a simulated field study (this study was not located; only a summary of results was located) using rabbits indicated two applications of one pound active/acre Monitor caused 16% mortality.

Relative to avian species, the proposed use provides for potentially serious hazards to the various avian life found in the areas to be treated. Available data indicate the LC_{50} for bobwhite quail is approximately 47 to 58 ppm, 1/5 of which[2] equal 9.4 and 11.6 ppm, respectively. Average residue values in/on feed items such as insects may approximate 32 ppm, whereas

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[2]Classification/hazard criterion expected to produce 0.1 and 10.0% mortality in wildlife populations depending upon population sensitivity (see Sec. 3 Regulations, p. 28261).

[3]7-day interval between applications; juvenile New Zealand rabbits were used; Monitor 6EC was tested.

for pod/seed items the residues may be 10 - 12 ppm. All of these values exceed the 1/5th criterion, and further, when one correlates the toxicity data with the potential hazards to smaller avian species[4] (such as robins, mourning doves, sparrows, wrens), one finds that residues of 10 - 32 ppm in/on feed items can approach or exceed the calculated LC_{50} values for these species.

As for chronic hazards to birds, the reviewer concludes that repeated applications may provide for such hazards and may do so more by adult/fledgeling mortality than by subtle reproductive effects. Apparently, an avian reproduction study in progress (by Mobay Chemical Co.) at levels less than 40 ppm (since LC_{50} is 47 ppm) indicates this is so.[5]

The proposed use provides for exposure of aquatic organisms to Monitor due to the close proximity of celery fields to waterways, marshes, lakes, and ponds. The available data is conflicting, however, for in one study the 96-hour LC_{50} for rainbow trout is 51 ppm, whereas, in another the LC_{50} is 1.28 ppm. The data for bluegill sunfish indicates minimal toxicity with a 96-hour LC_{50} of 46 ppm. For aquatic invertebrates the reverse is true with the 48-hour LC_{50} of Monitor to Daphnia magna being 27 ppb. The potential for hazard exists, therefore, since exposure is provided by the use, and the pesticide is toxic to aquatic invertebrates and, possibly, to certain fish species. How hazardous the use may be (especially, in regards to repeat applications) is debatable though, for Monitor has the propensity to hydrolyze fairly rapidly, especially

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[4]See N. Cook's review, 8/30/78, for Monitor^R 4, Reg. No. 3125-280; specifically, Tables 1, 2, and 3.

[5]Personal communication with J. Akerman, 8/78.

when large quantities of water are present.[6] This coupled with the minimal application rate (1.0 lb a.i./A) may lessen, or negate, acute, subacute, and/or chronic hazards.

104.3.2 Use Site/Wildlife Utilization

Utilization of the vegetable crop areas of Florida, particularly the muck soil crops such as celery, by wildlife is significant. Numerous waterways, marsh areas, ponds, and lakes (L. Apopka and L. Okeechobee, primarily) interspersed and/or juxtaposed with the vegetable crop areas provide excellent habitat for numerous species of mammals and birds.[7] Cotton rats, rice rats, black rats, cotton mice, marsh rabbits, and muskrats are found in these areas with the marsh rabbit being quite abundant. This rabbit can breed year round and, therefore, may be breeding during pesticide applications. Further, this species is known to feed in crop areas.[8]

The avian life in these areas is extremely abundant with herons, wood storks, cattle egrets, ducks, the Southern Bald Eagle, the Florida Everglades kite, and large numbers of shore birds inhabiting and/or traveling through the area. As for breeding, the times vary with the species but breeding ranges from December/January through June--- the time of proposed Monitor applications. The approximate peak for breeding is April/May and in August the heron and wood stork populations are high, for the young have left the nest. Of

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[6]See N. Cook's review, 8/30/78, for Monitor^{R} 4, Reg No. 3125-280; specifically, phone conversation with Dr. D. Powell and E. Fate Data.

[7]An examination of fish species was not undertaken since the primary hazards appear to be to terrestrial wildlife.

[8]Personal communication with Dr. Layne, Archibald Biol. Station, 9/6/78.

special interest concerning birds are the following factors:

1. The Florida Everglades kite is found in open-water marsh/lake areas and should not occur in vegetable field waterways.

2. The eagles are found in the L. Apopka and L. Okeechobee areas and being wide-ranging birds may feed on dead/dying birds, fish, and/or carron in/around celery/vegetable crop areas. They normally do not "frequent" vegetable crop areas but can be found flying over such areas.

3. Wood storks are considered "endangered" by the state of Florida. This species is being proposed as "threatened" for the Federal Endangered/Threatened Species Listing.

4. Wood storks, herons, and other waders are commonly found in the waterways around fields. Further, they can be found in flooded fields (a practice quite common to this area: i.e., flooding).

5. Sandpipers, cattle egrets, and other shorebirds actively feed in the drier vegetable crop fields. They are attracted to fields after water (or during removal) is drawn off from flooding.[9]

104.3.3 Endangered/Threatened Species

The two species[10] likely to be impacted on by Monitor are the Florida Everglades kite and the Southern Bald Eagle. Both of these

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[9]Personal communications with P. Sykes and S. Nesbitt, 9/1 and 9/5/78, respectively.

[10]See J. Tice's review of Permethrin, 1/6/78, Sec. 18 for celery.

species are found in areas near vegetable crops. However, it is not anticipated that Monitor would come into direct contact with these two species since neither commonly occurs in/around celery fields. As indicated above (Sec. 104.3.2) eagles normally do not "frequent" vegetable crop areas but are found more in the lake/marshy areas. As for the kite, the bird is an open-water species and does not inhabit/feed in areas directly adjacent to vegetable crop areas.

Possible contact with the pesticide could occur indirectly via contamination of feed items such as fish, birds, mammals, and the apple snail. Nothing is known about Monitor's effects on the apple snail, but the Daphnia study does show it is highly toxic to aquatic invertebrates. If Monitor could come into contact with snails, then, possibly, it could kill them, thus, reducing the kite's food source. Obviously, the same is true for the feed items (fish, birds, mammals, but primarily fish) of the eagle. As for bioaccumulation in these feed items, it is not anticipated that this could occur based upon the fish accumulation data (see Env. Fate Section) and Monitor's tendency to hydrolyze fairly rapidly under most situations.

104.4 Summary

Based upon the above discussion, the reviewer concludes that the proposed use provides for potentially serious adverse effects to avian species and, possibly, to mammalian and aquatic species. Hazards exist for the two endangered species considered, but it is anticipated that these hazards are minimized due to Monitor's lack of persistence and the location of feed items (especially for the kite) generally away from the proposed treatment site. However, for other avain species--particularly, for the smaller shorebirds, upland game birds, and songbirds--the hazards are significant. These hazards must be addressed prior to further consideration of the proposed use. The proposed introduction of a pesticide (which is 5X to 45X more toxic to bobwhite quail than the pesticides presently

registered for use on celery)[11] into a sensitive wildlife area warrants the need for adequate field research/observations--particularly, since such data are lacking. The reviewer recommends, therefore, that said research (small pen, or larger pen, and/or field observations) be performed to address typical use applications.

105.0 Conclusions

The Ecological Effects Branch recommends against concurrence with the proposed Sec. 18 for use of Monitor on celery. Field research/observations are warranted prior to introduction of this pesticide into a sensitive wildlife area.

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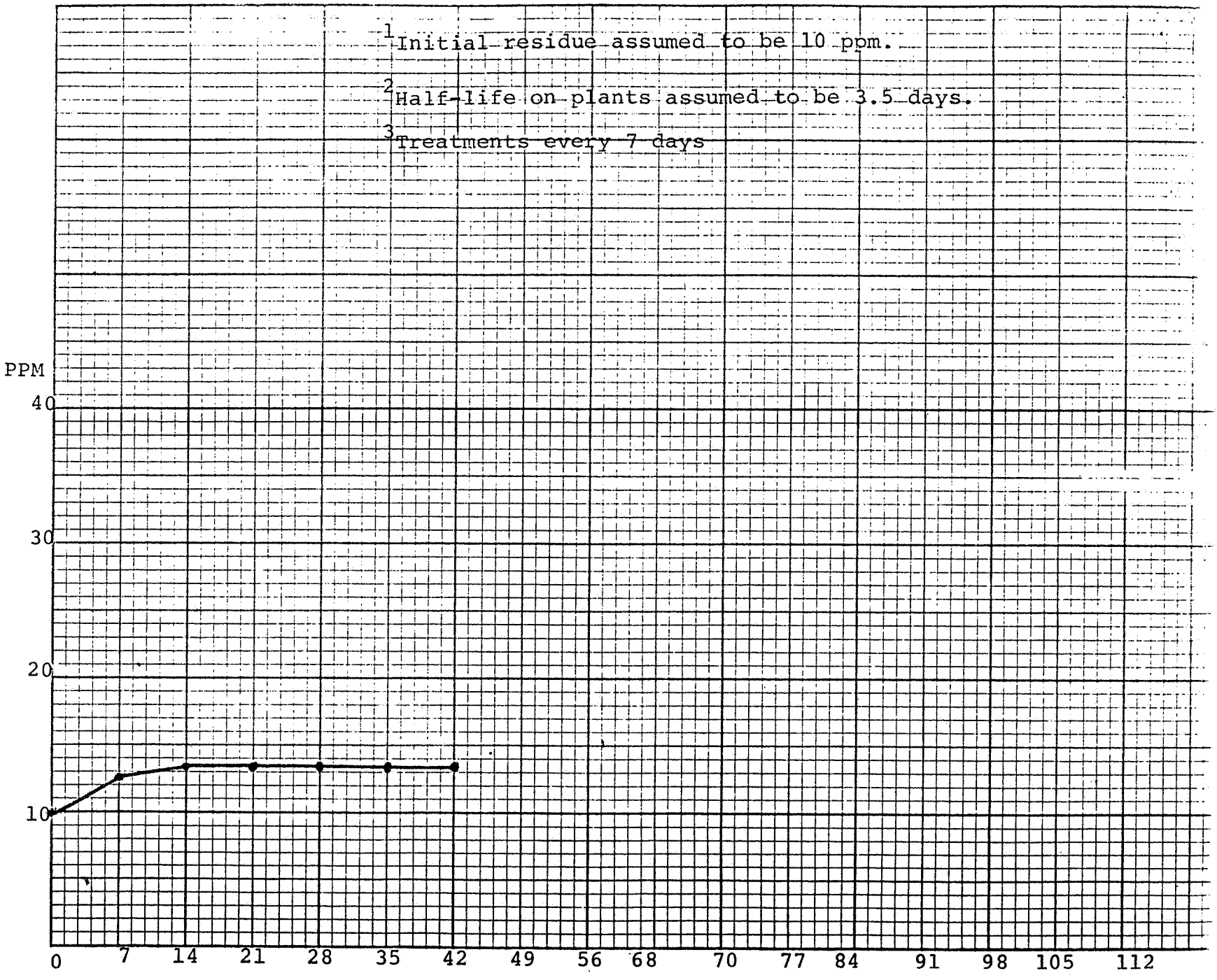
[11]Diazinon, Orthene, Cygon, Dibrom, Vydate

Norman J. Cook
Section 1
September 7, 1978

James Akerman, Section Head
Section 1
Date: 10/30/78

Clayton Bushong, Acting Chief
Ecological Effects Branch
Hazard Evaluation Division
Date: 10/30/78

Figure 1: Monitor Insecticide: Expected Residues on Seeds



-- ACREAGE --

County	Celery	Cabbage	Potatoes	Broccoli	Cauliflower	Cotton	Tomatoes	All Types Lettuce	Cucumbers	Eggplant Peppers Mellons
Palm Beach	9288	474	1050	8	-	0	1107	3760	769	3049
Sarasota	193	83	-			0	-	-	-	-
Seminole	1467	1322	2			0			868	110
Orange		858	100			0			-	-
TOTAL	10943	2737	1152			0	>1107	3760	1637	3159
STATE TOTAL	10948	14093	29535	15	296	13385	35916	5219	10199	13693

All crops/uses registered except for celery which is proposed for Sec. 18 and registration.
Data taken from 1974 Census of Agriculture.

Phone Conversation

DATE: 9/6/78

NAME: Dr. James Layne
Archibald Biological Station
Lake Placid, Florida

PHONE: 813-465-2571

Summary

Talked with Dr. Layne to learn more about wildlife utilization at vegetable crop areas around L. Okeechobee and L. Apopka. He was more familiar with the mammals in these areas than the avian life and indicated that a variety of species are found. Cotton rats, rice rats, black rats, and the cotton mouse are likely to be found, and in many areas the marsh rabbit is quite abundant. This rabbit can breed year round and will feed in crop areas; the population peak is probably around late summer and early fall. Dr. Layne also indicated that in mucky canal areas that muskrats are found. Lastly, he thought that there would not be any endangered/threatened mammals in those areas.

Norman Cook
9/6/78

Phone Conversation

DATE: 9/5/78

NAME: Steve Nesbitt
USFWS, Florida
S. Bald Eagle Expert

PHONE: 904-376-6481

Summary

Called Mr. Nesbitt to get more information on location of Southern Bald Eagle in regards to vegetable crop areas around L. Apopka and L. Okeechobee. Mr. Nesbitt indicated that eagles are found in both these areas and feed primarily on fish (>50% of diet) but also upon birds, mammals, herons, ducks, and carrion. The eagles are wide-ranging and can move into vegetable areas to feed but, apparently are dispersed around August* since breeding has ceased.

Mr. Nesbitt indicated that there is an abundance of avian fauna in the two lake areas. Herons, wood storks, cattle egrets, shore birds are common. In fact, in August the heron and wood stork populations are high since the young have left the nest. As for breeding, the times vary tremendously with some birds breeding in December/January (Great Blue Herons) and others breeding from February to June. The peak for breeding is April to May in most cases.

Of interest is the information that birds will work the dry fields (as well as wet), especially cattle egrets and sandpipers. The latter came through in August and, therefore, can be readily exposed to pesticides. Also, note that wood storks are considered endangered by the state of Florida and may be proposed for threatened for the Federal lists.

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* I indicated that some planting of celery occurs in August.

From the conversation it became apparent that there is high utilization of vegetable/mud flat areas by avian fauna. There is a significant opportunity for exposure of birds to pesticide applications, although no major kills (except Azodrin) in Florida, as yet, have occurred. Lastly, the mud-flats in the Apopka area contain some of the largest quantities of shorebirds in Florida.

Norman Cook
9/5/78

Phone Conversation

DATE: 9/1/78

NAME: Paul Sykes
Recovery Team Leader
Florida Everglades Kite

PHONE: 305-278-2378

Summary

Called Mr. Sykes to learn more about habitat of the Kite and its proximity to truck gardens. He indicated that there are no Kites right in the farm areas (nor in the drainage canals) because the bird requires "open-water" marsh areas and there are no snails in/around the vegetable garden areas. The hazard to Kites would be via pesticides that could move to areas where the snails are (be persistent) and that would kill the snails. He recommended obtaining mollusc data since copper has been shown to kill the apple snail, the sole food source of the Kite. I indicated that Monitor is not overly persistent and his concerns lessened, but he did indicate that in May most of the vegetable fields are flooded and the number of shore/ marsh birds and waterfowl using these flooded fields is incredible. I indicated that the 5 applications of Monitor should be in February and March, and Mr. Sykes said that there is little bird activity in fields at this time.

Mr. Sykes did imply that persistent pesticides could be very hazardous since there is so much movement of water back and forth from treated to non-treated areas. For example, to reduce water levels in vegetable fields, farmers simply reverse their pumps and backpump into L. Okeechokee (or their water source, if its another area).

Relative to Bald Eagles, Mr. Sykes indicated that there are few, if any, around the Everglades area. Most of the eagles are in the mangrove swamps of Southern Florida or North around Lake Apopka.

Norman Cook
9/1/78

Phone Conversation

DATE: 9/5/78

NAME: Dr. Denton
Agriculture Experiment Station

PHONE: 305-322-4134

Summary

Called Dr. Denton to learn more about celery agricultural practices in Florida. He indicated that celery is grown on muck soils interspersed with other crops grown in these areas such as carrots. Celery is started in seedbeds and is transplanted into the fields in 12 - 30 acre blocks. In the L. Apopka area, for the fall crop, the celery is transplanted in August and matures in 3 - 4 months. Planting is staggered due to the large blocks involved, and crops may be followed by sweetcorn, more celery, or may lay fallow.

Relative to pesticides, Dr. Denton indicated that none of the pesticides on the market now control the leafminer. Permethrin, issued via a Sec. 18, is giving excellent control but due to the leafminer's resistence to pesticides, Florida growers need another pesticide to rotate with Permethrin. The only pesticide viable at this point is Monitor, but according to Denton it can be used throughout the season. The most likely approach is applications of Monitor early followed by Permethrin sprays. However, mixing of applications (Monitor, Permethrin, Monitor, etc) can occur. Apparently, there is a long pre-harvest interval for Monitor due to its systemic activity.

As for flooding of fields, this occurs primarily in June and July when there is little agricultural activity. Field flooding is a widespread practice that is used on muck soils to control various insect pests.

Norman Cook
9/5/78

Phone Conversation

DATE: 9/1/78

NAME: Dave Peterson
U.S. FWS, Florida Area Office
946-2267

Summary

Called to talk to Mr. Don Hankla, Area Manager, but Mr. Hankla was out. Explained to Mr. Peterson that Florida was seeking use of Monitor on celery via Sec. 18 and eventual registration. Gave Mr. Peterson some background information and he indicated that pesticides, in general on celery, should have little or no impact on the Bald Eagle and/or Everglades Kite unless the material adversely affected the food source. He indicated that there was no need for a formal consultation on something this restricted geographically. He indicated he would talk to a Mr. Tom Martin, a refuge manager, and would have him call me.

Norman Cook
9/1/78

P.S. Mr. Peterson returned the call after talking to Tom Martin. They concluded that a non-persistent pesticide such as Monitor should pose no problems to the Kite.

REPORT OF TELEPHONE CALL OR VISITOR

NOTE: Complete this form. Write "NA" where not applicable.

INCOMING CALL	VISITOR	DATE
Mr, Donald Dye		2/8/79
OUTGOING CALL	CONGRESSIONAL	TIME OF CALL
Chevron Chemical Co.		4:00 p.m.

NAME AND ADDRESS OF CALLER OR VISITOR

PHONE NO. *(Include Area Code or IDS No.)*

REGISTRATION, ID NO. OR FILE SYMBOL

DATE OF LATEST SUBMISSION

BRIEF SUMMARY OF CONVERSATION

Chevron will consider participating in an avian simulated field study to atleast support the Florida Celery Grower's Section 18 and possibly registration of Monitor on other crops.

Mr. Dye called in response to EEB's request to P.M. Miller to Chevron. I informed Mr. Dye that EEB was attempting to coordinate with the Celery Growers and Chevron inorder to to aquire field data on Monitor's effect on birds. Ideally Chevron would be involved inorder that data would be supportive of registration actions and not just include casual observations. Mr. Dye assed what would be involved. I indicated that a modified large per study - probably using quail would be appropriate. The birds would be held at least for 3 applications with seven day intervals.

ACTION TAKEN OR REQUIRED

Mr. Dye stated that manpower committments plus the desire to test in a more controlled area might prevent Chevrous involvenment.

Mr. Dye indicated Chevron's intention to conduct a large per field study for orthene was a priority that will utilize otherwise available resources - especially men. I gave Mr. Dye the names of: Larry Beasley - Ecologist at Duda, George Tallot - manager of the celery growers and Florida State Fish and Game. These people may be willing to assist in conducting a study.

Mr. Dye will call back early next week.

RECORDED BY *(Name)*	REFERRED TO *(Name)*
H.T. Craven	

EPA Reg Form 6500-5 (8-72) REPLACES PR FORM 1-5 WHICH MAY BE USED UNTIL EXHAUSTED.

REPORT OF TELEPHONE CALL OR VISITOR

NOTE: Complete this form. Write "NA" where not applicable.

INCOMING CALL	VISITOR	DATE
Mr. Donald Dye		2/14/79
OUTGOING CALL	CONGRESSIONAL	TIME OF CALL
Chevron Chemical Co.		

NAME AND ADDRESS OF CALLER OR VISITOR

PHONE NO. *(Include Area Code or IDS No.)*

REGISTRATION, ID NO. OR FILE SYMBOL

DATE OF LATEST SUBMISSION

BRIEF SUMMARY OF CONVERSATION

Mr. Dye reported back on Chevon's decision regarding field studies on monitor when used in celery.

Chevron will not participate in a study due to committment of resources to other areas. Mr. Dye indicated that field men will be available to "check up". I informed Mr. Dye that the Branch will request information sufficient to satisfy our needs to evaluate the expected Monitor Section 18 for next year. Mr. Dye mentioned that Chermagro has submitted (as part of a petition) avian reproduction studies.

ACTION TAKEN OR REQUIRED

Conclusions:

EEB will request field observations similar to McEwen et al. (wo/mammal portion) to be conducted during December 18 on celery.

RECORDED BY *(Name)*	REFERRED TO *(Name)*
H.T. Craven	

EPA Form 6500-5 (4-72) REPLACES PR FORM 1-5 WHICH MAY BE USED UNTIL EXHAUSTED.