MINUTES

VERTEBRATE PEST CONTROL RESEARCH ADVISORY COMMITTEE MEETING
Ocean Mist Farms, 10855 Oceanmist Parkway
Castroville, California
October 29, 2008

Members Present	Members Absent
Dan Spangler, Chairperson	Edward Meyer
Ellen Des Jardin-Hirth	
Dale Huss	
Mark Novak	
Dennis Bray	
Robert Timm	
Art Foster	
Edward Tully	
Victoria Hornbaker	

Visitors	
Charmaine Canlas	Chris Drew
Tom Primus	Sherlan Neblett
Katherine Horak	Steve Skillicorn
Stephanie Shwiff	Cathy Roybal
Leonard Herrera	Gene Mangini
John Gouvaia	Casey McSwiggin
Douglas Miller	Paul Josselyn
Stella McMillin	Robert Coates

INTRODUCTIONS

Chairman, Mr. Dan Spangler, called the meeting to order at 8:00 a.m. followed by introductions of Committee members and guests.

BAGLEY-KEENE OPEN MEETING ACT AND VERTEBRATE PEST CONTROL RESEARCH ADVISORY COMMITTEE COMPLIANCE

Mr. Dan Spangler and the Committee acknowledged the Bagley-Keene Open Meeting Act and the Vertebrate Pest Control Research Advisory Committee (VPCRAC) compliance.

APPROVAL OF MINUTES

Motion: Dale Huss moved that the Committee approve the minutes of the April 16, 2008 meeting. The motion was seconded by Dennis Bray and passed unanimously.

FINANCIAL REPORT UPDATE

Ms. Victoria Hornbaker provided the Committee with information on the program budget, revenue, expenditures, and projections. Last year's program budget for 2007/08 was authorized at $1,007,881 with an administrative budget authorization of $252,000. In the

2007/08 fiscal year, 66 percent of the budget was spent, totaling $668,000. Total revenues were $653,978, including income from surplus money and interest from the loan. The program budget for the 2008/09 fiscal year is authorized at $1,000,000 with an administrative budget of $244,000. To date, $49,688 has been spent on personnel.

Ms. Hornbaker then asked the Committee to approve the Financial Reports as presented.

Motion: Robert Timm moved that the Committee accept the Financial Reports as presented. The motion was seconded by Arthur Foster and passed unanimously.

COMMITTEE MEMBERSHIP: CONSIDERATION AND RECOMMENDATION FOR NEW MEMBERS

Ms. Hornbaker announced that Mr. Edward Meyer, a retired Agricultural Commissioner from Contra Costa County, has been appointed as a new member to the Committee, filling in the public member vacancy. However, Mr. Meyer had a previous commitment and was unable to attend the meeting.

Ms. Hornbaker then stated that three California State University personnel are interested in Committee membership. The three candidates are: Dr. Paul Stapp from California State University, Fullerton; Dr. Alan Muchlinksi from California State University, Los Angeles; and Dr. Benjamin Sacks from California State University, Sacramento. Mr. Spangler recommended that the Committee talk to the candidates to assess their level of interest and commitment at the next meeting.

Mr. Robert Timm briefed the Committee on his plans for his sabbatical from January 2009 through January 2010. Mr. Timm will be traveling overseas to Christchurch, New Zealand and will be heading to the Canterbury region, which is an agriculturally rich location. At the Lincoln University, which is about one hour away from Christchurch, he will be out in the field studying various topics of interest such as wildlife damage management and community involvement in conservation and pest control.

STATUS OF THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY'S RISK MITIGATION DECISION FOR TEN RODENTICIDES

Ms. Hornbaker updated the Committee on the USEPA risk mitigation for rodenticides. Rodenticides are pesticides used in urban, suburban, and rural areas to control rodents, to prevent the transmission of disease and property damage, and to control crop damage. An introduction was then given on rodenticide anticoagulants, briefly mentioning the separation of two distinct groups: first generation (diphacinone and chlorophacinone) and second generation, which came out due to resistance issues. Re-registration occurred due to the concern of children accessing bait in domestic settings and to primary and secondary risks to birds and non-target mammals. In July 1998, the Rodenticide Cluster Re-registration Eligibility Decision (RED) was issued. This required registrants to incorporate bittering agents and indicator dyes into the formulations. EPA drafted a comparative risk assessment in September 2001. On January 2007, USEPA issued a proposed risk mitigation decision which if finalized would have made the second-generation anticoagulants into federally restricted materials for use by certified applicators. The final risk mitigation decision was issued on May 28, 2008; however, in the final risk mitigation decision second-generation anticoagulants were not assigned the federal restricted-use designation. They are to be used around agricultural buildings in bait stations and

will not be available to homeowners. First generation anticoagulants will be available to homeowners and to growers, but field uses are restricted-use. Ms. Hornbaker stated that her main concern with restricted-use is the affect it will have on the Program's revenue. People who were able to purchase 0.01 and 0.005 percent chlorophacinone and diphacinone in the past will no longer have access to those products if they are not licensed applicators. CDFA will work with the Department of Pesticide Regulation to attempt to show the kiosk system that has been developed in order to see if a special license can be developed for rodenticide users.

CALIFORNIA DEPARTMENT OF PESTICIDE REGULATION'S REEVALUATION OF SECOND GENERATION ANTICOAGULANT BAITS

Ms. Hornbaker briefed the Committee on the Status of the Department of Pesticide Regulation's (DPR) reevaluation of second-generation anticoagulants. DPR's main concern has been brodifacoum. DPR is holding off on the reevaluation to consider ways to address the hazards associated with the use of these materials at the request of the Department of Fish and Game. DPR is still currently waiting for USEPA to put forward a reasonable proposal before considering any action.

CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE REGISTRATION ISSUES

Ms. Hornbaker provided an update on the California Department of Food and Agriculture's (CDFA) current registration issues regarding zinc phosphide labeling for the use to control voles in artichokes. The application for registration was submitted to USEPA on February 2007 and was finally approved and received registration from DPR in March 2008. Due to the registration of zinc phosphide, chlorophacinone-treated bracts had to be discontinued and will be phased out on April 30, 2009.

Mr. Dale Huss stated that there are problems with the zinc formulation. The zinc formulation has a tendency to alter the bract into a consistency similar to sheet leather causing the voles to avoid picking it up. It is unsure if the cause is to due to the oil being used, but they will be looking at different oil amounts and oil types to determine which is more palatable to voles when used on the bracts.

UNIVERSITY OF CALIFORNIA, VERTEBRATE IPM POSITION UPDATE

Ms. Hornbaker provided the Committee with an update on the Vertebrate IPM position that the University has advertised. Dr. Roger Baldwin, who is based at the Kearney Research Station, has accepted the IPM Pest Management Advisor position. He was then introduced to the Committee.

REGULATORY STATUS OF ENDANGERED SPECIES

Ms. Stella McMillin provided an update on the regulatory status of endangered species. Ms. McMillin works for the Pesticide Investigation Unit (PIU) at the Department of Fish and Game. The PIU has statewide responsibility for assessing fish and wildlife impacts from pesticides. The unit receives animal carcasses, specifically birds and fish that have been subject to possible suspected pesticide acute poisoning due to illegal pesticide use. The PIU conducts monitoring when legal uses of a pesticide have caused exposure issues, and recommends mitigation measures to prevent future exposure incidents. Symptoms of anticoagulant toxicosis are analyzed by examining liver tissue samples and are usually a result of secondary exposure. A list of species impacted by secondary exposure includes golden eagles, owls, hawks, and the kit

fox. A study was directed towards San Joaquin Kit Foxes in Bakersfield because it is a sensitive population that is federally endangered and state threatened. The kit fox population habitat is located next to the city and is easily exposed to urban pesticide use. DFG has worked closely with the California State University, Stanislaus to obtain extracted liver tissue from Kit Fox carcasses. Liver tissues were then homogenized at the DFG laboratory. After analyzing 30 carcasses from Bakersfield and 12 from Lokern, a control site far from the city, it was revealed that 90% of the kit foxes from Bakersfield had brodifacoum in there system. The Lokern Kit Foxes did not have brodifacoum in their system. Therefore, a conclusion was made that there is an urban contribution to the problem of anticoagulant exposure.

RESEARCH UPDATE

University of California

Dr. Robert Coates provided an update on the research project entitled, "Evaluation and Control of Wild Turkey Damage in California Vineyards." Three main objectives of this project are to assess the actual extent and significance of damage caused by wild turkeys in vineyards, to identify alarm calls and distress calls that could be used to deter turkeys away from the vineyards as an alternative to trapping or shooting. In addition the study hopes develop control strategies that will be useful for keeping the turkeys away from the vineyards and to measure any changes of damage from using the alarm or distress calls. Research activities included the creation of an on-line survey to growers, the testing of various calls (wild turkeys, domesticated turkeys, crows, chicks, etc.) for effectiveness, the identification of 12 test sites, the measurement of turkey damage, and the recording of videos showing turkeys in the process of damaging crops. There were 100 respondents of the on-line survey from 19 counties, and approximately 43% of them believed to have turkey damage. Of the 12 study sites identified for damage assessments, six sites were located in the Napa Valley area and the other six sites were in the foothills. During the first year of the project, 20 vines were evaluated for turkey damage, ranging from less than one percent damage to over 12% damage at one site. For the second year of the project, broadcast units were installed at half of the vineyards, which were set on a timer to play calls at various times throughout the day. Data from the second year of research is still incomplete, and future plans for the project will be to finish analyzing the data.

Dr. Terry Salmon provided an update to the Committee on the VPCRAC web site project. At the last meeting, Dr. Salmon reported some of the major components of the new website, which now includes standardized templates for all grant proposals, project reports, and final reports that are funded through VPCRAC. A calendar system and electronic reminder system have also been implemented to assist researchers and the public to be updated on current VPCRAC issues and events. In addition, historical projects will eventually be put on the site, and the ultimate goal is to have all VPCRAC projects on the site. Dr. Salmon asked the Committee to view the site at www.vpcrac.org and to provide any input or comments for improvements to the website.

Dr. Terry Salmon provided a final progress report to the Committee on the Vertebrate Pest Control Handbook Revision Project. The project ended in June 2007, and the text and final edits have been completed. All of the chapters were submitted to Ms. Hornbaker for final approval, and the first chapter on diseases has been posted on the website. The goal is to have the entire handbook available on the VPCRAC website within a week or two.

Dr. Terry Salmon provided a final progress report to the Committee on Vertebrate Pest Control Training and Certification using an interactive computer kiosk system. The objective of this

project was to develop an interactive kiosk including a testing/certification component. The project ended September 2008, and a kiosk was brought at the meeting to display its functionality to the Committee. The kiosk includes over 20 videos, a pesticide applicator prompt, and has the ability to print out information. In addition, the kiosk focuses on four areas of ground squirrel management: general information about the ground squirrel, eating habits and diet of ground squirrels, selection of control methods by region, and an interactive test on ground squirrel knowledge. The project ended last month, and there are four units placed at agricultural commissioner offices in Monterey County, San Diego County, Alameda County, and Fresno County. The kiosks are stand-alone units in which data is periodically sent via the Internet to a central computer in the San Diego Cooperative Extension office, or is collected with a standard USB memory device. To date, 25 people in San Diego County have completed the test on ground squirrel management, and an average of six minutes is spent using the kiosk.

Dr. Terry Salmon provided an update to the Committee on the research project entitled, "Efficacy of Oat and Pellet Anticoagulant Baits Combined with Pretreatment of Oat and Pellet Zinc Phosphide Baits and Implications for Secondary Hazard Management." The goal of this project is to treat with zinc phosphide pellets or oats, and then follow treatments with anticoagulants pellets or oats. This should result in less anticoagulant secondary hazard risk, although there is a possibility that the study could be impacted by bait shyness. Dr. Salmon proposed to change his original field protocol from using a standard EPA evaluation to a new protocol that uses the same broadcast treatments but treats relatively large squirrel sites that have been identified with zinc phosphide. Squirrels on the sites will then be identified after 48 hours, and the plots will be treated on day one and day five. Fieldwork for this project with the new field protocol started in May 2008 in the Paso Robles vicinity. So far, tests have done reasonably well with plots treated with zinc phosphide oats and pellets. With the oat treatments of anticoagulant, there was significantly better control and fewer squirrels, and no apparent bait shyness problem was found. With the pellet treatments, the trend was the same but for some season, the six control plots lost all of their squirrels. One explanation may be that the pellets may have a longer field life and may have killed the squirrels after 48 hours of the treatment. Overall, Dr. Salmon stated that the concept works and the report is almost done.

Dr. Terry Salmon provided an update to the Committee on the research project entitled, "Assessing Some Potential Environmental Impacts from Agricultural Anticoagulant Uses." This project just started on October 1, 2008. The veterinary school at the University of California, Davis was contacted and arrangements were made with the school to take the liver samples from raptors that will be collected from urban and agricultural areas. However, there is an issue with difficulties finding raptor carcasses from the Central Valley.

Dr. Terry Salmon provided an update to the Committee on the research projects entitled, "Development of Gopher Control Demonstration Videos for Online and Kiosk-Based Training" and "Vertebrate Pest Control Continuing Education and Outreach for Licensed Trappers and Others Dealing with California Wildlife." A web broadcast based training program is being worked on for availability to the general public. This will be a correspondence course for those who do not have access to the Internet. A DVD version including the test will be available with a fee. The test will be based on Department of Pesticide Regulation requirements for certification, and hourly courses will be provided for credit. The plan is to have the training program ready by March 15, 2009 before the grant ends. Videos, brochures, flyers, pamphlets, and a link to the VPCRAC website will also be available on the web broadcast. Species that will be focused on for training will be meadow voles, pocket gophers, and ground squirrels. Data is based on the Vertebrate Pest Control Handbook, and photos taken from the field will be integrated into the training system. The presentation for the ground squirrel has been completed and is ready to be

implemented onto the website. The pocket gopher demonstration video is complete but narrations are still being recorded. No video tapings have been done for meadow voles, but data has been compiled. The website should be up by March 15, 2009. The grant ends on June 30, 2009 and anticipates for the project to be completed before that time.

National Wildlife Research Center

Dr. Katherine Horak provided an update to the Committee on the research projects entitled, "Development of a Pharmacokinetic Computer Model to Assure the Continued/Expanded Use of Anticoagulant Rodenticides" and "Pharmacokinetic Studies of Kestrels and Owls for Validating the CDFA/USDA Rodenticide PBPK Model." The major hurdle for the continued use of anticoagulant rodenticides is the non-target secondary hazard. The current risk analysis approach used by the USEPA overestimates anticoagulant rodenticide risks to non-target species. This research project proposes that the CDFA and USDA take the lead in rodenticide risk assessment development and incorporate physiologically based pharmacokinetic (PBPK) modeling into the risk assessment process. This approach uses currently known anticoagulant tissue residue data to estimate residues of anticoagulants in any animal tissues using computer-modeling techniques and then extrapolates these tissue residues to other species. The Food and Drug Administration has been using this approach to determine risks from drugs to humans using laboratory animals as surrogate species. Currently, the research project has focused on the development of the PBPK model for anticoagulant rodenticides that uses calculus to estimate the residues of anticoagulants in various animal tissues. Dr. Johnston then discussed the research goals of this project, which is to develop a PBPK model for two anticoagulant rodenticides and two species. Phase I, which has been completed, involved conducting dose versus mortality studies for warfarin and diphacinone in rodents and birds. The project is in the middle of Phase II, consisting of administering sub-lethal doses at multiple time intervals to determine and establish a relationship between blood clotting time and rodenticide tissue concentrations. Liver, muscle, and blood diphacinone residue analysis is currently in progress. Remaining objectives for Phase II include determining clotting time and residue levels versus post dosing time. Phase III of the project is to develop a physiologically based pharmacokinetic-pharmacodynamic model to predict the probability of mortality and tissue residues of warfarin and diphacinone in rodents and birds. The remaining objectives of Phase III are to modify the rodent PBPK model to best fit residue data and to create a quail PBPK model. Lastly, Phase IV proposes to validate the model by developing a small-scale study with wildlife avian species of interest. A study protocol by the United States Geological Survey Patuxent Wildlife Research Center has been completed and approved. Funding was approved in September 2008, and kestrel dosing will begin in early summer of 2009.

Ms. Stephanie Shwiff provided an update to the Committee on the research project entitled, "Economic Impacts of Rodent and Bird Damage to Vulnerable Crop/Commodity-Producing Counties." The first objective of this project is to determine the empirically reported nature and magnitude of damage caused by rodents and birds to major crops and commodities. Then provide a critical review and analysis of this literature. The second objective is to develop scenario-based projections of the magnitude of these economic losses within the state. And the final objective is to conduct an IMPLAN analysis of the job and revenue impacts attributed to the projected rodent and bird-caused losses of the impacted crops and commodities for the 10 leading agricultural counties of California. For the first objective, which has been completed, estimates of damage were calculated by doing literature reviews of various journals, reports, and return studies. Field interviews with growers, county agricultural commissioners, county officials, and University of California faculty were also held from October 7-17, 2008. The study is currently at Objective 2, in which input-output modeling techniques will be used to determine

the total economic impacts (the direct, indirect, and induced costs) to ten important agriculture counties in California. Two economic impacts of bird and rodent damage are: pest damage decreases the producer's yield per acre which, in effect, increases the cost of production for a particular yield per acre; and because pest damage exists, the producer has incentive to spend money on pest control. While pest control decreases the amount of pest damage that would have existed without control, pest control does have a monetary cost per acre. Data on damage estimates, pesticide use and costs, crop acreage, crop prices, and supply and demand elasticities will need to be compiled before moving on to Objective 3. For the third objective, ten counties have already been identified for this project based on total agricultural production, cash receipts from targeted crops, and highest percentage or concentration of targeted crops. The input-output analysis will model the economy and show multiplier effects of bird and rodent damage as well as the effects on county revenue and jobs. Plans for the next phase of the study include finalizing the damage and control data estimates, determining the validity of the input-output data, and completing the economic analyses.

Dr. Thomas Primus provided a progress report to the Committee on the research project entitled, "Using Liver Microsomes to Assess Resistance of Chlorophacinone and Diphacinone in Meadow Voles." Rodenticide chlorophacinone was evaluated and found to be much less effective than when introduced about 20 years ago to control meadow voles *(Microtus californicus)* in artichoke fields within Central California. University of California researchers found that the baiting strategies used were likely to increase the chances of developing genetic resistance in the target population. Anticoagulant resistance in other locations has been linked to enzyme activity, which is carried out in the liver microsomes. A brief overview was presented on a two-week experiment on a rat treated with 50 ppm diphacinone bait with no tetracycline hydrochloride and a male Wistar rat treated with chlorophacinone. According to the study, chlorophacinone did not metabolize as well as diphacinone. Liver microsomes from voles were collected, in which the liver was cleaned with a saline solution to remove the blood contents, frozen, and then brought back to the lab to extract the microsomes using a centrifuge procedure. The in-vitro liver microsome experiments were used to assess resistance to the anticoagulant chlorophacinone and to see if resistance can be assessed based on metabolism. This resistance can be evaluated and the synergism between anticoagulants and agents such as antibiotics can be evaluated to assess their impact on resistance. The in-vitro experiments can generate data much more efficiently and multiple interactions can be studied much more effectively than with live animal studies. Plans to trap meadow voles from chlorophacinone resistant and non-resistant populations and to collect their livers took place in Castroville and Davis. In Davis, 35 voles were trapped and 36 voles were trapped in Castroville over a week-long period. Blood samples and liver microsomes from both sets of meadow voles were collected afterwards, and those microsomes were used to evaluate the metabolism of both chlorophacinone and diphacinone. This resistance can be evaluated and the synergism between anticoagulants and agents such as antibiotics can be evaluated to assess their impact on resistance. In summary, use of the antibiotic tetracycline hydrochloride reduces the dose of diphacinone required. Therefore, lower residues of diphacinone are present by up to four times. Lower proportions of metabolites are present on average due to the drug interaction between the antibiotic and the anticoagulant.

Dr. Thomas Primus provided a brief update to the Committee on the research project entitled, "Using Liver Microsomes to Screen Anticoagulant/Antibiotic Formulations for Ground Squirrels and Pocket Gophers." Pocket gophers and California ground squirrels will be collected and tested using the same liver-testing methods and extraction method of microsomes used in the previous study on meadow voles. A cooperative agreement between CDFA and NWRC was

completed in September 2008; therefore, the protocol is currently in preparation. The study will resume within the next couple of months.

NEW RESEARCH PROPOSALS

Dr. Terrell P. Salmon, University of California, Cooperative Extension, San Diego County, presented to the Committee a research proposal entitled, "Food Safety and Rodent Control in Leafy Green Crops." The proposed budget amount is $108,924.

Dr. Roger Baldwin, University of California, Integrated Pest Management, Kearney Agricultural Center, presented to the Committee a research proposal entitled, "Development of Baiting Techniques for Jackrabbits." The proposed budget amount is $126,277.

Dr. Terrell P. Salmon, University of California, Cooperative Extension, San Diego County, presented to the Committee a research proposal entitled, "Developing a Vertebrate Pest Control Digital Library." The proposed budget amount is $39,814.

Dr. Roger Baldwin, University of California, Integrated Pest Management, Kearney Agricultural Center, presented to the Committee a research proposal entitled, "Vertebrate Pest Research 'NEEDS ASSESSMENT' for California." The proposed budget amount is $34,939.

Dr. Gary Witmer, United States Department of Agriculture, National Wildlife Research Center, presented to the Committee a research proposal entitled, "An Investigation of the Effects of Vitamin K-Rich Plant Food on the Efficacy of Diphacinone on Voles." The proposed budget amount is $22,623.

Dr. Gary Witmer, United States Department of Agriculture, National Wildlife Research Center, presented to the Committee a research proposal entitled, "A Field Efficacy of a Within-Burrow Zinc Phosphide-Grain Bait Packet for the Control of Ground Squirrels." The proposed budget amount is $47,445.

Ms. Sara Krause, University of California, Davis, presented to the Committee a research proposal entitled, "Efficacy and Behavioral Effects of Gonacon, a New Wildlife Birth Control Method, on the Invasive Tree Squirrel." The proposed budget amount is $90,905.

Ms. Stella McMillin, California Department of Fish and Game, presented to the Committee a research proposal entitled, "Anticoagulant Exposure to Non-Target Wildlife in California." The proposed budget amount is $120,000.

RESEARCH PROPOSAL DISCUSSION AND DECISION SESSION

Motion: **Dale Huss moved that the Committee table the research proposal from Dr. Terry Salmon, University of California, Cooperative Extension, San Diego County, entitled, "Food Safety and Rodent Control in Leafy Green Crops" to gather more information and present the proposal again at the next Committee meeting. The Committee asked the researcher to contact the Leafy Green Board to see if they will partner with CDFA to share funding for this project and will suggest any possible changes or amendments to the current proposal. The motion was seconded by Edward Tully and passed unanimously.**

Motion: **Ellen Des Jardin Hirth moved that the Committee fund the research proposal from Dr. Terry Salmon, University of California, Cooperative Extension, San Diego County, entitled, "Developing a Vertebrate Pest Control Digital Library," in the amount of $39,814. The motion was seconded by Arthur Foster and passed unanimously.**

Motion: **Dr. Mark Novak moved that the Committee fund the research proposal from Dr. Roger Baldwin, University of California, Integrated Pest Management, Kearney Agricultural Center, entitled, "Vertebrate Pest Research 'NEEDS ASSESSMENT' for California," in the amount of $34,939. The motion was seconded by Arthur Foster and passed unanimously.**

Motion: **Dan Spangler moved that the Committee fund the research proposal from Dr. Gary Witmer, National Wildlife Research Center, entitled, "An Investigation of the Effects of Vitamin K-Rich Plant Food on the Efficacy of Diphacinone on Voles," in the amount of $22,623. The motion was seconded by Robert Timm and passed by a seven to two vote. Committee members Ellen Des Jardin Hirth, Arthur Foster, Mark Novak, Victoria Hornbaker, Dan Spangler, Robert Timm and Edward Tully voted yes. Committee members Dennis Bray and Dale Huss voted no.**

Motion: **Dan Spangler moved that the Committee table the research proposal from Sara Krause, University of California, Davis, entitled, "Efficacy and Behavioral Effects of Gonacon, a New Wildlife Birth Control Method, on the Invasive Tree Squirrel," to gather more information and present the proposal again at the next Committee meeting. The motion was seconded by Victoria Hornbaker and passed unanimously.**

NEXT MEETING

The meeting was adjourned at 5:00 p.m. The next Committee meeting will be held in Napa, CA. The specific date for the meeting is April 22, 2009 from 8:00 a.m. until 5:00 p.m.

SUBMITTED,

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Victoria Hornbaker Date
Secretary