WASCO COUNTY BOARD OF COUNTY COMMISSIONERS
REGULAR SESSION
OCTOBER 19, 2011

PRESENT: Sherry Holliday, Chair of Commission
Scott C. Hege, County Commissioner
Rod L. Runyon, County Commissioner
Tyler Stone, Administrative Officer
Kathy McBride, Executive Assistant

Chair Holliday called the meeting to order at 9 a.m.

OPEN TO PUBLIC

Richard Murray asked the Board of Commissioners why two women who own a 37.93 acre parcel on Pleasant Ridge Road is allowed to have two dwellings on the property, while Thomas Teven is not allowed to have one dwelling. The property has the same zoning as Teven and one home was built illegally. Murray stated that the homes have water, power, telephone and the road is plowed.

Some discussion occurred.

John Roberts, Planning & Development Director, was provided with the property information. Roberts will be in contact with Murray regarding this matter.

OPEN TO DEPARTMENTS

John Roberts introduced Will Clark, AmeriCorps worker. Clark is working under the RARE Program at the Mid-Columbia Council of Governments Office. Clark will be updating the County's Natural Hazards Mitigation Plan.

Roberts noted all of the various organizations that are involved in the update of the Plan. A grant was received which will update the Natural Hazards Mitigation Plans for the Counties of Clackamas, Hood River, Sherman, Gilliam, Morrow, Wheeler and

Wasco. Clark is the lead person doing the update. Roberts will be facilitating this process for Clark.

Roberts stated that he prepared a memorandum in regards to this process, (Attached as Exhibit A). He is wondering if the Board is comfortable with using the former Steering Committee, and if there are any other individuals that the Board of Commissioners would like to see be involved in the update process. He anticipates three to four meetings of the Committee to provide Clark with feedback.

Roberts stated that he feels the current plan is in pretty good shape. The Plan prepares the County for emergencies. Without the Plan the County would not be eligible for any emergency funding from the Federal Emergency Management Agency.

Clark stated that they are currently working on a survey for the residents in the area. They will also be doing a risk analysis.

Some discussion occurred regarding the membership of the Steering Committee.

Roberts noted that the only cost to the County is in staff time.

Roberts reported that the County has been awarded a Technical Assistance Grant in the amount of $15,000 from the Oregon Department of Land Conservation and Development. He received the Board's approval to submit the grant proposal. At that time the Board was aware that a contingency transfer would be required if the grant was received.

Roberts noted that he will be preparing a Request for Proposals to hire a consultant to conduct an audit of the Planning & Development Department. The consultant will look at the Department's intake, the development review process and will identify the differences between federal, state and local regulations.

Roberts noted that his grant request was for $20,000 with a local commitment of $5,000 in cash contribution and $10,000 in staff and material costs for a total local contribution of $15,000.

Roberts was directed to speak with Tyler Stone, Administrative Officer, and Monica Morris, Finance Manager, regarding the contingency fund transfer.

Will Clark informed the Board that he just graduated from Oregon State University. He will be doing the AmeriCorps Program for the next 11 months. He is originally from La Grande and is currently residing in The Dalles.

Chair Holliday asked if there were any changes to the Board's Agenda. There were none.

Chair Holliday asked Tyler Stone, Administrative Officer, if he had anything to report today.

Stone stated that he had hoped to have some news back on the Agreement with the Wasco County Law Enforcement Association. The Union is still talking about the County's proposal.

CONSIDERATION of items listed on the Discussion List of October 19, 2011, (Attached as Exhibit B).

Item #1

Commissioner Hege wanted the Board to discussed House Bill 3188 and the requirements of the County to report annually on the lottery dollars received and expended by the County. As a new Commissioner, Hege does not know how much the County receives and where the funding goes. Commissioner Hege feels we really need to think about this matter. The purpose of the funding is to further economic development.

Kathy McBride, Executive Assistant, informed the Board of the phone call she received this morning from Monica Morris, Finance Manager. Morris wanted the Board to know that we are proposing to move the Lottery Funds from the General Fund to the dedicated Special Economic Development Payments Fund #208. The Board of Commissioners needs to direct Morris in the transfer of these funds to a dedicated fund. Morris also needs to know what the Board feels the money should be used for. This information is required in order to make the appropriation correctly. A supplemental budget may be required. McBride stated that Linda Brown, County Clerk, was requested to contact former County Clerk Karen LeBreton Coats to find out how the money has been utilized in the past.

Some discussion occurred.

Commissioner Runyon stated that some of this funding could be utilized on roads. He feels a work session may be in order to talk about the use of these funds.

McBride had one more item for the Board's discussion and that is the scheduling of a meeting to begin the update process on the Transportation Improvement Plan.

Some discussion occurred regarding the planning process and when the public becomes involved.

Stone informed the Board that the County has budgeted $90,000 in Video Poker monies during Fiscal Year 2011-2012.

The Board's preference is to schedule the first planning meeting on the afternoon of December 7, 2011.

Commissioner Hege stated that the minutes sent to the Board from McBride in regards to the discussion with Former County Judge John Mabrey and Dr. Frank Toda, Columbia Gorge Community College, is very clear that the National Guard was going to remove the structure and clear the property. He feels that any costs to the County in the abatement or removal of the structure should be taken out of the $15,000 annual lease fee to the College.

Some discussion occurred.

Stone stated that he will have a chance this evening to talk to the National Guard and ask that question again.

TOUR of the Columbia Basin Care Facility.

The Board recessed at 9:45 a.m. to tour the Columbia Basin Care Facility.

At 1:30 p.m. the Board reconvened.

RON GRAVES, WASCO COUNTY SOIL & WATER CONSERVATION DISTRICT. Discussion on feral pigs in Wasco County.

Ron Graves, Wasco County Soil & Water Conservation District Director, and Josh Thompson, Conservation Planner, were present to provide information to the Board of Commissioners on feral pigs in Wasco County.

Graves stated Thompson is one of their Planners who will be making today's presentation. The District has been working on feral pigs for 10 years.

Graves noted that the District has prepared a Pest Risk Assessment for Feral Pigs in Oregon with a Feral Swine Action Plan for Oregon. The Risk Assessment and Action Plan were presented to the Board, (Attached as Exhibit C).

Thompson presented a short video which was put together by Cody Stroda, High School Student, of the action taken by the District in tracking four feral pigs in Wasco County. Thompson noted that GPS collars were used to track the location of these pigs. The District did not see any trend or pattern in the data obtained by these devices. They estimate that there are five to thirty pigs in a sounder. They are unsure of the number of feral pigs within Wasco County.

Thompson then presented a PowerPoint presentation, (Attached as Exhibit D).

Some discussion occurred after the PowerPoint presentation.

Graves stated that the feral pigs started out in the Antelope area. They are migrating north. They are now in the Pine Hollow and Buck Hollow drainages, as well as in Sherman County. Dan Carver stopped in yesterday at the District Office. Carver indicated that he has seen pig signs in all of his drainages on his ranch.

Mel Omeg, Wasco County Budget Committee Member, stated that the County allocated some additional funding this year for Wildlife Services to help with the feral pig problem in the County. The Soil and Water Conservation District has been working on this problem for a number of years. We need to keep at it to keep the number of pigs down.

Thompson stated that the area where the pigs have been located in is growing. We have no way of knowing what their population is. He feels that the communications between the Department of Fish and Wildlife and the USDA, APHIS Wildlife Services needs to improve.

Graves noted that this is a state-wide problem. The State of Oregon needs to be doing something about this issue. The District has applied for grant funding since it is pretty expensive to take on an effort to eradicate the feral pigs. The District has failed to get grants on numerous occasions.

Thompson stated that they will keep on trying to get grant funding. The Oregon Watershed Enhancement Board has encouraged the District to reapply for grant funding. They will be sitting down with the various agencies to develop a good plan.

Chair Holliday stated that she has been in communications with David Williams, Wildlife Services Director, regarding the additional funding that has been allocated to their program by Wasco County. She has requested that the State provide the County with some type of plan on how they will be dealing with the feral pig and cougar problem. Essentially the County is buying more time from our Federal Trapper Jon Belozer.

DAVE PETERS, COLUMBIA CASCADE HOUSING CORPORATION. Discussion on the proposed Mid-Columbia Regional Home Repair Program Policies and Procedures and an update on the Wasco County Home Repair Loan Program.

Dave Peters, Columbia Cascade Housing Corporation, updated the Board on the Wasco County Home Repair Loan Program Grant Project. He noted that they have accepted the last loan under the Project. If the next bid is in the amount of $24,000 they will be done with that loan. The County has until December 31, 2011 to have committed all of the loan dollars under the Project. The State of Oregon would like to see all of the loan dollars dispensed by the end of the year. There is no problem getting the money leant out within the next two weeks.

The Home Repair Loan dollars in the Counties of Wasco, Hood River and Sherman need to come back to Columbia Cascade Housing Corporation upon repayment. The monies are intended to support housing. The proposed Mid-Columbia Regional Home Repair Program Policies and Procedures would be dealing with the repayment of these funds, (Attached as Exhibit E).

Peters is proposing that the next grant application would be for a regional program with the Counties of Hood River, Sherman and Wasco. He was thinking that Wasco County would be the grant recipient.

Some discussion occurred regarding the proposal that Wasco County would be a grant recipient for a regional grant. The grant application would need to be submitted during the first quarter of 2012.

Peters asked that the Board provide him with any questions or concerns regarding the proposed Policies and Procedures. Peters learned in speaking with Ernie Kirchner from Oregon Housing and Community Services that Kirchner feels that all property taxes should be current. Peters feels that there should be some wording within the Policies and Procedures which address people with tax deferments. Kirchner also suggested that the Dispute Resolution section be cleaned up.

Peters went over his handout entitled "Mid Columbia Regional Home Repair Program", (Attached as Exhibit F).

Chair Holliday asked what happens if they come across a residence that has been illegally placed and there is a lien on it.

Peters noted that they will do a title search and insurance is required.

Some discussion occurred.

The Board expressed that the Policies and Procedures should require that property taxes should be current and that property owners not be allowed to refinance and pull out all of the equity on their property.

Chair Holliday requested that Peters find out how other Regional Programs work. She feels that it will become complicated with a Regional Project.

Peters noted that under a Regional Project he believes that Wasco County would get the majority of the funding since Hood River County is running out of potential applicants and Sherman County did not spend all of their grant funding. Under the state rules the applicant is excluded from getting the administrative dollars.

Peters will make some changes to the proposed Policies and Procedures for the Board's consideration. Kirchner has suggested that the repayment dollars be kept for the required match. Columbia Cascade Housing Corporation will hold onto the repayment dollars until March or April.

Stone stated that the County will be required in the next round to have an Equal Opportunity Plan in place. He would like to see Columbia Cascade Housing Corporation do the work.

Peters noted in closing that there are new rules and more requirements under the next grant cycle.

Commissioner Runyon asked if the County would be allowed to charge the other two counties for the work that Wasco County would be doing on their behalf.

Peters will look into that matter and will let the Board know what he learns.

CONSIDERATION AND APPROVAL of the Regular Session Consent Calendars of October 19, 2011, (Attached as Exhibit G).

Commissioner Hege had a concern regarding the section of minutes on Page 5 of the Regular Session Minutes of October 12, 2011, that pertains to his comments on the request from Mid-Columbia Council of Governments for a letter of support. He requested that the minutes be amended before the Board would approve them.

{{{Commissioner Runyon moved to approve the Regular Session Consent Agenda for October 19, 2011, with the exception of Item #11. Commissioner Hege seconded the motion; it was then passed unanimously.}}}

COMMISSION CALL / REPORTS

Commissioner Runyon stated that he will send the Board an email regarding Regional Solutions.

Commissioner Runyon reported that on October 28th there will be a group of Wounded Warriors that will be making a trip from Vancouver, Washington to the City of Maupin. The group of 50 people will be staying at the Imperial River Company. They will be provided with a guided tour.

Commissioner Runyon noted that the Board of Commissioners, at our last meeting, allowed the North Central Public Health District to explore the District going out on their own. He felt that they should look at different approaches to a stand-alone District. Since then he has been hearing things that we are giving them an open book. Commissioner Runyon does not want the District to go out and hire attorneys or consultants. He thought the exploration would be done internally. Commissioner Runyon feels that the County needs to make it clear.

Chair Holliday stated that didn't appear as to what the discussion was before the Board of Health. Teri Thalhofer, North Central Public Health District Director, was going to get some figures together on what it might cost the District.

Commissioner Runyon would like the County to follow up on this with our District Director. At this point in time we are not looking to go out and incur any costs.

Chair Holliday stated that the discussion about utilizing Wilford Carey was only if they were going to go out and create their own District. Thalhofer was going to figure out what it would cost to contract out payroll, etc... Chair Holliday agreed that we should make it clear.

Stone stated if this is something that we don't think is a worthwhile avenue to be taking then we should not put Thalhofer through all of that work. Stone will contact Thalhofer to express the Board's concerns.

Commissioner Hege stated that he feels it would be good to make it clear on what we expect. He is pretty open in looking at this as long as it is in that scope. Commissioner Hege stated it does not seem like it would be a lot more. The District could contract back with the County which would set the County free of the administrative role. He does not feel we need to spend money to look into that.

Stone stated that he just received back from Hood River County the modified Intergovernmental Agreement for Veterans Services.

{{{Commissioner Hege moved to approve the Intergovernmental Agreement for Provision of Veterans' Services between Wasco County and Hood River County; said approval is subject to County Counsel's approval. Commissioner Runyon seconded the motion; it was then passed unanimously.}}}

Stone stated that the Board asked about the number of volunteer hours at the Veterans Services Office (229 hours for the month of September). The number of hours is growing.

Commissioner Runyon reported that the volunteers are scheduling all of the appointments. They are doing a lot of work.

Commissioner Hege asked that we address the GIS System that is listed under the On Hold Section on the Board's Discussion List.

Staff will schedule Tycho Granville to discuss the GIS System with members of the Board of Commissioners.

The Board signed:

- Order in the matter of the reappointment of Rich Remington to the Wasco County Board of Review.
- Order in the matter of the reappointment of Jerry Duling to the Wasco County Board of Review.
- Order in the matter of the reappointment of David Cooper to the Wasco County Board of Review.
- Order in the matter of the reappointment of Louise Sargent to the Wasco County Elderly & Handicapped Transportation Funds Advisory Committee.
- Order in the matter of the reappointment of Dave Mason to the Wasco County Elderly & Handicapped Transportation Funds Advisory Committee.
- Order in the matter of the reappointment of Lee Bryant to the Wasco County Elderly & Handicapped Transportation Funds Advisory Committee.
- Order in the matter of the reappointment of Pam Petersen to the Wasco County Courthouse Safety Committee.
- Order in the matter of the reappointment of Jeff McCall to the Wasco County Public Works Building Safety Committee.
- Order in the matter of the reappointment of Don Lewis to the Wasco County Public Works Building Safety Committee.
- Order in the matter of the reappointment of Don Uhalde to the Wasco County Public Works Building Safety Committee.
- Intergovernmental Agreement for Provision of Veterans' Services.

The Board adjourned at 3:07 p.m.

WASCO COUNTY BOARD OF
COUNTY COMMISSIONERS

Sherry Holliday, Chair of Commission

Scott C. Hege, County Commissioner

Rod L. Runyon, County Commissioner

Exhibit A

Wasco County Planning Department

"Service, Sustainability & Solutions"

2705 East Second St. • The Dalles, OR 97058
Phone: (541) 506-2560 • wcplanning@co.wasco.or.us
www.co.wasco.or.us/planning/planhome.html

To: Wasco County Board of Commissioners ("Board")

From: John Roberts, Planning Director
Will Clark, RARE-MCCOG

Date: October 19, 2011 Meeting

Re: Update to Wasco County's Natural Hazards Mitigation Plan

Purpose:
The purpose of this memo is to make the Board aware of the background behind the reasons to update the Wasco County Natural Hazard Mitigation Plan (NHMP), anticipated process, and project leads and stakeholders to be involved.

Background:
A NHMP forms the foundation for a community's long-term strategy to reduce disaster losses and break the cycle of disaster impacts, reconstruction and repeated damage. It creates a framework for risk-based decision making to reduce damages to lives, property and the economy from future disasters. Jurisdictions with Federal Emergency Management Agency (FEMA) approved mitigation plans are eligible for federal grant funding to implement those mitigation items identified in the plan. Jurisdictions are required to review, update and re-seek FEMA approval of their plans every five years in order to maintain grant eligibility. Wasco County adopted its NHMP in February 2007 making it due for its 5-year update early 2012.

In October 2010 Wasco County submitted to the Oregon Partnership for Disaster Resilience (OPDR) a letter of commitment to support an application to conduct the required 5-year update to the County's NHMP. OPDR prepared and submitted the grant, which included a proposed scope of work, activities and contributions required by Wasco County should it be funded. The grant was ultimately awarded and approved this past summer[1]. Additional beneficiaries to the grant included Clackamas, Hood River, Sherman, Gilliam, Morrow, Wheeler and Umatilla counties (as their NHMPs were are also nearing expiration). As a result OPDR is facilitating a regional planning approach with training sessions, technical assistance and plan updates occurring for each county simultaneously.

OPDR is partnering with two Resource Assistance to Rural Environments (RARE) AmeriCorps service placements to assist all the aforementioned counties with updates to their respective NHMPs (through the University of Oregon Community Service Center). Additionally, placements are being housed or hosted by the Mid-Columbia Council of Governments. The RARE placement or designated project lead for Wasco County is Will Clark, who will be introduced at the meeting. Whereas Will is the project lead designated by OPDR, he will work closely with the County's Planning Director for guidance and to see the project through to completion.

---

[1] The project was identified as the Planning Department's number one long range project and work program priority in 2010.

Process/Timelines:
The project began in earnest in September and is anticipated to be completed by June or July 2012. There was a project kick-off meeting held September 20th. Between now and January 2012, Will will take initiative to work with the County's Planning Director to:

- Develop a viable work plan.
- Reconvene the Wasco County Mitigation Plan Steering Committee formed to develop the 2007 edition of the NHMP. **Previous 2007 Steering Committee members included:**

  Dan Boldt, *Wasco County Public Works*
  Dan Hammel, *Mid-Columbia Fire and Rescue*
  Mike Davidson, *Wasco County Emergency Management*
  Todd Cornett, *Wasco County Planning and Development*
  Ryan Bassette, *Wasco County Soil and Water Conservation District*
  Richard Gassman, *City of The Dalles*
  Sherry Holliday, *Wasco County Court*
  Hanna Settje, *American Red Cross*
  Tycho Granville, *Wasco County GIS*

- Identify and invite new participants or jurisdictions into the planning process.
- Identify and work with external partners (e.g., CGCC, School Districts, Port of the Dalles, Oregon Department of Forestry, US Army Corps of Engineers, Oregon Department of Agriculture, Hospitals, Soil and Water Conservation Districts, etc.).
- Overview a public involvement strategy.
- Review and update strategies identified in the 2007 NHMP.
- Identify and document plan implementation activities, including completed projects and other "success stories".
- Collect other necessary data.

Recommendation
At the meeting it is requested the Board make the project leads aware of anybody else they think should be included on the Steering Committee or any other important considerations. It is important to note the Steering Committee should not be a huge time commitment, but will likely include 3 or 4 meetings.

Next Steps
The Planning Department will keep the Board award of the status and progress of the update to the NHMP and report back as necessary.

Exhibit B

WASCO COUNTY BOARD OF COMMISSIONERS
REGULAR SESSION
OCTOBER 19, 2011

DISCUSSION LIST

ACTION AND DISCUSSION ITEMS:

1. Discussion on HB 3188.

ON HOLD:

1. Discussion on Scope of Work and Proposed Budget for Updates and Maintenance to Wasco County Website. (Waiting for AOC)

2. Discussion on the GIS System.

3. Discussion on the National Guard Armory Property.

4. Consideration of the approval of the Intergovernmental Agreement between Wasco County and Hood River County for Veterans Services.

5. Request from Mid-Columbia Council of Governments for funding assistance on Renewable Energy Pilot Project.

Exhibit C

Pest Risk Assessment for Feral Pigs in Oregon

Bruce Coblentz
Cassie Bouska
Department of Fisheries and Wildife
104 Nash Hall
Corvallis, OR 97330
(541) 737-1959
Bruce.Coblentz@oregonstate.edu
bouskac@onid.orst.edu

This pest risk assessment follows the format used by the Exotic Forest Pest Information System for North America. For a description of the evaluation process used, see http://www.exoticforestpests.org/english/guidelines/eval.htm.

IDENTITY
Name: *Sus scrofa domesticus, Sus scrofa scrofa* Linnaeus
Taxonomic Position: Mammalia: Artiodactyla: Suidae
Common names: feral pig, feral hog, wild boar, Russian boar

RISK RATING SUMMARY
Numerical Score: 18
Relative Risk Rating: Very High

RISK RATING DETAILS
Establishment Potential is HIGH

Justification:
Feral pigs, wild boars, and hybrids either currently inhabit, or have been successfully introduced to every continent except Antarctica, and many oceanic islands. There are thirteen current known localities of feral pigs in Oregon (see Appendix A), distributed in various locations in southern and central Oregon. The biology of feral pigs indicates that these animals are capable of inhabiting virtually all available habitat west of the Cascade mountains, and the majority of the habitat east of the Cascades, with preference for riparian regions. Reports of feral pig biology and ecology in other regions in the United States, as well as around the world, give no indication of any limits to distribution, with the exception of high elevations.

Economic Impact Potential is HIGH

Justification:
Issues concerning the economics of feral pigs are dichotomous in that they are considered assets by some and pests by others. ORS 610.002 and 496.004 designate feral pigs as predators and wildlife animals under the jurisdiction of Oregon Department of Fish and Wildlife, and ORS 608.510 makes it unlawful to allow hogs to run at large or upon the property of another. These designations remove some of the conflicts experienced between other state governments and sport hunting interests, although the importation of wild "Russian boar" to trophy hunt ranches still occurs in Oregon.

Feral pigs are capable of becoming agricultural pests in Oregon, as they have in other states and countries. In the US, feral pigs are responsible for an estimated $800 million in damage each year to agricultural commodities, and there is no reason, given their dispersal capabilities, phenomenal reproductive rate, and biological and ecological generalist characteristics, that Oregon's agricultural economy could not add to this estimate. Feral pigs are also considered to be vectors for disease, many of which are transmissable to other wildlife, livestock, and even humans.

In addition, control costs of feral pigs, although very low (< $1 million) in comparison with the damage estimates, are continuous, and resource managers are often discouraged

by the constant need for trapping and killing required (70% of the population annually) just to maintain the current population. Feral pigs were restricted to a few coastal Californian counties prior to 1950, but by 1999, they occupied 49 of 58 counties. California's situation prior to 1950 was not unlike the situation that exists in Oregon today. However, California's costs of control today are much higher than they would have been 50 years ago, and statewide eradication is no longer even a consideration. In Oregon, current costs of eradicating the existing populations may be substantial, but worthwhile given the high potential of range expansion and the resulting demands on the economy.

Environmental Impact Potential is HIGH

Justification:

Feral pigs have been shown to restrict timber growth, reduce and/or remove understory vegetation, and destabilize soils, causing increased erosion and compaction, while simultaneously decreasing stream quality. Rooting and grubbing activities have also been shown to facilitate the invasion of noxious weeds and other non-native vegetation. thereby reducing site diversity and the distribution of native species. Feral pigs are capable of consuming virtually all available oak mast, thereby competing with native wildlife and severely limiting oak regeneration, a process that would negatively affect Oregon's already threatened white oak (*Quercus garryana*) savannahs. In addition, pigs prey upon herpetofauna, small mammals, and the young of larger mammals (i.e., lambs, deer fawns), thus presenting an additional source of mortality upon these organisms.

GEOGRAPHIC DISTRIBUTION

Wild pigs (*Sus scrofa* ssp.) are native to the Old World, but with the advent of world-wide travel, they have been introduced to all continents except Antarctica, and many oceanic islands (Oliver and Brisbin 1993). Although the Polynesians are credited with the first introductions of domestic pigs (*Sus scrofa domesticus*) to Hawaii as early as the 400 A.D. (Stone 1985), they first arrived in the West Indies with Christopher Columbus in 1493 (Sweeney and Sweeney 1982, Mayer and Brisbin 1991), and these populations are what sustained further expeditions to the mainland, such as that of Hernando De Soto in 1593 (Hanson and Karstad 1959, Sweeney and Sweeney 1982, Mayer and Brisbin 1991, Cox 1999). De Soto traveled over 3000 miles in his explorations of what is now the southeastern United States, and unsurprisingly, over the course of his travels, many of the pigs brought along as a food resource escaped (Hanson and Karstad 1959). There are accounts of Native Americans utilizing the resulting generations of feral pigs as a free-ranging resource, and future settlers of North America continued these practices (Sweeney and Sweeney 1982, Mayer and Brisbin 1991). Existing feral populations were bolstered by the release of domestic pigs for hunting (Mayer and Brisbin 1991, Cox 1999), and their range expanded with the movement of settlers across the country, continued use of free-ranging livestock practices, and accidental escapes (Sweeney and Sweeney 1982, Mayer and Brisbin 1991, Kotanen 1994, Cox 1999).

European wild boar (*Sus scrofa scrofa* Linnaeus) were introduced to a small game preserve on Hooper Bald, North Carolina, by George Moore in 1912, and have since interbred with feral domestic pigs, resulting in wild boar-feral pig hybrids that are still present in the southeastern United States (Laycock 1966, Mayer and Brisbin 1991). Wild boar were introduced into California by George Moore as well, again to establish a hunting population (Laycock 1966). This population has also interbred with pre-existing populations of feral pigs, producing hybrid stock (Waithman et al. 1999).

Currently, feral pig populations exist throughout the southeastern United States, from Florida to Texas (Sweeney and Sweeney 1982, Cox 1999) and Oklahoma, as well as in a band from Ohio and West Virgina to Colorado (Cox 1999). Populations are also documented in New Mexico, Arizona, California, Oregon, and Hawaii (Sweeney and Sweeney 1982, Mayer and Brisbin 1991, Cox 1999).

In California, feral pigs were restricted to a few coastal counties prior to the 1950s (Mansfield 1986). By the mid-1980s, feral pig populations had expanded into 33 of California's 58 counties, and were estimated at 70,000 to 80,000 animals (Waithman et al. 1999). As of 1994, the feral pig population was estimated at 133,000 and animals were present in 49 counties (Waithman et al. 1999). The northern and central coast regions of California host 81.7% of the state's feral pigs, who depend on permanent water sources and prefer oak (*Quercus* spp.) woodlands (Sweeney and Sweeney 1982, Waithman et al. 1999). They are also associated with hardwoods, conifer, coastal sage scrub, chaperral-chamise (*Adenostoma fasciculatum*) scrublands, grasslands, and riparian areas (Waithman et al. 1999). Very dry conditions limit range expansion into eastern and southeastern portions of California, but there are no conditions, aside from lack of cover and resources at very high elevations, that would restrict range expansion in the northern and central coast regions (Waithman et al. 1999). In fact, even high elevations may not be a limiting factor of the potential range of these animals at low latitudes. In Hawaii, feral pigs have been found on Mauna Loa and Mauna Kea at elevations as high as 3,030 meters (Stone 1985). The potential for expansion into higher elevations, however, is dependent upon freezing levels; feral pigs are not successful at higher elevations where the frost layer reaches depths greater than 2.54 cm (Hanson and Karstad 1959, Singer 1981), which presumably, inhibits their ability to root for subterranean invertebrates and tubers.

In Oregon, feral pig populations have been reported in nine counties (see Appendix A): Coos and Curry Counties (Dement Creek/Sixes River area, Pistol River, and Thomas Creek), Josephine County (Rough and Ready Creek), Jackson County (Sampson, Slide, and Conde Creeks), Klamath County (Swan Lake Ridge, Klamath River), Wasco and Jefferson Counties (Ashwood area), Crook County (Ochoco National Forest), and Wheeler County (Spray/Service Creek/Waterman Triangle area). Two additional populations existed along the coast of Coos County (North Spit) and in Crook County (east of Post on highway 380), but have been eradicated. The existing populations have resulted from a combination of unauthorized releases for hunting and ranch escapes and consist of feral domestic pigs, although the Crook County population reportedly consists of feral pig-wild boar hybrids (Ferry 2004, *pers comm*). Reports indicate that current

populations are small, relatively isolated from each other, and seem to be limited by hunting pressure, and government control efforts (Huffman 2004, *pers comm*), although range expansion can be expected given that pigs are food and habitat generalists (Duncan 1974, Bratton 1975, Coblentz and Baber 1987, and others).

POTENTIAL RANGE IN OREGON

Although feral pig populations are currently limited to small isolated populations in southern and central Oregon (see Appendix A), feral pigs could successfully inhabit any region west of the Cascade Mountains where forage and water is readily available and the amount of herbaceous vegetation and understory cover is more than adequate to provide suitable habitat for feral pig populations. Presumably, forage would be limited at higher elevations in the Cascade Range, but existence would be feasible during the summer months, although seasonal altudinal migrations would be necessary for survival. In central and eastern Oregon, there are limitations to range expansion tied to the availability of water, forage, and adequate cover for thermoregulation. Riparian areas, golf courses, irrigated fields and pastures (which are most likely adjacent to riparian areas) are areas most susceptible to range expansion of feral pigs in the drier regions of Oregon.

BIOLOGY

A great deal of the difficulty associated with control of feral pig populations is due to high fecundity and early onset of sexual maturation. As a result, population growth rates can be astonishing. The growth rate of a population of European boar on the Belowesh Preserve in Poland has been as high as 178%, although typical growth values are 40% or higher (Cabon 1958, Kozlo 1970). In the United States, sows are sexually mature between 4-9 months (Lasley 1958, Sweeney 1970, Duncan 1974), with an average of 6 months in California (Pine and Gerdes 1973, Sweeney and Sweeney 1982). Boars may reach puberty between 7-12 months in Great Smoky Mountain National Park (Duncan 1974), and were observed attempting to breed at 6 months in California, but do not typically breed successfully until they are at least 12 months old (Barrett 1978).

Feral pigs are capable of reproducing year-round (Hanson and Karstad 1959, Duncan 1974, Barrett 1978), with peak farrowing periods in July and November (Sweeney and Sweeney 1982). Gestation lasts approximately 115 days (Henry 1968). Litters of California feral pigs typically consist of an average of 5.6 young (Barrett 1978, Sweeney and Sweeney 1982), and under favorable conditions, sows will produce two litters per year (Duncan 1974, Barrett 1978, Baber and Coblentz 1986). Farrowing success is tied to forage quality and availability; sows with access to irrigated pasture when other forage was limited were capable of producing 20% more fetuses than sows who did not have access to the higher quality forage (Barrett 1978). Nutritive deficiencies can result in delayed puberty and periods of anestrous (Matschke 1964, Duncan 1974) Unlike wild boar, feral pigs will attempt to reproduce even when resources are severely limited (Matschke 1964).

Feral pigs often travel in sounders, groups of eight or less comprised of one to three adult females and their subadult offspring (Kurtz and Marchinton 1972, Sweitzer et al. 2000).

It is uncommon to find more than three adults in a sounder, and mature boars are most often found alone (Hanson and Karstad 1959, Kurtz and Marchinton 1972). Home range estimates vary between sexes, subspecies, and season, which in turn affects temperature, water and forage availability. The mean home range of feral pigs in California, as taken from several studies (n = 31) was 2.53 km^2 (Sweitzer et al. 2000). It is interesting to note that the range of the wild boar-type is typically larger, reported at 7.48 km^2 in California and 6.85 km^2 as an average from several regions (Sweitzer et al. 2000). Females have demonstrated smaller home ranges than males, regardless of region (Barrett 1978, Wood and Brenneman 1980, Caley 1997, Dexter 1999), and for approximately three weeks following parturition, their home range use is further restricted to the area immediate to their nesting site (Kurtz and Marchinton 1972).

Seasonal variations in habitat use are evident. Lacking sweat glands as a physiological means of thermoregulation, pigs employ behavioral mechanisms to regulate body temperatures. Thus, the sites most preferred by pigs, especially during the summer months, are areas with quality forage, readily accessible water, and copious amounts of cover (Hanson and Karstad 1959, Coblentz and Baber 1987, Dexter 1999), which is why they are often associated with riparian areas, bottomlands, and swamp-like habitats (Singer 1981, Sweeney and Sweeney 1982, Dexter 1998, Waithman et al. 1999, and others). Similarly, nocturnal foraging and other associated movements are often observed during periods of high temperatures (Hanson and Karstad 1959, Kurtz and Marchinton 1972, Duncan 1974, Caley 1997).

Densities of feral pigs are dependent on forage availability and hunting pressure. Density increases observed in populations in California between 1994 (0.7 pigs/km^2) and 1995 (3.8 pigs/km^2) were positively correlated with higher rainfall and increased forage (Sweitzer et al. 2000). In addition, the same study reported lower densities of animals in intensely hunted areas than in lightly or unhunted areas (Sweitzer et al. 2000).

Invasion rates vary from region to region, and invasions are often sporadic, depending on available resources (Singer 1981). In California, range constriction was observed during a drought, but when the drought ended, the range of the population expanded into previously occupied areas (Waithman et al. 1999). The establishment of new trails by solitary boars facilitates home range expansion, or invasion (Hanson and Karstad 1959). In Poland, 18.5% of a population at any time was emigrating or immigrating (Singer 1981), and in the oak woodlands of California's Sierra foothills, feral pigs expanded their home ranges by 5-8 km^2 per year (Barrett 1978).

Although animal material is consumed on a regular basis, the majority of the diet of feral pigs consists of plant material (Henry and Conley 1972, Coblentz and Baber 1987, Schley and Roper 2003). A study of European wild boar in Western Europe determined that at least one energy-rich food (e.g., mast, olives, cereal grains, agricultural crops, etc.) was always consumed, with corn being the most preferred agricultural crop, and mast preferred over all other vegetative food types when available (Schley and Roper 2003). Studies of feral pigs and wild boar in the United States gave similar results, with mast, fresh shoots and herbs, and roots being preferred in descending order, over all other food

types (Wood and Roarck 1980). In the southern Appalachians, plant foods, mainly acorns and hickory nuts, comprised 89% of the diet of a population of wild boar during autumn (Henry and Conley 1972). In California, acorn mast regularly comprised 70% of the diet of feral pigs on Santa Cruz Island when available, and often approached 100% (Peart and Patten 1992). In addition, a single adult is capable of consuming 1300 pounds of mast/year (Cox 1999). Other foods commonly found in the stomachs of feral pigs and wild boar include earthworms and other invertebrates (Hanson and Karstad 1959, Henry and Conley 1972, Coblentz and Baber 1987, Schley and Roper 2003), carrion (Hanson and Karstad 1959, Barrett 1978, Galdikas 1978), herpetofauna and small mammals (Bratton 1974, Singer 1976), groundnesting birds (Bratton 1974, Wood and Lynn 1977), and the young of larger mammals, such as lambs (Choquenot et al. 1997) and deer (Schley and Roper 2003).

PEST SIGNIFICANCE

Economic Impact

Economic Impacts in Other Regions: Feral pig presence has both negative and positive economic impacts, and thus, there are mixed sentiments regarding their continued existence. Feral pigs are listed as a game species in California, Florida, Hawaii, North Carolina, West Virginia, and Tennessee (Sweeney and Sweeney 1982), and are a source of state income and are valuable to recreational hunters. In California, an estimated 30,000 wild pigs are legally taken by hunters annually, who pay up to $750 for trophy wild pig hunts on private lands (Waithman et al. 1999). Although feral pigs are considered pests in Texas, hunters pay between $25 and $1000 to hunt pigs on private lands, with an average of $169 per hunt (Higginbotham 1995). The 100,000 feral pig hunters in Australia contribute $5-15 million to the economy annually, and trapping, killing, and exporting pigs to Europe as "wildschwein" provides rural Australian economies with an estimated $12 million (O'Brien and Saunders 1986).

Despite these seemingly substantial economic benefits, the costs associated with feral pigs are daunting. In Australia, for example, agricultural damage (i.e., to crops, lamb depredation, pasture, fences, and watering points) was estimated to be $80 million per year (O'Brien and Saunders 1986, Land Protection 2003), and control costs were estimated at $0.13 million annually (O'Brien and Saunders 1986), although this obviously was not enough funding to constitute a serious effort at control. Damage to sugar cane, wheat, corn and groundnuts by wild boars is common in Pakistan, and in 1989 was estimated to be 7.6 million US dollars (Brooks et al 1989). Estimates of control costs were not provided, although they were presumably substantial. Changing to diurnal irrigation practices increased water loss and waste, converting sugar cane crops to varieties with lower sugar content and hard rinds likely lowered profits, and guarding fields, building electric fences, and poison-baiting the fields were all activities that may or may not have proven effective, but did have costs associated with them.

In the United States, an estimated $800 million in agricultural damages is incurred annually, while as of 2000, less than $1 million was spent each year in control costs (Pimental et al. 2000). Hawaii alone spends approximately $100/year/pig removed on control, totaling $450,000 annually (Pimentel et al. 2000). In Great Smoky Mountain

National Park, more than $1 million was spent between 1986 and 1989 to remove 1,327 animals (Cox 1999). In 2001, the Midpeninsula Regional Open Space District board in California authorized $35,000 to hire a company to trap and kill 150 feral pigs in the central coast region of California, an average of $230 per pig (Softky 2001). Other pig trapping contracts, paying per pig (avg. $200/pig) or per hour ($500 to trap the last pig on Mt. Diablo, CA) have proven expensive, but effective (Barry 2004, *pers comm*).

Although unquantified, feral pigs are also implicated in disease transmission. Feral pigs are believed to be vectors for the transmission of diseases such as leptospirosis, tuberculosis, sparganosis, meliodoidosis, Q fever, pseudorabies, swine pox, hog cholera, and brucellosis to other wildife, livestock, and humans (Land Protection 2003). For example, in Australia, an outbreak of foot and mouth disease would cost the Australian community an estimated $3 billion in lost export trade, even if it were eradicated immediately (Land Protection 2003).

Potential Economic Impact in Oregon - Agriculture is a key portion of Oregon's economy, providing $3.6 billion of the state's revenue each year. Many of Oregon's agricultural commodities could potentially be hard-hit by feral pig activities. The nursery and greenhouse industry is the top agricultural commodity in Oregon, grossing $714 million in 2002 (see Appendix B). In addition, Oregon is the largest producer of grass seed in the world. Over 1 million acres of land are in hay production. Oregon produces the highest number of blackberries, hazelnuts, loganberries, black raspberries, potted florist azaleas, and Christmas trees in the nation. Many of these commodities require irrigation, or have fruits, nuts or rhizomes that would encourage land use and crop depredation by feral pigs.

Irrigated pastures and alluvial vegetation possess important nutritive value, especially during seasons of drought. Feral pigs grazing on irrigated pastures experienced greater growth and increased reproductive rates (Barrett 1978), and are cited as foraging in alluvial soils and meadowlands (Caley 1997, Rouys and Theuerkauf 2003). Corn was the preferred agricultural crop of wild boar in Western Europe (Schley and Roper 2003), but feral pigs and wild boar in the United States will readily invade grain crops (Caley 1997) and row crops (Wood and Lynn 1977). It was noted by Schley and Roper (2003) that "foods that are not generally consumed by wild boar can be eaten in relatively large quantities in specific localities where they are readily available," which implies a realistic potential to exploit any possible food source, especially those providing food for livestock or humans. In addition, consumption was responsible for only 5-10% of crop destruction in Western Europe; the remainder was a result of trampling (Schley and Roper 2003). Intensive damage to longleaf pine plantations in the southern United States (i.e., losses of up to 8,320 two-year old seedlings per acre, as well as regeneration losses through seed predation) has also been of economic importance in the past 50 years (Hanson and Karstad 1959, Wood and Lynn 1977).

Rooting adjacent to roadways can destabilize foundations, increasing maintenance costs (Wood and Lynn 1977). Similarly, rooting in pastures and fields has the potential to

damage farm machinery (Wood and Lynn 1977), increasing costs for time, machine repairs, and lost productivity.

In addition to the aforementioned predation on wildlife, feral pigs are detrimental to sheep production in Australia, constituting a considerable source of lamb mortality. Rates of lamb predation were shown to increase with feral pig density, and interestingly, the presence of alternate food sources did not affect these rates (Choquenot et al. 1997). Feral pigs have also been reported breaking into pens and breeding with domestic pigs (Hanson and Karstad 1959), exposing the domestic livestock to disease and parasites, and lowering, or even negating, the value of the domestic sow's litter.

Control and monitoring costs can be expected to grow if range expansion of feral pigs occurs in Oregon. The statutes that have designated pigs as predatory wildlife animals (ORS 610.002 and 496.004) enhance public awareness and the ease at which the public can participate in control efforts. However, the risk of range expansion and further establishment of feral pigs is high, as is the potential for escalating control and damage costs.

Environmental Impact:

Rooting Effects – Feral pigs and wild boar spend a considerable amount of energy rooting (or grubbing) beneath the soil surface in search of bulbs, tubers, roots, and earthworms and other invertebrate food items. Rooting activities typically occur in the uppermost 25 cm of the soil layer (Lacki and Lancia 1983) mixing the surface organic soil horizons (A_1 and A_2) until they are no longer distinguishable from each other (Singer 1981, Lacki and Lancia 1983), and significantly reducing the litter layer (Bratton 1975). This, in turn, increases the natural decomposition rate of organic substances in the soil, increases nutrient cycling and acidity, and decreases the amount of nutrients available in the system (Wood and Lynn 1977, Singer 1981, Lacki and Lancia 1983, Singer et al. 1984, Stone 1985). These effects were typically associated with negative impacts to the community, although in Europe, the increased nutrient cycling resulting from wild boar rooting was believed to enhance pine growth in poor soils (Lacki and Lancia 1983), and in the southeastern United States, elongation of beech shoots was evident in areas of increased exposure to pig rooting (Lacki and Lancia 1986).

Because rooting disrupts and loosens the soil surface, it contributes to erosion, soil compaction, and subsequent siltation in streams (Bratton 1974, Bratton 1975, Howe and Bratton 1975, Singer 1976, Wood and Lynn 1977). In addition, rooting negatively affects herpetofauna and invertebrate communities by essentially removing their habitat (Bratton 1974). Rooting and wallowing near streams is detrimental to water quality and stream environments, increasing siltation and removing streamside vegetation (Howe and Bratton 1975, Singer 1981).

Rooting compromises understory complexity (Howe and Bratton 1975), and in combination with trampling, presents an effective barrier to regeneration, with seedling density decreasing with increasing activity (Peart and Patten 1992). Rooting accounted for greater than 35-65% of the soil disturbance in parts of California's oak woodlands

where densities were greater than two pigs/km^2, resulting in significant declines in aboveground productivity (Sweitzer and Van Vuren 2002). In the Great Smoky Mountains National Park, the understory in areas inhabited by feral pigs or wild boars had been reduced 87%, or was only 2-15% as dense as expected, while areas uninhabited by feral pigs contained 80-110% the expected understory coverage (Singer 1981). The same study observed that the amount of bare ground increased 88%, while the litter layer was reduced 36% (Singer 1981).

The effects of rooting are most severe in high density situations and in sensitive plant communities (Singer 1981). Rooting has been shown to significantly reduce already low levels of regeneration of oaks in California (Sweitzer and Van Vuren 2002), and longleaf pine regeneration in the southern forests (Hanson and Karstad 1959, Wood and Lynn 1977, Wood and Roarck 1980). In fact, rooting and seed consumption by feral pigs was blamed for the loss of 8,320 two year-old pine seedlings per acre, with up to 200-400 seedlings per day being killed (Hanson and Karstad 1959). Rooting affects plant species composition (Sweitzer et al. 2002), favoring perennials and invasives (Stone 1985, Kotanen 1994, Kotanen 1997) and reducing species diversity (Singer 1976). Native species, especially those with starchy bulbs, tubers, rhizomes, and corms were especially at risk (Bratton 1975, Howe and Bratton 1976), and one author studying feral pig rooting activity and subsequent community modification in California suggested that in regions feral pigs have inhabited for at least 100 years, any sensitive species may have already been lost, and current studies only examine an already altered community (Kotanen 1994).

Competition – Competition with native wildlife for food resources, especially mast, is a valid concern given the rates of consumption of which feral pigs and wild boar are capable (i.e., 1300 lbs mast/year per adult). Typical competitors for mast in the southeastern United States include black bear (*Ursus americanus*), white-tailed deer (*Odocoileus virginianus*), turkey (*Meleagris galopavo*) and gray squirrels (*Sciurus carolinensis*) (Henry and Conley 1972, Bratton 1974, Wood and Lynn 1977, Wood and Roark 1980). The level of competition is dependent upon the quality and quantity of the mast crop, being the most intense when the mast crop is poor (Henry and Conley 1972, Wood and Roarck 1980).

Predation – Feral pigs ingest mostly plant material, but animal material is common as well. They are known to predate the nests of groundnesting birds (Hanson and Karstad 1959, Henry and Conley 1972, Bratton 1974, Wood and Lynn 1977), and in Switzerland and Luxembourg, increases in wild boar populations were correlated with decreases in woodcock (*Scolopax rusticola*) populations (Schley and Roper 2003). Feral pigs have been known to ingest reptiles and amphibians (Bratton 1974, Coblentz and Baber 1987, Schley and Roper 2003), small mammals, such as voles (*Microtus* spp.) and shrews (*Blarina* spp.) in the southeastern United States, and larger animals in western Europe: hares (*Lepus* spp.), rabbits (*Oryctolagus cuniculus*), roe deer fawns (*Capreolus capreolus*), and pheasants (*Phasianus colchicus*) (Schley and Roper 2003). In the Galapagos, feral pigs prey on the eggs and hatchlings of the green sea turtle (*Chelonia mydas*), the giant tortoise (*Geochene elephantopus*), and dark-rumped petrels

(*Pterodroma phaeopygia*), and are believed to have assisted in the extinction of land iguanas (*Conolophys subcristatus*) from Santiago Island (Coblentz and Baber 1987).

Potential Impacts in Oregon - Although there have not been any studies of the impacts of feral pigs in Oregon, their presence undoubtedly affects understory cover, soil qualities, water and stream quality, and exotic plant invasion in a manner similar to those described from other regions, altering nutrient cycling pathways and successional patterns. The Oregon white oak (*Q. garryana*) is found in low elevations throughout the western part of the state and areas in southern and southwestern Oregon near known feral pig populations (Martinez 1996). Oak savannah habitat is slowly disappearing in Oregon, and invasion of savannah regions by feral pigs could seriously diminish this habitat of concern. Native wildlife dependent on mast of the Oregon white oak and the canyon live oak (*Q. agrifola*) in southern Oregon would be, and perhaps already are, suffering the effects of competition for mast with feral pigs, and are required to locate supplemental food sources during the mast season.

DETECTION AND IDENTIFICATION

Feral pigs are typically intermediate in size between domestic hogs and the European wild boar. They tend to be dark, either black or brown in color, but mottling or spotting is not uncommon, and occasionally they will be white. They tend to have a lean, "gamey" look that is different from domestic hogs, with longer tusks and coarser coats, although there is considerable variation between individuals (Sweeney and Sweeney 1982). Because their activity is often crepuscular or nocturnal, feral pigs may not be seen, but if they are inhabiting or foraging in an area, there should be ample evidence of their presence. Rooting and foraging activity often occur in moist or irrigated soil, simulating the effect of a rototiller in a garden churning up the soil. Wallows appear as distinct oval-shaped mud holes utilized for thermoregulation, and rubbing places can be seen low on the trunks of nearby trees. In instances in which feral pigs have broken through fencing, hairs may be present in the wire.

MEANS OF MOVEMENT AND DISPERSAL

Feral pigs have demonstrated a remarkable ability for range expansion (Waithman et al. 1999). Home ranges tend to be smaller in regions and seasons where resources are abundant, but expand in areas or seasons where resources are limited (Singer 1981). They prefer habitat types that provide ample cover and water, but are quite capable of adapting to harsher environments. Adult females and subadults travel in groups of eight or less; boars are usually solitary, creating trails that are used as main thoroughfares or highways through their home range. The ranges of boars are typically larger, and as they expand and create trails into new territories, the female groups eventually begin utilizing them as well, slowly expanding the range of a population that, under optimal circumstances, is capable of doubling every four months (Katahira et al. 1993).

CRITICAL INFORMATION NEEDS

The most important piece of information relating to feral pig management that is missing in Oregon is actual quantified estimates of population sizes, densities, and ranges of the known populations. Their presence has been affirmed, but actual numbers have yet to be

determined. Until this is quantified, it will be difficult to obtain solid cost estimates for eradication.

DISCUSSION

Feral pigs are a plague on the environment, ripping up riparian meadows, denuding understory vegetation, increasing soil erosion, compaction, and siltation, and competing with native wildlife for resources. In short, they alter ecosystem function and processes in both predictable and unpredictable ways. Although it is difficult to place a dollar value on environmental damages, cost estimates of economic damages incurred because of feral pigs are illustrative of the immense nuisance that feral pigs present. They have enormous negative economic potential; in the US alone, feral pigs are estimated to cause $800 million in agricultural damages annually, although less than $1 million is spent on control (Pimentel et al. 2000).

Approximately $3.6 billion of Oregon's economy is dependant upon agricultural commodities. Feral pigs have been observed foraging in agricultural fields when habitat quality and associated forage availability is low, as in late summer and fall in semi-arid regions (Baber and Coblentz 1986). They are known to depredate agricultural crops during other seasons as well (see Appendix B), often causing thousands of dollars' worth of damage. For example, an incident that occurred in a single night in 1972, a herd of feral pigs were responsible for $25,000 damage to a sorghum crop in Australia (Hone et al. 1980).

An integral part of any management or eradication program is an estimate of the current population size. In the past, these have typically been generated by mark-recapture studies, which are both labor-intensive and expensive, and are often limited by recapture difficulties, especially with respect to adults (Baber and Coblentz 1986). Sweitzer et al. (2000) conducted a modified mark-recapture study using baited camera stations and found that they were able to use photographs to identify individual pigs and obtain minimum population estimates that were similar to mark-recapture estimates. In their study, Sweitzer et al. (2000) determined that the costs associated with the camera-sighting method were lower than that of traditional mark-recapture programs. The estimated costs of capturing and tagging 20 wild pigs at one site with 3 traps in a traditional mark-recapture project, including an estimated 10-18 days/site for surveying, construction and setup, and capturing and processing animals was estimated to be between $3,681 and $5,494. Initial costs, including the purchase of 4 camera systems ($550 each), for sighting wild pigs at a site for the camera-sighting method were between $3,942 and $4,539. The amount of field work required was reduced by as many as 5 days with the camera-sighting method, repair costs were relatively small (<$50/system), and once the initial purchase of the camera systems were made, total costs for the project decreased even more. The cost estimates presented here are dated to 1995, and are most likely lower than they would be today. Current (2004) costs of Trailmaster® camera systems similar to that used in Sweitzer et al. (2000) are between $650 and $750 each.

Costs of control efforts vary considerably, and are dependent on the densities of feral pig populations and the structure and complexity of the invaded habitat, with eradication cost

and difficulty increasing with increasing vegetative density. Populations subject to hunting pressure have been shown to have lower densities (Sweitzer et al. 2000), and encouraging hunting pressure on lands inhabited by feral pigs is certainly a plausible management action, and has been implemented through the establishment of a temporary Feral Swine Control Area in Crook County by Oregon Department of Agriculture (1999). Trapping, poison baiting, and shooting have been used as control methods, with a combination of poison baiting and shooting being most successful (Coblentz and Baber 1987). Trapping is reportedly the most expensive and inefficient method of control (Coblentz and Baber 1987), but recent pig control contracts in California have utilized this method, at costs ranging from $200 to $500 per pig, likely because of potential secondary non-target poisoning associated with poison baiting (McIlroy 1983, O'Brien et al. 1986). However, despite the high costs, the documented trapping efforts have been successful in eradicating pigs from the target areas. This kind of success, although costly, serves to protect the integrity of existing communities, while allowing damaged systems to recover, thereby presenting benefits that are difficult to assign dollar values to, but are nonetheless highly valuable.

Given the current knowledge of feral pig distribution and numbers in Oregon, it is probable that the existing populations could be eradicated with reasonable costs and efforts. However, a parallel probability exists that these populations could grow and expand in manner similar to populations in California, so that complete state-wide eradication efforts would be too costly to attempt, and would offer little or no hope for long-term success. Fortunately, the outlook for control of Oregon's feral pig populations is not yet bleak. Oregon's statutes designating feral pigs as predatory wildlife, that anyone with a current hunting license can legally take on public land, or on private land with the landowner's permission, potentially gives us the advantage on controlling or eradicating this invasive generalist mammal. However, without enhancing public knowledge, restricting imports of all wild pigs for trophy hunting ranches, and somehow limiting livestock escapes, feral pigs will always be a part of Oregon's biotic landscape, albeit on a small scale.

BIBLIOGRAPHY

Baber, D.W. and B.E. Coblentz. 1986. Density, home range, habitat use, and reproduction in feral pigs on Santa Catalina Island. Journal of Mammalogy, 67(3): 512-525.

Baber, D.W. and B.E. Coblentz. 1987. Diet, nutrition, and conception in feral pigs on Santa Catalina Island. Journal of Wildlife Management, 51(2): 306-317.

Barrett, R.H. 1978. The feral hog on the Dye Creek Ranch, California. Hilgardia, 46(9): 283-355.

Barry, S. 11 May 2004. Natural Resource Advisor, Santa Clara County, CA. Personal communication.

Bratton, S.P. 1974. An integrated ecological approach to the management of European wild boar (*Sus scrofa*) in Great Smoky Mountains National Park: Management Report No. 3. National Parks Service, 49 pp.

Bratton, S.P. 1975. The effect of the European wild boar, *Sus scrofa*, on gray beech forest in the Great Smoky Mountains. Ecology, 56(6): 1356-1366.

Brooks, J.E., E. Ahmad, I. Hussain, and M.N. Khan. 1989. The agricultural importance of the wild boar (*Sus scrofa* L.) in Pakistan. Tropical Pest Management, 35(3): 278-281.

Cabon, K. 1958. Das Massensterben von Wildschweinen im Naturstaatspark von Bialowiezc im Winter 1955/56. Acta Theriol., 2: 71-82.

Caley, P. 1997. Movements, activity patterns and habitat use of feral pigs (*Sus scrofa*) in a tropical habitat. Wildlife Research, 24(1): 77-87.

Choquenot, D., B. Lukins, and G. Curran. 1997. Assessing lamb predation by feral pigs in Australia's semi-arid rangelands. Journal of Applied Ecology, 34: 1445-1454.

Coblentz, B.E. and D.W. Baber. 1987. Biology and control of feral pigs on Isla Santiago, Galapagos, Ecuador. Journal of Applied Ecology, 24: 403-418.

Cox, G.W. 1999. Alien Species in North America and Hawaii: Impacts on natural ecosystems. Island Press, Washington, D.C. and Corelo, California.

Dexter, N. 1998. The influence of pasture distribution and temperature on habitat selection by feral pigs in a semi-arid environment. Wildlife Research, 25(5): 547-559.

Dexter, N. 1999. The influence of pasture distribution, temperature and sex on home-range size of feral pigs in a semi-arid environment. Wildlife Research, 26(6): 755-762.

Duncan, R.W. 1974. Reproductive biology of the European wild hog (*Sus scrofa*) in the Great Smoky Mountains National Park. M.S. Thesis, University of Tennessee, 69 pp.

Ferry, B. 26 April 2004. Oregon Department of Fish and Wildlife, Prineville Office. Personal communication.

Galdikas, B.M. 1978. Orangutan death and scavenging by pigs. Science, 200(7): 68-70

Hanson, R.P. and L. Karstad. 1959. Feral swine in the Southeastern United States. Journal of Wildlife Management, 23(1):64-74.

Henry, V.G. 1968. Length of estrous cycle and gestation in European wild hogs. Journal of Wildlife Management, 32(2): 406-408.

Henry, V.G. and R.H. Conley. 1972. Fall foods of European wild hogs in the Southern Appalachians. Journal of Wildlife Management, 36(3): 854-860.

Higgenbotham, B. 1995. Feral hogs: the good, the bad or the ugly? http://agnews.tamu.edu/stories/WFSC/feralhog.htm.

Hone, J., J. O'Grady, and H. Pedersen. 1980. Decisions in the control of feral pig damage. AGbulletin 5, Department of Agriculture New South Wales, 22 pp.

Howe, T.D. and S.P. Bratton. 1976. Winter rooting activity of the European wild boar in the Great Smoky Mountains National Park. Castanea, 41: 256-264.

Huffman, R. 28 April 2004. Oregon Department of Agriculture, Animal Health and Identification Division. Personal communication.

Katahira, L.K., L. Finnegan, and C.P. Stone. 1993. Eradicating feral pigs in montane mesic habitat at Hawaii Volcanoes National Park. Wildlife Society Bulletin. 21: 269-274.

Kotanen, P.M. 1994. Effects of feral pigs on grasslands. Fremontia, 22(2): 14-17.

Kotanen, P.M. 1997. Effects of experimental soil disturbance on revegetation by natives and exotics in coastal California meadows. Journal of Applied Ecology, 34: 631-644.

Kozlo, P.G. 1970. Faktory, opredelyayuschchie dinamiku chislennosti Kabana (*Sus scrofa*) V Belovezhskoĭ Pushche. Zool. Zh., 49: 422-430.

Kurtz, J.C. and R.L. Marchinton. 1972. Radiotelemetry studies of feral hogs in South Carolina. Journal of Wildlife Management, 36(4): 1240-1248.

Lacki, M.J. and R.A. Lancia. 1983. Changes in soil properties of forests rooted by wild boar. Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies, 37: 228-236.

Lacki, M.J. and R.A. Lancia. 1986. Effects of wild pigs on beech growth in Great Smoky Mountains National Park. Journal of Wildlife Management, 50(4): 655-659.

Land Protection. 2003. Feral pigs in Queensland: distribution, ecology, and impact. Land Protection, Queensland Government, Natural Resources and Mines, 4 pp.

Lasley, J.F. 1968. Estrous cycles. Pp. 81-97 *In*: E.S.E. Hafez (Ed.), Reproduction in farm animals (2nd Ed.). Lea and Febiger, Philadelphia, Pennsylvania.

Laycock, G. 1966. The Alien Animals: The story of imported wildlife. The Natural History Press, Garden City, New York.

Mansfield, T.M. 1986. Wild pigs can be problems. Outdoor California, 47: 23-24.

Matschke, G.H. 1964. The influence of oak mast on European wild hog reproduction. Proc. 18th Annu. Conf. SE Game and Fish Commiss., 18: 35-39.

Martinez, P. 1996. Oregon white oak series. Siskiyou National Forest website. http://www.fs.fed.us/r6/siskiyou/QUGA400.PDF

Mayer, J.J. and I.L. Brisbin, Jr. 1991. Wild Pigs of the United States: Their history,morphology, and current status. University of Georgia Press, Athens.

McIlroy, J.C. 1983. The sensitivity of Australian animals to 1080 poison. V. The sensitivity of feral pigs *Sus scrofa* to 1080 and its implications for poisoning campaigns. Australian Wildlife Research, 10: 139-148.

O'Brien, R.E. Kleba, J.A. Bleck, and P.J. Baker. 1986. Vomiting by feral pigs after 1080 intoxication: nontarget hazard and influence of anti-emetics. Wildlife Society Bulletin, 14: 425-432.

O'Brien, P.H. and G.R. Saunders. 1986. Socio-economic and biological impact of the feral pig in New South Wales: an overview and alternate management plan. The Australian Rangeland Society, 4th Biennial Conference, Armidale. Working papers, 200-203.

Oregon Department of Agriculture. 21 December 1999. Control area order for feral swine in portions of Crook County, Oregon.

Peart, D. and D.T. Patten. 1992. Feral pig activity associated with coast live oak regeneration on Santa Cruz Island, California. In: Ecology and Management of Oak and Associated Woodlands: Perspectives in the Southwestern United States and Northern Mexico. (Ffolliott, P.F. et al., tech. coords.), Symp. April 27-30, 1992, Sierra Vista. USDA Forest Service Gen. Tech. Rep. RM-218: 162-164.

Pimentel, D., L.Lach, R. Zuniga, D. Morrison. 2000. Environmental and economic costs of non-indigenous species in the United States. Bioscience, 50(1): 53-65.

Pine , D.S. and G.L. Gerdes. 1973. Wild pigs in Monterey County, California. California Fish

and Game, 59: 126-137.

Rouys, S. and J. Theuerkauf. 2003. Factors determining the distribution of introduced mammals in nature reserves of the southern province, New Caledonia. Wildlife Research, 30(2): 187-191.

Schley, L. and T.J. Roper. 2003. Diet of wild boar, *Sus scrofa*, in Western Europe, with particular reference to consumption of agricultural crops. Mammal Review, 33(1): 43-56.

Singer, F.J. 1976. The European wild boar project, Great Smoky Mountains National Park: Problem analysis and proposed research. National Park Service SE Regional Uplands Research Laboratory GSMNP, 66 pp.

Singer, F.J. 1981. Wild pig populations in the national parks. Environmental Management, 5(3): 263-270.

Singer, F.J., W.T. Swank, and E.E.C. Clebsch. 1984. Effects of wild pig rooting in a deciduous forest. Journal of Wildlife Management, 48: 464-473.

Softky, M. 07 March 2001. Open space district traps, kills wild pigs. The *Almanac*. http://www.almanacnews.com/morgue/2001/2001_03_07.pigs.html

Stone, C.P. 1985. Alien animals in Hawai'i's native ecosystems: toward controlling the adverse effects of introduced vertebrates. In: Stone, C.P. and J.M. Scott, eds. 1985. Hawai'i's Terrestrial Ecosystems: preservation and management. Cooperative National Park Resources Studies Unit, University of Hawaii, Honolulu, HI.

Sweeney, J.M. 1970. Preliminary investigations of a feral hog (*Sus scrofa*) population on the Savannah River Plant, South Carolina. M.S. Thesis, University of Georgia. 58 pp.

Sweeney, J.M. and J.R. Sweeney. 1982. Feral hog (*Sus scrofa*). In: Chapman, J.A. and G.A. Feldhamer, eds. 1982. Wild Mammals of North America: biology, management, economics. The Johns Hopkins University Press, Baltimore, MD.

Sweitzer, R.A., D.Van Vuren, I.A. Gardner, W.M. Boyce, and J.D. Waithman. 2000. Estimating sizes of wild pig populations in the north and central coast regions of California. Journal of Wildlife Management, 64(2): 531-543.

Sweitzer, R.A. and D.H. Van Vuren. 2002. Rooting and foraging effects of wild pigs on tree regeneration and acorn survival in California's oak woodlands ecosystems. USDA Forest Service Gen. Tech. Rep. PSW-GTR-184.

Waithman, J.D., R.A. Sweitzer, D. Van Vuren, J.D. Drew, A.J. Brinkhaus, I.A. Gardner, W.M.

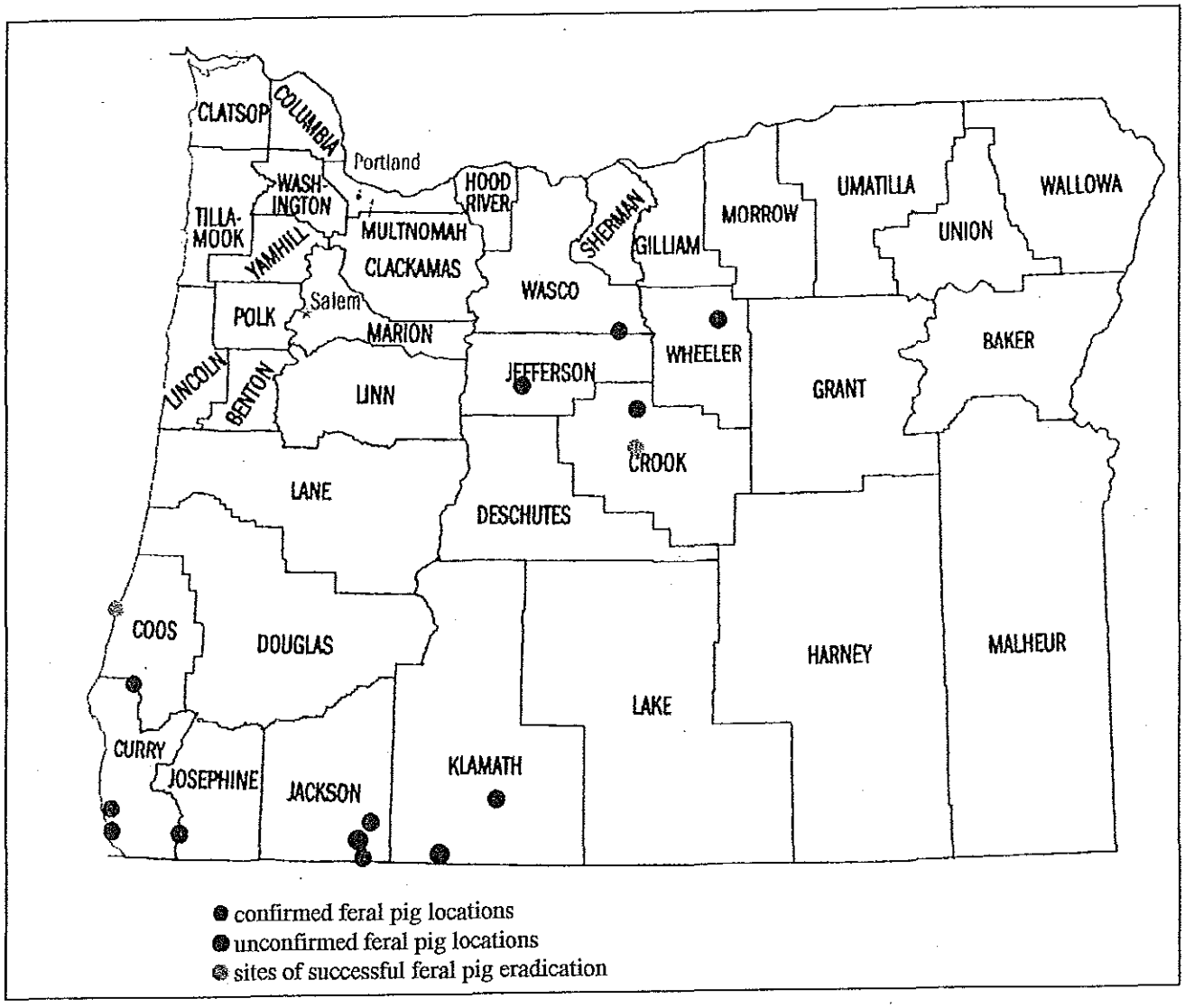
Boyce. 1999. Range expansion, population sizes, and management of wild pigs in California. Journal of Wildlife Management, 63(1): 298-308.

Wood, G.W. and R.E. Brenneman. 1980. Feral hog movements and habitat use in coastal South Carolina. Journal of Wildlife Management, 44(2): 420-427.

Wood, G.W. and T.E. Lynn, Jr. 1977. Wild hogs in Southern forests. Southern Journal of Applied Forestry, 1(2): 6pp.

Wood, G.W. and D.N. Roarck. 1980. Food habits of feral hogs in Coastal South Carolina. Journal of Wildlife Management, 44(2): 506-511.

Appendix A



Map of known locations of feral pigs in Oregon as of June 2004.

Appendix B

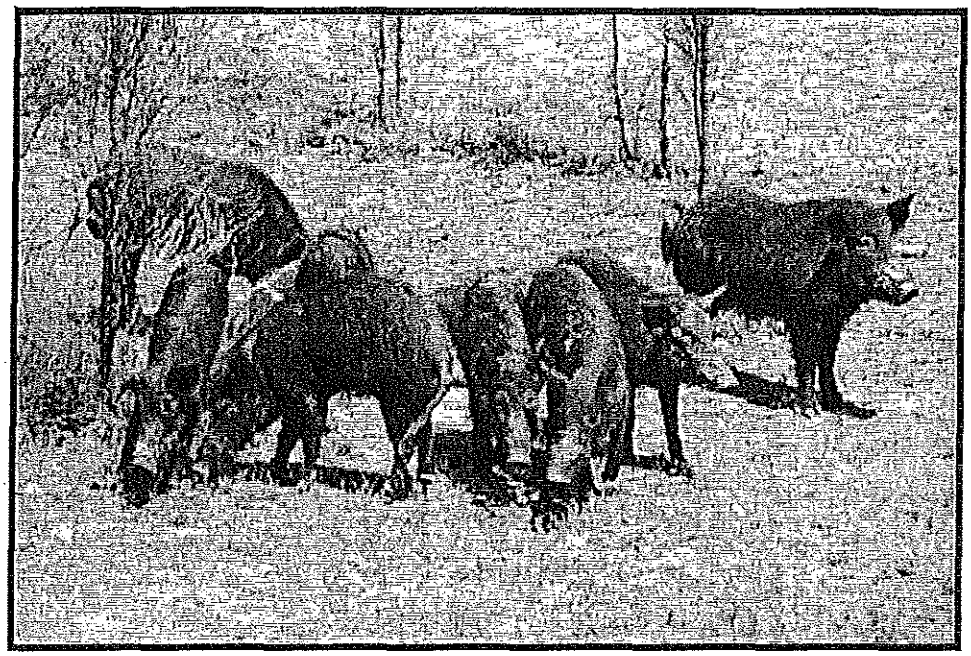
Appendix B. Top 40 agricultural commodities in Oregon in 2002. (*Modified from "Oregon Agriculture: Facts and Figures." http://www.oda.state.or.us/information/pdf/statsfacts.pdf*

Agricultural Commodities (1-20)	Value ($)	Agricultural Commodities (21-40)	Value ($)
*†Greenhouse & nursery products[1]	714,026,000	Crab landings	20,654,000
*†Cattle & calves[1]	473,806,000	*Hops	20,103,000
*†Hay[1]	357,729,000	*Blueberries	20,075,000
*Grass seed	277,574,000	*Hazelnuts	18,009,000
*Milk	273,652,000	*Apples	17,609,000
*Christmas trees	160,190,000	*Strawberries	16,613,000
*†Wheat[2,3]	135,565,000	*†Sheep & lambs[4,3,5]	14,550,000
*Potatoes[3]	134,908,000	Groundfish landings	14,229,000
*Onions	80,974,000	*Vegetable & flower seed	13,106,000
*Pears	68,004,000	*†Hay silage[1]	11,923,000
*Eggs	43,947,000	*Garlic	11,877,000
*†Wine grapes[1]	32,340,000	*Squash & pumpkins	11,761,000
*†Sweet corn [1,2,3]	28,782,000	Shrimp landings	11,340,000
*Mint for oil	28,509,000	*Sugarbeets	11,186,000
*Cherries	28,169,000	*Cranberries	10,543,000
*†Grass & grain straw[1]	26,568,000	*†Hogs[1]	9,027,000
*†Corn, grain & silage field [1,2]	25,637,000	*†Barley[3]	8,880,000
*†Horses & mules[1]	24,043,000	*Tomatoes	8,704,000
*Blackberries	21,871,000	*Raspberries	8,691,000
*Snap beans	20,951,000	*†Oats [1,3,6]	7,546,000

*Commodities that could potentially incur depredation by feral pigs
†Commodities that have incurred depredation in other regions

[1] Resource losses reported to California's Wildlife Services program during the fiscal year of 2002.
[2] Brooks, et al. 1989
[3] Hone, et al. 1980
[4] Choquenot, et al. 1997
[5] O'Brien and Saunders 1986
[6] Baber and Coblentz 1986

Feral Swine Action Plan for Oregon



Portland State
UNIVERSITY

Center for Lakes and Reservoirs
Environmental Science & Resources

Feral Swine Action Plan for Oregon

Prepared for the
Oregon Invasive Species Council

by
Arick Rouhe and Mark Sytsma
Environmental Science and Resources

January 2007

Feral Swine Action Plan

Executive Summary

Feral swine are defined as free roaming animals of the genus *Sus* that are not being held under domestic management or confinement. Swine have spread from Europe and Russia to habitats around the world via human introduction. Currently, feral swine populations are established on every continent except Antarctica. Unlike other large mammal invaders, swine have a high reproductive capacity and are omnivorous, which allows for a quick assimilation into most habitats. Once a breeding population is established in an area, the population can quickly increase and negatively impact the ecosystem. A successful invasion of feral swine is difficult, and sometimes impossible, to reverse.

A feral swine pest risk assessment for Oregon, released in 2004, designated feral swine as a very high-risk species due to high potential for establishment, environmental and economic impacts, and disease transmission to wildlife, livestock and humans. Economic impacts on ecosystems and disease transmission to wildlife are difficult to assess, but restoration of ecosystems and losses to agriculture and livestock have been estimated to exceed US$800 million in the United States each year. Environmental impacts include facilitation of noxious weed invasions, shifts in dominant plant species, reduction of forest regeneration, and soil erosion. Facilitation of noxious weeds and erosion due to feral swine rooting are documented in Oregon. Feral swine in Oregon have not been implicated in disease transmission to humans, but the recent *E. coli* outbreak from spinach grown on a California farm that caused three deaths has been genetically traced to feral swine excrement deposited in spinach fields.

The feral swine population in Oregon is currently small and dispersed. Few disturbances have been documented but state and federal biologists report regular occurrence of disturbances due to feral swine. Actions to prevent the effects of an invasion fall into three categories: management, control or eradication. Of the three categories, only eradication efforts have successfully slowed or reversed the effects of swine invasions. Case studies from California, Australia, Hawaii, the Galapagos Islands and the Channel Islands off the coast of California show that management and control

efforts, while effective in the short term, have not successfully kept small feral swine populations from increasing to levels that are unmanageable and uncontrollable.

A four-year feral swine eradication plan is proposed. The Plan includes recommended legislative changes to facilitate eradication, outreach and education, population assessment, rapid response, and eradication elements. A 0.5 FTE position is required at the Oregon Department of Fish and Wildlife to implement the plan.

Specifically, the Plan includes:

- Source Control (Task 1)
  - Legislation to halt the release or escape of domestic swine
  - Legislation to facilitate the removal of feral swine from private and public land
  - Ear tags for all domestic swine for identification of feral swine and escaped domestic swine
- Population Assessment and Public Education (Task 2)
  - Survey to estimate population locations and size
  - A database of locations and control efforts
  - Education of public to facilitate citizen reports of swine disturbances
- Eradication (Task 3)
  - Planned eradication of the known populations
  - Rapid response system for swift removal of new sightings and introductions of swine
- Monitoring and Assessment (Task 4)
  - Monitoring of each eradication area for two years.
  - Lack of disturbance after two years will lead to a designation of eradication success for each site.

Eradication of feral swine in Oregon is estimated to require a four-year, $1.29 million effort. Follow-up control of new releases and escapes will require a maintenance effort estimated at less than $50,000 per year (excluding contingency funds for emergency response). These costs are small relative to the value of the $3.6 billion Oregon agriculture and livestock industries and the investment Oregon has made in riparian restoration efforts. Sustained control of feral swine in Oregon will require a long-term commitment that will include annual domestic swine marking, education, and monitoring.

Table of Contents

Acknowledgements

Brian Ferry, Mark Vargas and Clayton Barber from the Oregon Department of Fish and Wildlife provided background and current information on swine in Oregon. Roger Huffman from the Oregon Department of Agriculture provided the details of the Post and Antelope eradications. Tuch Koreiva from the Oregon Department of Forestry provided a history of actions taken in Coos and Curry counties for the Oregon case study. Kev Alexanian, of the Crook County Weed Control, provided details of invasive weeds in Oregon for the Oregon case study. Rob Klinger from the University of California at Davis provided the description of swine effects on island habitat for the Channel island case study. Justin Stevenson, USDA/APHIS/Wildlife Services, provided insight based on his knowledge of swine habit, behavior, and locations of burgeoning populations in Oregon. Martin Nugent and Dan Hilburn participated in initial meetings on this response plan and provided valuable comments and recommendations for the action plan. Jim Gores gave this plan his overall support and provided detailed recommendations. Robyn Draheim contributed research support and invasive species management expertise.

Since its inception, the Oregon Invasive Species Council has maintained steadfast support for feral swine management in Oregon; the Council funded preparation of the risk assessment that set the stage for this Plan. Funding for preparation of this plan was provided by the Center for Lakes and Reservoirs at Portland State University.

Feral Swine Action Plan for Oregon

Introduction

Feral mammals cause greater ecological damage than any other introduced, terrestrial taxonomic group due to their size and energy consumption (Ebenhard 1988), and feral swine are perhaps one of the most harmful mammalian species worldwide (Long 2003). Feral swine are a recognized threat to Oregon. The Oregon Invasive Species Council (OISC) placed feral swine on the 100 Most Dangerous Invaders list because of their impacts on ecosystem processes and their history of invasion around the world. Feral swine were classified as very high-risk species in a pest risk assessment developed for the OISC (Coblentz and Bouska 2004). The risk assessment concluded that the threat of destruction to natural habitat, agriculture, and livestock in Oregon is imminent without action. Currently, feral swine populations in Oregon are in isolated areas that are far from intensive agriculture and livestock production, thus Oregon has not experienced the deleterious effects of feral swine populations that plague other areas of the world with similar habitat (Barber 2006, pers com). This feral swine management plan was developed to prevent severe ecological, economic, and human health impacts in Oregon.

Feral Swine Lineage

Sus scrofa scrofa is the common ancestor of the true swine (boars, feral swine and domesticated swine) that are distributed worldwide (Choquenot *et al.* 1996, Mayer and Brisbin 1991, Sweeney and Sweeney 1982, Nowak 1991). Fossil evidence of *S. scrofa scrofa* has been found in Ethiopia, United Kingdom, Norway, Denmark, Siberia and isolated sections of eastern Asia (Mayer and Brisbin 1991). In more recent times the natural range of *S. scrofa scrofa* included Europe, most of Asia and the Northwest coast of Africa (Mayer and Brisbin 1991). The modern domesticated swine, *Sus scrofa domesticus,* was developed by selective breeding of *S. scrofa scrofa* by humans in Europe and Asia (Sweeney and Sweeney 1982, Mayer and Brisbin 1991, Choquenot *et al.* 1996). Wild boars are swine that have descended directly from *S. scrofa scrofa* and have no history of domestication in their ancestry. Feral swine are wild-living animals of the genus *Sus* with domestic ancestry; these include recently escaped or released swine and swine from populations that have been wild for more than one generation. Hybrid populations

consist of individuals with a recent ancestry that includes *S. scrofa domesticus* and *S. scrofa scrofa*. Most wild or free-living populations of swine are described as *S. scrofa* ssp. because they can include Eurasian wild boar, feral swine, or hybrids (Mayer and Brisbin 1991).

The lineage of feral swine determines their aggressiveness. Populations closely related to wild boars are more aggressive toward humans and cause more destruction to habitat during disturbances than populations descended directly from domestic swine (Koreiva 2006, pers com). Hybridization of swine populations due to interbreeding has made it difficult to determine the origin of many swine populations (Oliver and Brisbin 1993, Sweeney and Sweeney 1982); but a few, general characteristics can be used as clues to lineage. Feral swine descended from wild boars tend to have large body sizes (up to 200 kg), long skulls, mottled coloration, and thick hair that is curly and wool-like on the underside. Descendents of domestic swine have smaller body sizes, short and broad skulls, black coloration, and short but straight hair (Mayer and Brisbin 1991).

History of Feral Swine Dispersal and Invasion

S. scrofa expansion from Eurasia began with introduction of swine into the islands of the Pacific as a human food source (Tomich 1996). The expansion reached Melanesia and Polynesia about 3500 years ago (Long 2003). Swine were introduced by Polynesians to Hawaii around 1000 A.D. (Oliver and Brisban 1993, Mayer and Brisbin 1991, Nowak 1991, Tomich 1969). The Polynesian-introduced swine were small compared to the *S. scrofa* subspecies that the European explorers introduced to islands of the Pacific in the 1700's and 1800's. The European-introduced swine included *S. scrofa scrofa* and well as *S. scrofa domesticus* (Ellis 1917). Because *S. scrofa scrofa* is more aggressive than *S. scrofa domesticus*, the Polynesian-introduced domestic swine have all but disappeared from the larger gene pool on Pacific islands and most feral swine on Pacific islands are indistinguishable from *S. scrofa scrofa* (Kramer 1971, Billy 2006 pers com).

European distribution of *S. scrofa* in North America began immediately after European discovery of the New World (Clarke and Dzieciolowski 1991). Columbus introduced domestic swine to the West Indies in 1493 and DeSoto introduced them to Florida in 1593 (Sweeney and Sweeney 1982). The first populations of wild *S. scrofa* in North America began during the 1500's in the southeastern United States as escaped domestic swine from Spanish colonists

(Long 2003). American Indians also assisted swine naturalization by acquiring animals and allowing them to roam free (Hanson and Karstad 1959).

Swine traveled to western North America with European settlers; by 1769 Spanish settlers reached California with domestic swine (Barrett 1977, Van Vuren 1984). It was common practice among Spanish settlements of that time to release swine to forage in woodlands. It is very likely that some of them escaped and became California's feral swine population (Groves and Di Castri 1991). Currently in the United States, dense populations of feral swine occur in the Southwest, Midwest, and California (Figure 1).

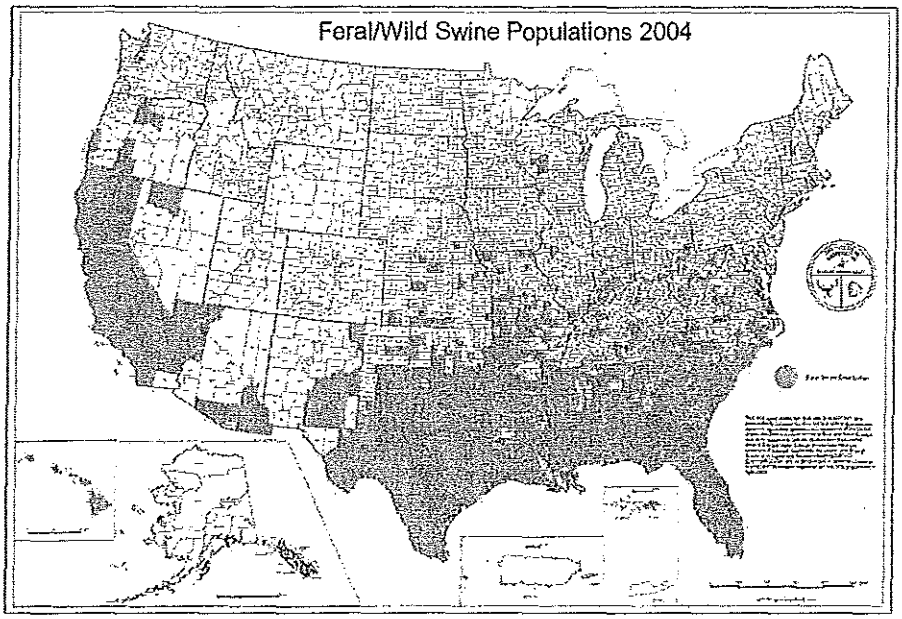


Figure 1. Feral swine distribution in the United States (Southeastern Cooperative Wildlife Disease Study, Ga)

Feral swine have been present in Oregon for nearly 200 years. The first permanent settlers arriving at present day Astoria in 1811 on the *Tonquin* as part of the John Astor's trading venture brought swine that escaped and formed a "large and troublesome pack of wild swine". (McDougal Journal, March 27-28, 1811, as cited by Ronda 1990). Although the current population distribution in Oregon is not well described, established populations were reported in 2004 Coos, Crook, Curry, Jackson, Jefferson, Josephine, Klamath, Wasco and Wheeler counties by Coblentz and Bouska (Figure 2), and a new population was reported in 2006 in Harney County (Stevenson 2006 pers com). Feral swine in Coos and Curry Counties are aggressive and have long skulls, which suggests that they are closely related to wild boars (Koreiva 2006, pers

com). The wild boar traits in the south coast feral swine suggest that they may have been intentionally released or escaped after importation of wild boars to Oregon or that they are immigrants from the expanding population in Northern California. Feral swine in the eastern and southern counties are less aggressive, which suggests that they are escapes or intentional releases of domestically raised swine. Presence of small feral swine populations for long periods prior to rapid and large population expansion is a common phenomenon. Indeed, long latent periods prior to population explosion is common for invasive species in general (Williamson 1996), and lack of major feral swine impacts in Oregon to date is not a good predictor of the likelihood of impacts in the future.

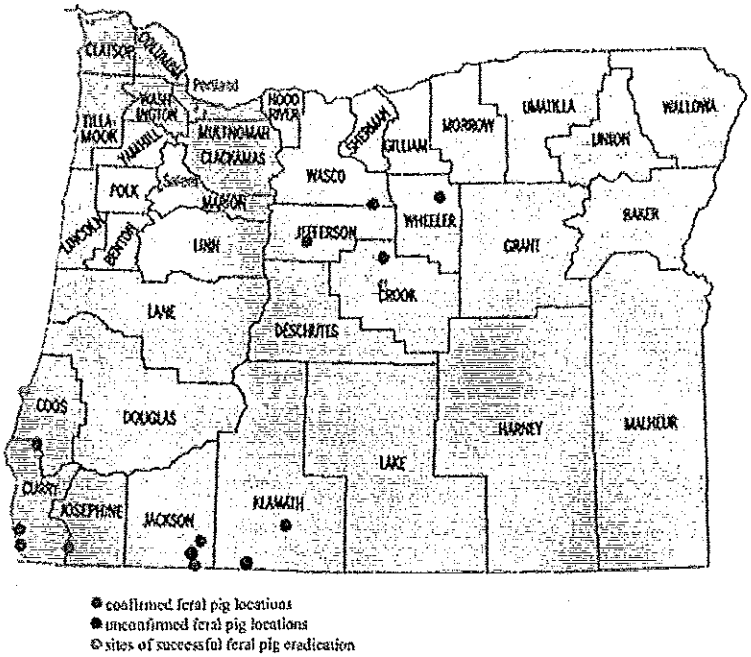


Figure 2. Map of known locations of feral swine in Oregon as of June 2004 (from Coblentz and Bouska 2004)

Impacts of Feral Swine

Ecological Impacts

Feral swine impacts are well documented in areas with large swine populations. Lack of noticeable ecological damage in Oregon is likely due to the relatively small population size currently in the state (Barber 2006, pers com). Swine have the greatest reproductive capacity of all free-ranging, large mammals in the United States (Wood and Barrett 1979) and population

expansion can occur rapidly. A feral sow reaches reproductive age at eight months and can produce up to two litters per year that contain 10-12 swine each (Tisdell 1982).

Feral swine degrade ecosystems through predation and competitive impacts on native fauna, grazing on native plants, and physically altering habitats by rooting. Rooting creates large, disturbed areas that can lead to extensive erosion, displace native species, and facilitate invasion by non-native, weedy species (Sweitzer and Van Vuren 2002, Waithman *et al.* 1999, Choquenot *et al.* 1996, Mayer and Brisbin 1991, Sweeney and Sweeney 1982, Wood and Barret 1979, Hanson and Karstad 1959). Massive erosion due to swine rooting has occurred in California (Barrett 1977), Hawaii (Tomich 1969) and Australia (Bomford and Hart 2002). Acorn survival in oak woodlands in California is reduced by feral swine rooting. Oak woodland impacts include a reduction in above ground biomass, availability of acorns for germination, and availability of mast for consumption by native wildlife (Sweitzer and Van Vuren 2002). Feral swine have rooted mast and acorns in open meadows and on the edges of white oak (*Quercus garryana*) stands in Oregon (Barber 2006, pers com).

Feral swine caused a shift in dominance in the native plant comunities in national parks in Australia and Hawaii. The floor of Eucalyptus forests in Australia's Namadgi National Park (NNP) are naturally dominated by the herbaceous Vanilla lily (*Arthropodium milleflorum*). Rooting by feral swine has led to a decrease in vanilla lily and an increase in shrubs (*Leptospermum* ssp.) in the park (Hone and Stone 1989). Swine rooting led to invasion of non-native, noxious weeds in Hawaii. Soil disturbance in some areas has altered the floor to such an extent that they are unable to support any native plant species (Diong 1982). Dominant, native forest floor species, such as ohi's (*Metrosideros polymorpha*) and koa (*Acacia koa*), have been replaced by invasive species such as strawberry guava (*Psidium cattleianum*) and curuba (*Passiflora mollissima*) (Hone and Stone 1989). Swine rooting in upper elevation grasslands and lower elevation forests of Hawaii has caused an increase in cover of non-native velvet grass (*Holcus lanatus*). *Deschampsia nubigena*, a native bunchgrass, cover declined and velvet grass cover increased from 9.5 to 15.3 percent in swine-disturbed areas of the Kalapawili grasslands in Haleakala National Park, Hawaii, between 1973 and 1986. The increase in velvet grass cover stopped after swine were removed from the area (Stone *et al.* 1992).

Impacts of feral swine have been noted in diverse habitats in Oregon, although most reports are anecdotal and detailed documentation of impacts is lacking. Soil erosion and facilitation of noxious weed invasions due to rooting have been reported in grassland habitats in the central and southwest counties (Alexanian 2006 pers com, Ferry 2006 pers com, Huffman 2006, pers com), in open meadows and riparian zones in the coastal counties (Koreiva 2006, pers com), and in woodland habitats in southwestern counties (Barber 2006, pers com).

Facilitation of weed invasion by disturbance is a major concern in Oregon. Rooting in riparian areas may be contributing to the spread of knotweed in Oregon (Gores 2006, pers com). Weed invasion associated with rooting has been reported in dry areas, seep areas from underground springs, and in riparian zones (Ferry 2006, pers com). Infestation of noxious weeds in the steppe grasslands east of Madras (spotted knapweed [*Centaurea maculosa*], diffuse knapweed [*C. diffusa*], russian knapweed [*C. repens*], whitetop [*Cardaria draba*] and medusahead rye [*Taeniatherum caput-medusae*]) are worse in areas that swine have disturbed, and once weeds are established, continued disturbances by swine compounds further weed dispersal (Alexanian 2006, pers com).

Agriculture Impacts

Agricultural areas are very susceptible to swine rooting due to the high density of easily accessible food and well-irrigated, moist soil. Losses of row crops in areas with swine populations are regularly reported (Schley and Roper 2003, Caley 1997, Wood and Lynn 1977). Losses due to feral swine rooting and consumption to agriculture in the United States are estimated to be greater than $800 million per year (Pimental *et al.* 2000). Damage to agriculture in Texas, the state with the highest density of feral swine, exceeds $50 million (Hutton *et al.* 2006). Feral swine in Australia cause more than AU$100 million per year in damage to the agriculture industry (Choquenot *et al.* 1996). In areas of high swine density, single rooting events have caused up to AU$25,000 in damage (Hone *et al.* 1980 as cited in Coblentz and Bousk 2004).

Losses to Oregon agriculture caused by feral swine are not well-documented, but the potential is great. Oregon's agriculture is a $3.6 billion industry (Table 1). Many of the top 40 Oregon crops are favorites of feral swine worldwide. Grain, grass, hay, wheat, which are top 10 products in Oregon, are preferred by feral swine in other parts of the United states and in

Australia (Choquenot *et al.* 1996). If feral swine populations expand to areas of the state with high value crops, losses could be in the millions of dollars.

Table 1. Top 40 agricultural commodities in Oregon in 2002 (Modified from "Oregon agriculture: facts and figures." http://www.ods.state.or.us/information/pdf/statsfacts.pdf in Coblentz & Bouska 2004)

Agricultural Commodities (1-20)	Value ($)	Agricultural Commodities (21-40)	Value ($)
*†Greenhouse & nursery	714,026,000	Crab landings	20,654,000
*†Cattle & calves	473,806,000	*Hops	20,103,000
*†Hay	357,729,000	*Blueberries	20,075,000
*Grass seed	277,574,000	*Hazelnuts	18,009,000
*Milk	273,652,000	*Apples	17,609,000
*Christmas trees	160,190,000	*Strawberries	16,613,000
*†Wheat	135,565,000	*†Sheep & lambs	14,550,000
*Potatoes	134,908,000	Groundfish landings	14,229,000
*Onions	80,974,000	*Vegetable & flower seed	13,106,000
*Pears	68,004,000	*†Hay silage	11,923,000
*Eggs	43,947,000	*Garlic	11,877,000
*†Wine grapes	32,340,000	*Squash & pumpkins	11,761,000
*†Sweet corn	28,782,000	Shrimp landings	11,340,000
*Mint for oil	28,509,000	*Sugarbeets	11,186,000
*Cherries	28,169,000	*Cranberries	10,543,000
*†Grass & grain straw	26,568,000	*†Hogs	9,027,000
*†Corn, grain & silage field	25,637,000	*†Barley	8,880,000
*†Horses & mules	24,043,000	*Tomatoes	8,704,000
*Blackberries	21,871,000	*Raspberries	8,691,000
*Snap beans	20,951,000	*†Oats	7,546,000

*Commodities that could potentially incur depredation by feral swine
†Commodities that have incurred depredation in other regions

Disease Transmission

Feral swine are susceptible to, and can be carriers of, a wide range of infectious diseases that are detrimental to wildlife populations, livestock, and humans (Choquenot *et al.* 1996) (Table 2). Pseudorabies and swine brucellosis are considered the two most potent disease threats to the commercial pork industry and bovine tuberculosis is a serous threat for the cattle industry in the USA. The USDA has established a national eradication program for eliminating these three diseases (Witmer *et al.* 2003). Currently, when feral swine are harvested by USDA/APHIS/Wildlife Services personnel they are sampled for pseudorabies, swine brucellosis, and classical swine fever, which is a foreign-animal disease of concern. This sampling effort is currently being done at the expense of USDA/APHIS/Wildlife Services in Oregon and testing is provided by USDA/APHIS/Veterinary Services (Stevenson 2006, pers com). Disease

surveillance is the only way to determine the threat of transfer of bovine tuberculosis, pseudorabies or swine brucellosis from feral swine to Oregon livestock.

Table 2. A partial list of viral and bacterial diseases to which feral swine are susceptible (Compiled by Witmer *et al.* (2003) from Williams and Barker (2001) in Hutton *et al.* (2006)).

Viral Diseases	Bacterial Diseases
Bovine Herpesvirus	Anthrax
Classes Swine Fever (hog cholera)	Brucellosis
Coronaviral infections	Erysipelothrix infections
Encephalomyocarditis	Helicobacter
Foot-and-mouth disease	Letpospirosis
Influenza A	Bovine tuberculosis
Louping-ill virus	Pasteurellosis
Malignant catarrhal fever	Plague
Menangle virus	Salmonellosis
Papillomavirus infections	Yersiniosis
Parainfluenza virus	
Pestvirus infections	
Pseudorabies	
Rabbit hemorrhagic disease	
Rinderpest	
San Miguel sea lion virus	
Swinepox	
Swine vesicular disease	
Vesicular swine virus	
Vesicular stomatitis	

Foot and mouth disease (FMD) can be transmitted by feral swine and has impacted livestock industries in other countries. In 2001, an outbreak in the United Kingdom cost the livestock industry $12 billion (Hutton *et al.* 2006). In 1997, FMD wiped out Taiwan's hog industry and cost the country $25 billion (Pearson *et al.* 2005). Large economic costs are incurred by a state's livestock industry if it loses disease-free status due to FMD, pseudorabies, bovine tuberculosis or brucellosis. Testing requirements, shipping and marketing restrictions drastically reduce profitability (Witmer *et al.* 2003). For example, domestic swine in the United States recently achieved pseudorabies-free status after a 17-year effort and the expenditure of approximately $200-250 million dollars (Hutton *et al.* 2006).

Feral swine can also transmit disease to humans. Recently, the death of three people and illness in 200 people in the USA and Canada was attributed to feral swine spreading *Escherichia. coli* via excrement onto spinach fields in California (Nordqvist 2006). Diseases that can infect humans from feral swine include brucellosis, balantidiasis, leptospirosis, salmnellosis,

toxoplasmosis, trichinosis, trichostrongylosis, tuberculosis, tularemia, anthrax, rabies and plague. Most human cases cause mild flu-like symptoms and often go unreported (Hutton *et al.* 2006). A notable exception, however, was the 1918 Spanish flu that was caused by an H1N1 virus that originally infected swine (Tautneberger 2006, Fanning *et al.* 2002, Schlotissek 1994). The Spanish flu pandemic killed over 50 million people worldwide (Johnson and Mueller 2002).

Case Studies

California, Hawaii, Australia, the Galapagos Islands, and the Channel Islands off the coast of California are important examples of actions to reduce the impacts feral swine because these areas have large populations that cause significant financial and ecological damage in habitats similar to habitats occupied by feral swine in Oregon. These areas report widespread negative impacts to agriculture. At one point, these areas had feral swine populations with characteristics very similar to the current status of Oregon populations – populations were small, dispersed, and limited to a few isolated areas with limited impact (Cruz *et al.* 2005, Long 2003, Sweitzer 1998, Choquenot *et al.* 1996, Tomich 1969).

Actions taken to reduce the impacts of feral swine fall into three categories in the following case studies: control, management or eradication. Control is utilized to keep feral swine from invading a specified control area. It is not meant to diminish the population, but is used to limit population expansion into protected areas. Management, primarily with commercial or sport hunting, is used to regulate and maintain population size in areas with desired populations. Eradication is the complete removal of the population.

Australia

Queensland, New South Wales, the Northern Territory, and Western Australia have the largest feral swine populations in Australia (Choquenot *et al.* 1996). Management efforts began in the late 1800's when bounties were offered by local governments as a way to reduce feral swine populations (Pullar 1953). The bounty system became officially supported by the government in 1945 and lasted until 1977 (Choquenot *et al.* 1996). In Queensland alone, the government paid between 25,000 and 130,000 bounties per year during that time (Pullar 1953). The bounty system was eventually abolished due to fraud, the deliberate spread of pest animals, and failure to reduce swine populations (Rolls 1969). In Australia, each territory sets it's own standards and rules regarding feral swine, but a resolution was passed by the Vertebrate Pest

Committee in 1975 recommending that bounty payments be phased out. Territory governments now recognize bounties as an ineffective control method (Choquenot 1996).

Each territory in Australia has passed it's own legislation concerning feral swine, but the territories with the highest populations (Queensland, New South Wales, Northern Territory and Western Australia) have passed similar legislation to control feral swine, but the effectiveness of the legislation is limited by the economic value feral swine have acquired. The Rural Lands Protection Act of 1985 requires that Queenslanders destroy feral swine that live on their property. The Department of Lands recognizes feral swine as an important resource for the commercial harvesting industry and, as a consequence, feral swine are controlled in Queensland only if they have a negative economic impact on business or on local agriculture.

New South Wales passed similar legislation in 1989. Landowners are required to manage swine on private and leased land and the government controls swine on public land. As in Queensland, commercial harvesting is an important source of income in the territory and, as a result, populations persist in all areas. The Territory Parks and Wildlife Conservation Act of 1988 declared feral swine as a pest in the Northern Territory but no legal obligation is placed on land managers to control or manage them. Therefore, control of feral swine is conducted only in areas where agriculture is impacted. In Western Australia, the Agriculture and Related Resources Protection Act of 1976 places legal obligation of feral swine control on the landowner. Similar to the Queensland and the Northern Territory, control efforts are only taken in areas where agriculture is affected (Choquenot 1996). Overall, the management and control approaches adopted by the territories of Australia have not been successful (Izac and O'brien 1991).

Hawaii

Until the early 1900's, no official action was taken to manage, control or eradicate swine in Hawaii. In 1910, the Hawaii Territorial Board of Agriculture and Forestry instituted a policy of swine eradication on State and Forest Reserves (Diong 1982). Although thousands of swine were removed, feral populations spread across reserve boundaries at rates up to 4 km/year (Hone and Stone 1989). After 1959, responsibility for swine was transferred to the Hawaii Fish and Game Department and populations were managed to maintain a sustained yield of swine for hunting (Stone and Loope 1987). Despite high hunting success and the removal of hundreds of

swine per year from park areas, swine densities remained high. Management by citizen-hunters only removed swine from easily accessible areas while populations in inaccessible areas were unaffected (Stone and Loope 1987). In Hawaii Volcanoes National Park (HAVO), hunting with dogs, trapping, baiting, snaring and fencing began in 1980. Eradication was achieved in a few, small, fenced areas (Stone and Loope 1987) but populations persisted in many fenced and unfenced areas (Hone and Stone 1989). From 1985 to 1989 they were controlled in the Kalapawili grasslands with fences, which led to disturbance of native grassland from pig rooting in the swine populated areas (Stone *et al* 1992). Currently swine serve as a game animal on private and public land in Hawaii. Eradication efforts have ceased, but there is an ongoing effort to protect the native forested watersheds by fencing to exclude swine (Billy 2006, pers com).

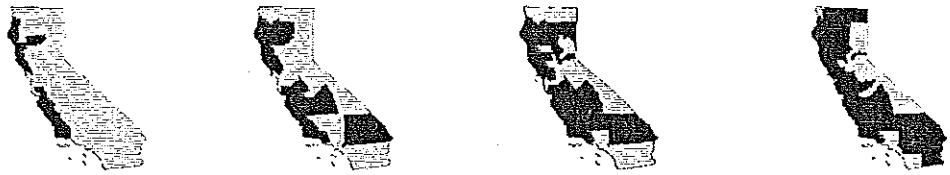


Figure 3. Range expansion of wild swine in California based upon annual Game Take Hunter Surveys during four survey periods from 1959 to 1994. (a) 1965-1967 (b) 1974-1974 (c) 1983-1985 (d) 1992-1994. Red areas indicate counties with establish feral swine (adapted from Waithman *et al.* 1999).

California

Feral swine in California illustrate how rapidly small, relatively low-impact, populations can expand. In 1957 feral swine populations were small and restricted to a few coastal counties (Mansfield 1986) (Figure 3). There were no regulations and no game status until 1957 when they were classified as big game animals (Mayer and Brisbin 1991). By the mid 1980's, the swine population had increased to 80,000 and the public raised concerns over damage to agriculture and ecological resources (Waithman *et al.* 1999). Statewide management action was taken in 1992 when hunters were required to fill out a "pig tag" for every swine killed. The "pig tags" provided detailed information on the location of the hunter-killed animals for determination of statewide swine population sizes and densities (Waithman *et al.* 1999). Swine hunting season ranges from six months to year round, depending on the county, with a bag limit of one in most

areas (Mayer and Brisbin 1991). The objective of hunting regulations is to manage feral swine populations, but even with the removal of up to 50,000 swine per year by hunters, the feral swine population remains above 133,000 statewide (Waithman *et al.* 1999).

Channel Islands

Swine hunting on the Channel Islands, off the coast of southern California, is limited by reserve areas and accessibility. The lack of hunting has led to swine densities that impact island ecosystems (Baber and Coblenz 1986). A management effort began on Santa Catalina in 1990 to reduce feral swine numbers and alleviate their impacts. The goal of the first phase, from November 1990 to April 1991, was to evaluate the effectiveness of swine removal techniques in a control area located on the island. The 3492-ha control area was isolated from the rest of the island by a 5-kilometer long bison fence. Ground hunting with and without dogs, trapping, and aerial hunting by helicopter were evaluated. Phase 1 results indicated ground hunting needed to be accompanied by trapping and helicopter hunting only worked in open areas. Phase 2, February 1992 to June 1996, expanded the efforts across the entire island and consisted of a combination of techniques: trapping, ground hunting with and without dogs, and aerial hunting. Although Phase 2 was planned as an eradication program, financial constraints limited it to a control effort. Over 3000 swine were removed from the 194-km^2 island during Phase 2, but swine effects on ecosystems remained high. After 3 years, phase 3 was implemented with the goal of eradication in the original control area. Beginning in 1996 the intensity of hunter days, the number of dogs per hunter, the number of traps, and the number of aerial hunting hours were increased. The result was complete eradication by 1998 in the control area. The final step was an expansion of the eradication effort to the entire island. In Phase 4, the island was divided into four sections separated by fences to isolate swine groups and the same intensity of techniques utilized in phase 3 were implemented. The result was near eradication by 2001 with the total removal of 11,855 swine over 15 years at a cost of $3,175,000 (Schuyler *et al.* 2002). A similar effort to eradicate feral swine from Santa Cruz Island is currently underway, with no published results at this time (Klinger 2006, pers com).

Galapagos Islands

Swine control efforts began in 1968 on Santiago Island, the largest and most densely populated island in the archipelago. The specifics of the hunting methods were not recorded, but

swine were hunted, trapped and snared sporadically. Recorded hunting began in 1974 and included shooting with 0.22 caliber rifles and hunting with dogs. By 1985 the number of hunter-days/year were increased to 1500 and a poisoning routine, which consisted of injecting goat carcasses with sodium monofluoroacetate and placing them in areas of known swine populations, was implemented. By 1989, control efforts had removed 1896 swine from the island. The next year, with similar effort, only 523 swine were removed, and efforts in subsequent years were reduced.

The control efforts became an organized eradication plan in 1998. The island was divided into blocks with a team of 12-15 hunters and 1-2 dogs per block. Hunters carried radios and GPS units to coordinate hunting and document daily coverage. Poisoning efforts continued and night hunts were organized to supplement daytime hunting. In April 2000 the last swine was shot and an extensive monitoring program began in July 2000. Non-toxic goat carcasses were place and routinely checked for disturbance and hunters checked for swine signs in marginal habitat. Following four months of monitoring and 2414 monitoring hours, the last swine was detected and removed in October 2000. In total, the eradication of feral swine from Santiago Island removed 18,800 swine over 30 years for an undisclosed sum in the millions of US dollars (Cruz *et al.* 2005).

Oregon

There have been two organized eradication efforts in Oregon. The first occurred in Crook County, near Post, from 2000 to 2005. An unfenced control area was designated after identification of the travel patterns of the local swine population. Ground and aerial hunting occurred and live traps were utilized for 90 days by the U.S. Department of Agriculture. Most of the control area was located on private land and most of the kills were by private hunters and were undocumented. Overall, the eradication effort removed 12-20 swine through trapping and shooting in the control area. No signs of swine disturbance or sightings of swine were reported after the first year of the five-year eradication plan (Huffman 2006, pers com). The second Oregon eradication effort occurred in Jefferson County, near Antelope, from 2001 to April 2006. It consisted of ground hunting by landowners and the public, and aerial hunting from a fixed-wing plane by the USDA/APHIS/Wildlife Services. Eradication was not accomplished by the end of the USDA/APHIS/Wildlife Services contract in April 2006, and there are still reports of

small populations and disturbances in the area. Lack of effective eradication of the Antelope-area swine was likely due to the lack of community involvement, tougher terrain for hunting, greater mobility by the family groups, and lack of use of helicopters in the control efforts compared to the effort near Post (Huffman 2006, pers com).

Additional swine were killed in Oregon by private individuals and USDA/APHIS/Wildlife Services in the past 10 years in Oregon. The number of swine removed by private landowners and hunters is unknown (Ferry 2006 pers com, Huffman 2006 pers com, Koreiva 2006 pers com, Vargas 2006 pers com). Three documented rapid response efforts have occurred. One swine was shot on federal land near the Upper Rogue River in the late 1990's (Vargas 2006, pers com), two swine were removed from Elliott State Forest in July 2006, and 11 were removed from private property near Spray in October by USDA/APHIS/Wildlife Services (Stevenson 2006, pers com).

Action Plan

Feral swine populations in Oregon are currently at levels similar to those in California 50 years ago. Left unchecked, feral swine populations are likely to grow and cause ecological, economic, and human health impacts in Oregon. Evidence from the Galapagos islands, Channel islands, and from Post, Oregon indicates that feral swine can be eradicated. Furthermore, the case studies demonstrated that efforts to control or manage (not eradicate) populations typically fail. Our current understanding of feral swine population size and distribution in Oregon is limited, however, known populations in eastern and southern Oregon can be eradicated. Dense vegetation and rugged topography in Coos and Curry counties, and the uncontrolled population in nearby areas of northern California will complicate eradication efforts there.

The strategies outlined in this action plan are aimed at reducing the threat of ecological, economic, and human health impacts by feral swine in Oregon. To be successful, the strategy will require a long-term commitment and application of a suite of control techniques used in an adaptive manner.

Task 1. Source Control

Successful eradication requires the elimination of swine introductions (Cruz *et al.* 2004, Schuler *et al.* 2002). Escapes or intentional releases from private property and immigration from

Feral Swine Action Plan

Northern California populations are probably the main sources of feral swine in Oregon. Escape from commercial pork production is not considered a major source. Legislation to stop releases and escapes is already in place but enforcement is difficult. ORS 496.004 defines feral swine as wildlife and ORS 498.052 restricts the release of domestically raised wildlife. ORA 603-010-0055 defines feral swine as free roaming animals of the genus *Sus* that are not being held under domestic management or confinement, are not domesticated, are not tame and are not claimed by any land owner within five miles of their location during the past five days. Despite the statutes, feral swine populations continue to be supplemented by releases and escapes. In most cases, enforcement of the law is inhibited by the difficulty of proving the source of new releases (Vargas 2006 pers com). Unless the swine is seen leaving private land, it is impossible to prove the source (Barber 2006 pers com).

In 2001 ORS 601 was amended to classify feral swine as unprotected wildlife to reduce restrictions on take. Along with the designation of feral swine as predators (ORS 610.002), ORS 601 has allowed the public to better harvest these animals when seen, either with a hunting license on public land or without a license on private land, acting as a landowner agent. On private land, it is unlawful to allow swine to run at-large (ORS 608.510), but immediate removal requires permission of the landowner. A precedent for the removal of at-large swine on private land was set in the Post and Antelope eradication efforts. In those cases, a landowner on adjacent property reported the release to State officials. Under ORS 570.405, a statute that describes the necessity of eradication of weeds and wildlife, a public hearing was held to establish a feral swine eradication area. Since the swine were seen on private land, that land was included in the eradication area (Huffman 2006 pers com).

Hearings to establish an eradication area under ORS 570.405 require several months, which is not practical for eradication of a small, mobile group of feral swine. The typical home range for feral swine is 2.53 km^2 and for wild boars it is 6.85 km^2, in good swine habitat (Sweitzer *et al.* 2000). During periods of drought or lack of resources, home ranges can expand to 50 km^2 (Tisdell 1982). Seasonally, movements span the entire home range. When sources of food are abundant, daily movements are slow, up to 0.1 km/h. If food is scarce, populations travel at >0.4 km/h and have been reported to transverse the entire home range in 24 hours (Singer *et al.* 1991). Because swine can be very active and under some conditions have large

ranges, a system is necessary for rapid response. The rapid response system must be immediate due to swine potential for movement, and should not be limited by migrations from public to private land.

Legislation requiring markers on domestic swine to facilitate identification

The source of escaped swine on public land is difficult to determine, and free-roaming swine on private land can require a five-day determination of ownership – too long for effective control of these mobile animals. A method to clearly identify domestic swine on private and public property is required; identification markers for all domestic swine are recommended. This program is aimed at easy identification of feral swine and protection of the pork production industry in Oregon. This marking program should be implemented in conjunction with the National Animal Identification system currently under development by USDA/APHIS/Veterinary Services, which would allow producers to register their premises and their livestock for disease control (Stevenson 2006, pers com).

The marker should be brightly colored, easily identified from a distance, and located on one ear of all domestic swine above 20 lbs. The marker should include a registration number that can be used to identify the owner of the swine if it is found on public land. Application of the ear tags could occur during regular disease treatments of domestic swine. Existing law should be amended or new law written that requires ear tags on domestic swine and the immediate removal of all swine without ear tags from public or private land (similar to ORS 570.510 for the control of noxious weeds). Together with ORS 498.052, these recommendations will allow for the rapid removal of <u>any</u> swine located on public land and <u>unmarked</u> swine on private land.

<u>Task 2. Population Determination and Public Education</u>

Feral swine database and mapping

A current and accurate database of swine populations and management actions should be created and maintained by a central office in ODFW designated to oversee feral swine eradication in Oregon. The most recent documentation on feral swine distribution in Oregon was prepared for the Pest Risk Assessment for Feral Swine in Oregon (Coblentz and Bouska 2004). While useful for identifying general locations, it does not indicate swine density or precise locations for swine removal. Due to the transient nature of feral swine populations, a map that is not periodically updated quickly becomes obsolete.

Feral Swine Action Plan

Survey

To determine the current status of feral swine, and to populate the database, a detailed survey of state and federal resource management agencies (Oregon Departments of Fish and Wildlife, Agriculture, Parks and Recreation, Transportation, Forestry; U.S. Bureau and Forest Service) for feral swine information is required. The survey should obtain information on signs of swine disturbance, cost associated with swine disturbance, swine sightings, number of swine sighted, likely population sources, numbers of swine removed, and any actions taken by private citizens or government officials dealing with feral swine within the past five years.

Education

ODFW district biologists receive most of their information about feral swine locations from reports from private citizens about swine rooting and swine sightings (Ferry 2006, pers com). APHIS and ODA also receive the vast majority of their information on feral swine populations from private citizen reports (Stevenson 2006). If the public is not informed about the deleterious effects of feral swine populations to local ecosystems, wildlife, agriculture and livestock, the likelihood of a report to local agency officials will be minimal (Barber 2006, pers com). Therefore, providing the public with information on feral swine, the damage they cause, and how to report sightings is important for accurate population assessment (Huffman 2006, pers com). In addition, an informed public is necessary for mounting and sustaining a successful eradication effort that typically requires long-term commitment of public resources and agency attention.

An informed public was critical to development of current knowledge of the status and impacts of feral swine in Oregon. Furthermore, the success of the Post eradication relied upon reports from local landowners and hunters. Local knowledge helped set up a control area before the eradication and locate individual swine during the eradication. Education efforts in each ODFW district should include annual talks to local hunter associations; discussions with local farmers and livestock owners about the negative effects of feral swine populations; fliers and signs at trailheads, ranger stations and kiosks; and communication with various outdoor groups. Education efforts should be coordinated through OISC invasive species education and outreach activities.

Task 3. Eradication

Based upon the Pest Risk Assessment, and personal communication with district biologists, current Oregon populations were grouped into three zones (Figure 4). Each zone contains similar habitat and will require similar techniques to eradicate. Zones 1 and 2 are in open habitat, with little cover, in which eradication is very likely given the successful eradication near the city of Post, located in Zone 1. Therefore, organized efforts should begin with the seven established populations located in Zones 1 and 2. This approach allows development of additional expertise and methods that will be necessary in Zone 3, which contains more difficult terrain with dense cover. Initially, control areas may be required to prevent spread of populations in Zone 3; however, once the Zone 1 and 2 populations are eradicated the control areas should be targeted for eradication.

Eradication of feral swine in Oregon will require long-term commitment and a well-conceived strategy. Reports of feral swine sightings in areas outside existing, known core populations should receive high eradication priority and a rapid response system should be organized and put in place. Contracts with USDA- Wildlife Services should be in place to permit rapid response statewide throughout the year.

All potential eradication techniques should be applied where appropriate including ground hunting with dogs, aerial hunting, and trapping. All successful feral swine eradications have included a combination of methods, e.g., hunting and trapping and aerial shooting (Cruz *et al.* 2005, Schuyler *et al.* 2002). The successful Crook County eradication relied mainly on ground hunting; however, traps and aerial hunting were sparingly utilized but limited due to low population density (Huffman 2006, pers com).

The time required to eradicate swine from an area will be a function of population size and accessibility. Large populations may require the designation of a control area and require several breeding seasons for eradication. Eradication efforts may be lengthy, such as in Post, but not all eradications will need such an effort. Contracts with USDA-Wildlife Services should be developed to target known swine populations in Oregon. Rapid response eradications, such as the Elliott State Forest removal, will also be crucial to Oregon swine eradication.

Task 4. Monitoring and Assessment

Swine have been known to reinvade, or be reintroduced, six months to a year following eradication (Schuyler *et al.* 2002) and monitoring is required to document and reinforce the eradication effort. Monitoring includes visitation of the site to check for disturbances and communication with local citizens about possible swine sightings. All areas are to be checked for subsequent disturbance by district biologist for two years following the removal effort. A minimum of two years is suggested for monitoring areas in which swine have been eradicated (Oregon Invasive Species Council 2005).

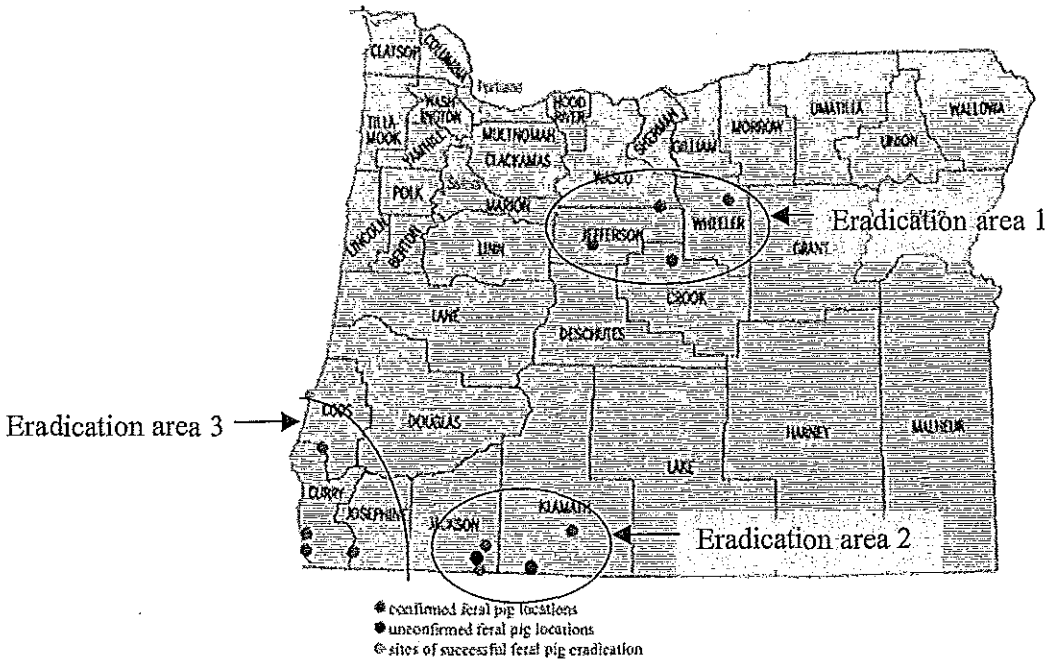


Figure 4. Recommended priority of areas for eradication during the first three years of the Oregon feral swine eradication effort.

Budget

A four-year eradication, and an ongoing maintenance budget are proposed. The budget includes a 0.5 FTE feral swine eradication program manager at ODFW who will be primarily responsible for contracting, surveys, database maintenance, outreach and education, and overall program direction. Funds are budgeted for the swine ear tag program, signs and educational materials, and eradication. Funds for rapid response to new sightings and eradication will be an

ongoing requirement. Eradication funds would focus on Zones 1 and 2 in the first year and on Zone 3 in the third and fourth years.

Compared to other, large-scale eradications, the price of eradicating the small, sparse populations in Oregon will be small. Conservative estimates of the cost of feral swine eradication efforts are $400-500 per swine in areas with sparse populations (Schuyler *et al.* 2002). Eradication costs here are based on cost of the Antelope-area eradication effort. The proposed population assessment will further inform the estimated eradication costs. In addition, experience gained in Zones 1 and 2 may result in a more efficient eradication effort in Zone 3.

Table 3. Estimated costs of the four-year eradication and ongoing maintenance program for feral swine management in Oregon.

	Yr 1	Yr 2	Yr 3	Yr 4	4-Yr Total	Ongoing
Pig eradication coordinator						
(0.5 FTE@ $75,000 salary and benefits)	37500	37500	37500	37500	150000	37500
Travel	2000	2000	2000	2000	8000	2000
Task 2						
Signs	3000	2000	2000	1000	8000	500
Task 3						
Rapid Response Contract	5000	5000	5000	5000	20000	5000
Planned Eradication Contract	300000	300000	300000	200000	1100000	100000*
	347500	346500	346500	245500	1286000	135780

* contingency

References

Alexanian, K. 25 May 2006. Crook County Weed Control. Personal Communication.

Barber, C. 21 April 2006. Oregon Department of Fish and Wildlife. Personal Communication.

Baber, D. W. and B.E. Coblentz (1986). Density, home range, habitat use, and reproduction in feral pigs on Santa Catalina Island. *Journal of Mammology* 67(3):512-525.

Barrett, R.H. (1977). Wild pigs in California. In G.W. Wood (Ed), *Research and Management of Wild Hog Populations.* Proceedings of a Symposium (pp. 111-113). Georgetown, South Carolina: B.W. Baruch Forest Science Institute.

Billy, P. 20 April 2006. The Nature Conservancy, Hawaii. Personal Communication.

Bomford, M. and Q. Hart (2002). Non-indigenous vertebrates in Australia. In D Pimentel (Ed), *Biological Invasions: Economic and Environmental Costs of Alien Plant, Animal, and Microbe Species* (pp. 25-44). Cornell University, Ithica, New York: CRC Press.

Caley, P. (1997). Movements, activity patterns and habitat use of feral pigs (*Sus Scrofa*) in a tropical habitat. *Wildlife Research* 24(1):77-87.

Choquenot, D., J. McIlroy and T. Korn (1996). *Managing Vertebrate Pests: Feral Pigs. Bureau of Resource Sciences*, Australian Government Publishing Service, Canberra. 163 pg.

Clarke, C.M.H, and R.M. Dzieciolowski (1991). Feral pigs in the northern South Island, New Zealand: Origin, distribution and density. *Journal of the Royal Society of New Zealand* 21:237-247.

Coblentz, B. and C. Bouska (2004) *Pest Risk Assessment for Feral Pigs in Oregon.* Oregon Invasive Species Council Report. 20 pg.

Cruz, F., C.J. Donlan, K. Campbell and V. Carrion (2005). Conservation action in the Galapagos: feral pigs (Sus scrofa) eradication from Santiago Island. *Biological Conservation* 121:473-478.

Diong, C.H. (1982). *Population Biology and Management of the Feral Pig (Sus scrofa L.) in Kipahula Valley, Maui.* PhD dissertation. University of Hawaii, Honolulu, Hawaii. 408 pg.

Ebenhard, T. (1988). Introduced birds and mammals and their ecological effects. *Swedish Wildlife Research* 13(1):1-107.

Fanning, T.G., R.D. Slemons, A.H. Reid, T.A. Janczewski, J. Dean, J.K. Taubenberger (2002). 1917 avian influenza virus sequences suggest that the 1918 pandemic virus did not acquire its hemaglutinin directly from birds. *Journal of virology* 76 (15):7860-7862.

Ferry, B. 25 April 2006. Oregon Department of Fish and Wildlife. Personal Communication.

Gores, J. 18 April 2006. Oregon Department of Fish and Wildlife. Personal Communication

Groves, R.H. and F. Di Castri (1991). *Biogeography of Mediterranean Invasions.* Cambridge, Massachusetts: Cambridge University Press. 485 pg.

Hanson, R.P. and L. Karstad (1959). Feral Swine in the Southeastern United States. *Journal of Wildlife Management* 23(1):64-74.

Hoehne, V.M. 1994. Wild pigs in Santa Cruz County. *Fremontia* 22:18-19.

Hone, J. and C.P. Stone (1989). A comparison and evaluation of feral pig management in

two national parks. *Wildlife Society Bulletin* 17:419-425.

Huffman, R. May 2006. Oregon Department of Agriculture. Personal Communication.

Hutton, T., T DeLiberto, S. Owen and B. Morrison (2006). *Disease Risk associated with Increasing Feral Swine Numbers and Distribution in the United States.* Report for the Midwest Association of Fish and Wildlife Agencies, Wildlife and Fish Health Committee July 11, 2006 (www.michigan.gov/documents/emergingdiseases/ Hutton_Pig_Paper_177657_7.doc).

Izac, A.N. and P. Obrien (1991). Conflict, uncertainty and risk in feral pig management: the Australian approach. *Journal of Environmental Management* 32(1):1-18.

Johnson, N. and J. Mueller (2002). Updating the accounts: global mortality of the 1918-1920 "Spanish" influenza pandemic. *Bulletin of the History of Medicine* 76 (1):105-115.

Kramer, R.J. (1971). *Hawaiian Land Mammals.* Rutland, Vermont: CE Tuttle Co. 347 pg.

Klinger, R. 22 April 2006. Belize Foundation for Research and Environmental Education, University of California, Davis. Personal communication.

Koreiva, T. August 2006. Oregon Department of Forestry. Personal communication.

Long, J.L. (2003). *Introduced Mammals of the World: their history, distribution and influence.* Collingwood, Australia: CSIRO Publishing. 589 pg.

Mansfield, T.M. (1986). Wild swine can be problems. *Outdoor California* 47(6):23-24.

Mayer, J.J. and I.L. Brisbin, Jr. (1991). *Wild Pigs in the United States: Their History, morphology, and current status.* Athens, Georgia: University of Georgia Press. 313 pg.

Nordqvist, C. (2006). Pigs source of spinach E coli outbreak say investigators. *Medical News Today* (www.medicalnewstoday.com).

Nowak, R.M. (1991). *Walker's Mammals of the World* (5th Edition). Baltimore, Maryland, USA: Johns Hopkins University Press. 1629 pg.

Oliver, W.L.R. and I.L. Brisbin Jr. (1993). Introduced and feral pigs: problems, policy and properties. In W.L.R. Oliver (Ed), *Swine, Peccaries and Hippos* (pp179-191). Status Survey and Conservation Action Plan of the IUCN World Conservation Union. Gland, Switzerland.

Oregon Invasive Species Council (2005). *Oregon Invasive Species Action Plan* (www.oregon.gov/OISC). 48 pg.

Pearson, J. P., M. D. Salman, K. BenJebara, C. Brown, P. Formety, C. Griot, A. James, T. Jemmi, L. King, E. Lautner, B. J. McCluskey, F. X. Meslin, V. Ragan. Reviewers: R. Kahrs, S. C. Mcdiarmid, N. J. MacLachlan, and N. O. Nielsen. (July 11, 2006)

Global risks of infectious animal diseases. Issue Paper Number 28. Council for Agricultural Science and Technology (www.cast-science.org).

Pimentel, D., L.Lach, R. Zuniga and D. Morrison (2000). Environmental and economic costs of non-indigenous species in the United States. *Bioscience* 50(1):53-65.

Pullar, E.M. (1953). The wild (feral) pigs of Australia: their origin, distribution and economic importance. *Memoirs of the National Museum, Melbourne* 18:7-23.

Rolls, E.C. (1969) *They All Ran Wild; the story of pests*. Sydney, Australia: Angus and Robertson. 444 pg.

Ronda, J.P. (1990). *Astoria and Empire*. Lincoln, Nebraska: University of Nebraska Press. 400 pg.

Schley, L. and Roper (2003). Diet of wild boar, Sus Scrofa, in Western Europe with particular reference to consumption of agricultural crops. *Mammal Review* 33(1):43-56.

Schlotissek, C (1994). Source for Influenza Pandemics. *European Journal of Epidemiology* 10(4):455-458.

Schuyler, P.T., D.K. Garcelon and S. Escovar (2002). Eradication of feral pigs (*Sus scrofa*) on Santa Catalina Island, California, USA. In C.R. Veitch and M.N. Clout (Eds), *Turning the Tide: the eradication of invasive species* (pp. 274-276). IUCN, Gland, Switzerland.

Singer, F.J., D.K. Otto, A.R. Tipton and C.P. Hable (1981). Home ranges, movements and habitat use of European wild boar in Tennessee. *Journal of Wildlife Management* 45(2):343-353.

Stevenson, J. 22 June 2006. Unites States Department of Agriculture, Animal and Plant Health Inspection Service. Personal communication.

Stone, C.P. and L.L. Loope (1987). Reducing negative effects of introduced animals on native biotas in Hawaii: what is being done, what needs to be done and the role of national parks. *Environmental Conservation* 14(3):245-258.

Stone, C.P., L.W. Cuddihy and J.T. Tunison (1992). Response of Hawaiian ecosystems to removal of feral pigs and goats p 666-704 In C.P. Stone, C.W. Smith and J.T. Tunison (Eds), *Alien plant invasions to native ecosystems of Hawaii* (pp. 666-704). Honolulu, Hawaii: Cooperative National Park Resources Studies Unit, University of Hawaii.

Sweeney, J.M. and J.R. Sweeney (1982).. Feral Hog. In J.A. Chapman and G.A. Feldhamer (Eds),*Wild Animals of North America* (pp. 1099-1113).Baltimore, Maryland, USA: John Hopkins University Press .

Sweitzer, R.A. (1998). Conservation implications of feral swine in island and mainland

ecosystems, and a case study of feral swine expansion in California. *Proceedings of the Vertebrate Pest Conference* 18:26-34.

Sweitzer, R.A. and D. Van Vuren (2002). *Rooting and Foraging Effects of Wild pigs on Tree regeneration and Acorn Survival in California's Oak Woodland Ecosystem.* USDA Forest Service Gen. Tech. Rep. PSW-GTR-184 (pp. 219-231).

Sweitzer, R.A., D. Van Vuren, I.A. Gardner, W.M. Boyce and J.D. Waithman (2000). Estimating sizes of wild pig populations in the north and central coast regions of California. *Journal of Wildlife Management* 64(2): 531-543.

Tautneberger, J.K. (2006). The origin and virulence of the 1918 "Spanish" influenza virus *Proceedings of the American Philosophical Society* 150 (1): 86-112.

Tisdell, C.A. (1982). *Wild Pigs; Environmental pest or economic resource?* Sydney, Australia: Pergamon Press. 445 pg.

Tomich, P. (1969). *Mammals in Hawaii: A synopsis and Notational Bibliography.* Honolulu, Hawaii: Bishop Museum Press. 375 pg.

Vargas, M. May 2006. Oregon Department of Fish and Wildlife. Personal Communication.

Van Vuren, D. (1984). Diurnal activity and habitat use by feral pigs on Santa Cruz Island, California. *California Fish and Game* 70: 140-144.

Waithman, J, R. Sweitzer, D. Van Vuren, J. Drew, A. Brinkhaus, I. Gardner and W. Boyce (1999). Range expansion, population sizes, and management of wild pigs in California. *Journal of Wildlife Management* 63(1): 298-308.

Witmer, G. W.; Sanders, R. B.; Taft, A. C. (2003). Feral swine-are they a disease threat to livestock in the United States? In: Fagerstone, K. A.; Witmer, G. W. (Eds) *Proceedings of the 10th wildlife damage management conference* (pp316-325) 6–9 April 2003. Hot Springs, AR. Fort Collins, CO: The Wildlife Damage Management Working Group of The Wildlife Society.

Wood, G.W. and R.H. Barrett (1979). Status of wild pigs in the United States. *Wildlife Society Bulletin* 7(4): 237-246.

Wood, G.W. and T.E. Lynn Jr. (1977). Wild hogs in Southern forests. *Southern Journal of Applied Forestry* 1(2): 12-17.

Appendix: Oregon Revised Statues and Administrative Rules

WILDLIFE

ORS 496.004 Definitions. As used in the wildlife laws, unless the context requires otherwise:

(1) "Angle" means to take or attempt to take a fish for personal use by means involving hook and line.

(2) "Commission" means the State Fish and Wildlife Commission created by ORS 496.090.

(3) "Compatible" means capable of existing in harmony so as to minimize conflict.

(4) "Department" means the State Department of Fish and Wildlife created by ORS 496.080.

(5) "Director" means the State Fish and Wildlife Director appointed pursuant to ORS 496.112.

(6) "Endangered species" means:

(a) Any native wildlife species determined by the commission to be in danger of extinction throughout any significant portion of its range within this state.

(b) Any native wildlife species listed as an endangered species pursuant to the federal Endangered Species Act of 1973 (P.L. 93-205, 16 U.S.C. 1531), as amended.

(7) "Fund" means the State Wildlife Fund created by ORS 496.300.

(8) "Fur-bearing mammal" means beaver, bobcat, fisher, marten, mink, muskrat, otter, raccoon, red fox and gray fox.

(9) "Game mammal" means antelope, black bear, cougar, deer, elk, moose, mountain goat, mountain sheep and silver gray squirrel.

(10) "Hunt" means to take or attempt to take any wildlife by means involving the use of a weapon or with the assistance of any mammal or bird.

(11) "Manage" means to protect, preserve, propagate, promote, utilize and control wildlife.

(12) "Optimum level" means wildlife population levels that provide self-sustaining species as well as taking, nonconsumptive and recreational opportunities.

(13) "Person with a disability" means a person who complies with the requirement of ORS 496.018.

(14) "Shellfish" has the meaning given that term in ORS 506.011.

(15) "Species" means any species or subspecies of wildlife.

(16) "Take" means to kill or obtain possession or control of any wildlife.

(17) "Threatened species" means:

(a) Any native wildlife species the commission determines is likely to become an endangered species within the foreseeable future throughout any significant portion of its range within this state.

(b) Any native wildlife species listed as a threatened species pursuant to the federal Endangered Species Act of 1973 (P.L. 93-205, 16 U.S.C.

1531), as amended.

(18) "Trap" means to take or attempt to take any wildlife by means involving the use of a trap, net, snare or other device used for the purpose of capture.

(19) "Wildlife" means fish, shellfish, wild birds, amphibians and reptiles, feral swine as defined by State Department of Agriculture rule and other wild mammals.

ORS 498.052 Releasing domestically raised or imported wildlife without permit prohibited. No person shall release within this state any domestically raised wildlife or wildlife brought to this state from any place outside this state unless the person first obtains a permit therefor from the State Fish and Wildlife Commission.

CONTROL AREAS

ORS 570.405 Department may establish control areas; limitations.

(1) The State Department of Agriculture may establish, in accordance with the provisions governing the procedure for the declaring of quarantines contained in ORS 561.510 to 561.590, control areas within this state, if after careful investigation it determines that such areas are necessary for the general protection of the horticultural, agricultural or forest industries of the state from diseases, insects, animals or noxious weeds or for the eradication or exclusion from such areas of certain plants or their produce, trees, diseases, animals, insects or noxious weeds that may be a menace to such areas and generally to horticultural, agricultural or forestry industries. Whenever eastern filbert blight is found to exist, the department may declare it a hazard and may establish a control area without having to prove how the disease is transmitted.

(2) The power and authority to establish such control areas and for the eradication or exclusion of certain plants or their produce, trees, diseases, insects, animals or noxious weeds existing therein or to be excluded therefrom shall be exercised reasonably and justly considering the exigencies of the particular situation, the danger to the interests sought to be protected and the immediate and continuing effect upon the property and the owners of the property in the areas established. Such powers shall in no case be exercised unreasonably, unjustly or arbitrarily.

(3) The department in such determination shall define the boundaries of the areas and specify the character and kinds of plants or their produce, trees, diseases, insects, animals or noxious weeds to be eradicated or excluded and the manner and method of such eradication or exclusion.

CIVIL LIABILITY

ORS 608.015 Civil liability for animals trespassing on adequately fenced land situated on open range.

(1) As used in this section, "open range" means an area wherein livestock may lawfully be permitted to run at large.

(2) A person who permits a horse, mule, ass, sheep, goat or animal of the bovine species to trespass on land enclosed by an adequate fence and situated on open range shall be liable to the owner or lawful possessor of the enclosed land for damage done by the animal. The person seeking to recover the damages shall plead and prove that the fence of the person consisted of structures, masonry, hedges, ditches, rails, poles, planks, rivers, streams, ponds, lakes, wire fences, natural or artificial barriers of any kind or any combination thereof. The adequacy of the fence shall be determined by reference to the customs and practices of good husbandmen in the particular area with reference to fences. The question of the existence of the fence and the adequacy thereof are questions of fact.

(3) Nothing contained in subsection (2) of this section is intended to modify the provisions of ORS 608.310 to 608.400

FENCING AGAINST HOGS

ORS 608.510 Fencing against hogs. The owner or occupant of premises is not required to fence against hogs. No owner or person entitled to the possession of a hog shall permit it to run at large or upon the property of another person

PREDATORY ANIMALS

ORS 610.002 "Predatory animals" defined. As used in this chapter, "predatory animal" or "predatory animals" includes feral swine as defined by State Department of Agriculture rule, coyotes, rabbits, rodents and birds that are or may be destructive to agricultural crops, products and activities, but excluding game birds and other birds determined by the State Fish and Wildlife Commission to be in need of protection.

ORS 610.105 Authority to control noxious rodents or predatory animals. Any person owning, leasing, occupying, possessing or having charge of or dominion over any land, place, building, structure, wharf, pier or dock which is infested with ground squirrels, and other noxious rodents or predatory animals, as soon as their presence comes to the knowledge of the person, may, or the agent of the person may, proceed immediately and continue in good faith to control them by poisoning, trapping or other appropriate and effective means.

DEPARTMENT OF AGRICULTURE

OAR 603-010-0055 Feral swine are animals of the genus Sus which meet the following conditions:

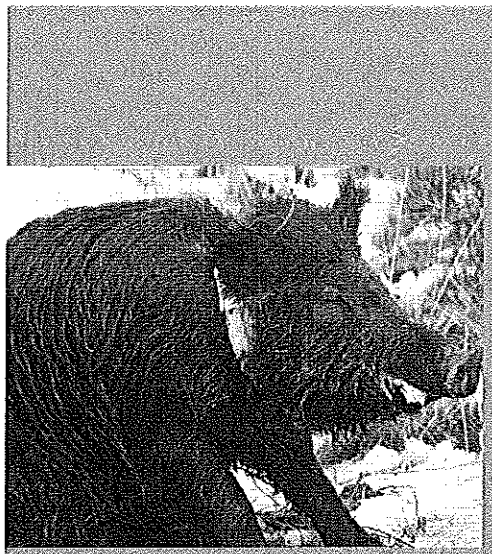
(1) The animals are free roaming on public or private lands and not being held under domestic management confinement;

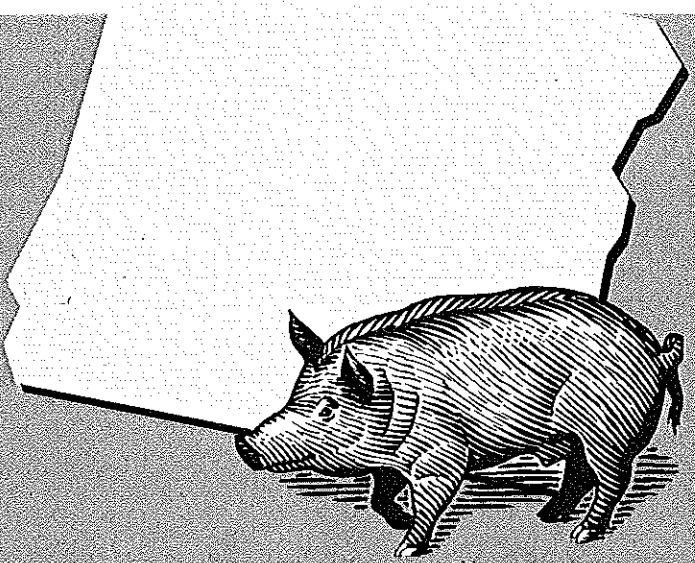
(2) No notification to the land owner, manager, or occupant has been made by the swine owner or their representative of specifically identified and described swine having escaped domestic management confinement within a radius of five (5) miles during the past five (5) days;

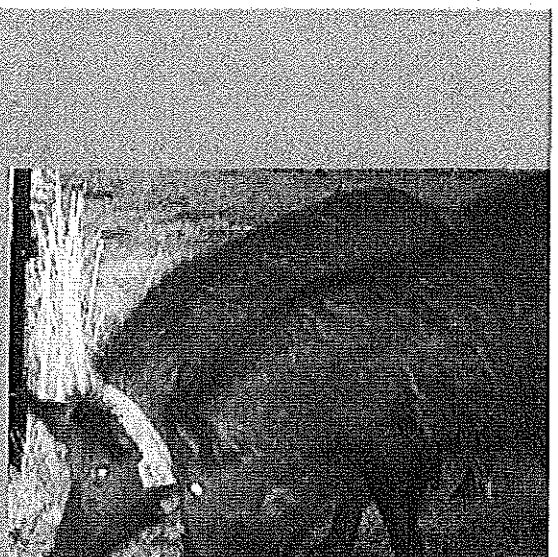
(3) The swine under consideration do not appear to be domesticated and are not tame; and

(4) The swine under consideration do not meet the identification and description of escaped swine in section (2) above.

Exhibit O







Feral Swine in Wasco County

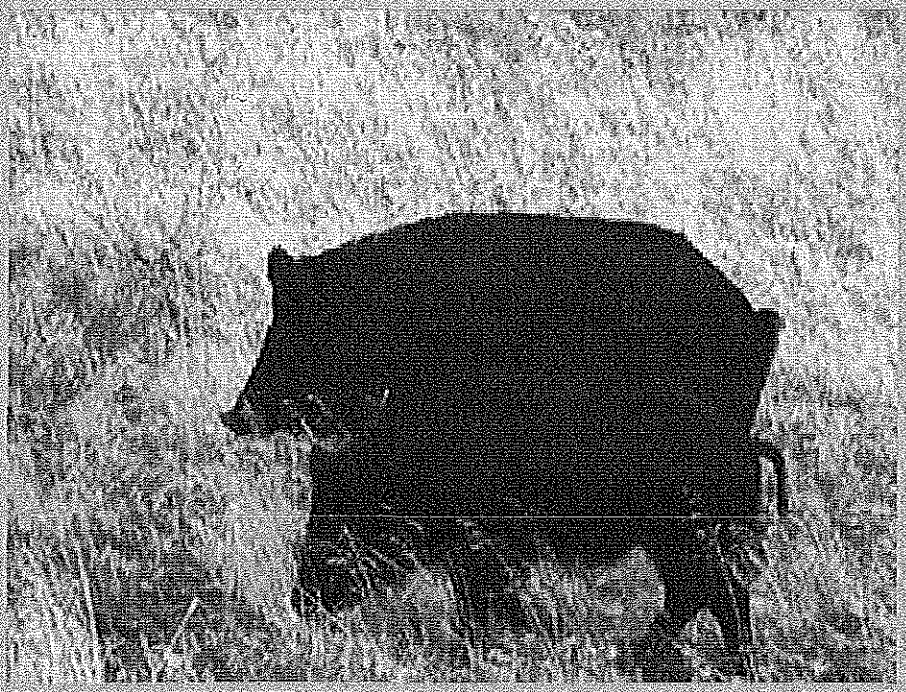
Josh Thompson
Conservation Planner
Wasco County SWCD

What is a Feral Swine?

- Define by OAR 603 010 0055 as;
- Free roaming pigs on public or private lands and not being held under domestic management confinement;
- No notification to the land owner, manager, or occupant has been made by the swine owner or their representative of specifically identified and described swine having escaped domestic management confinement within a radius of five (5) miles during the past five (5) days;

What is a Feral Swine?

- The swine under consideration do not appear to be domesticated and are not tame; and
- The swine under consideration do not meet the identification and description of escaped swine in section (2) above.



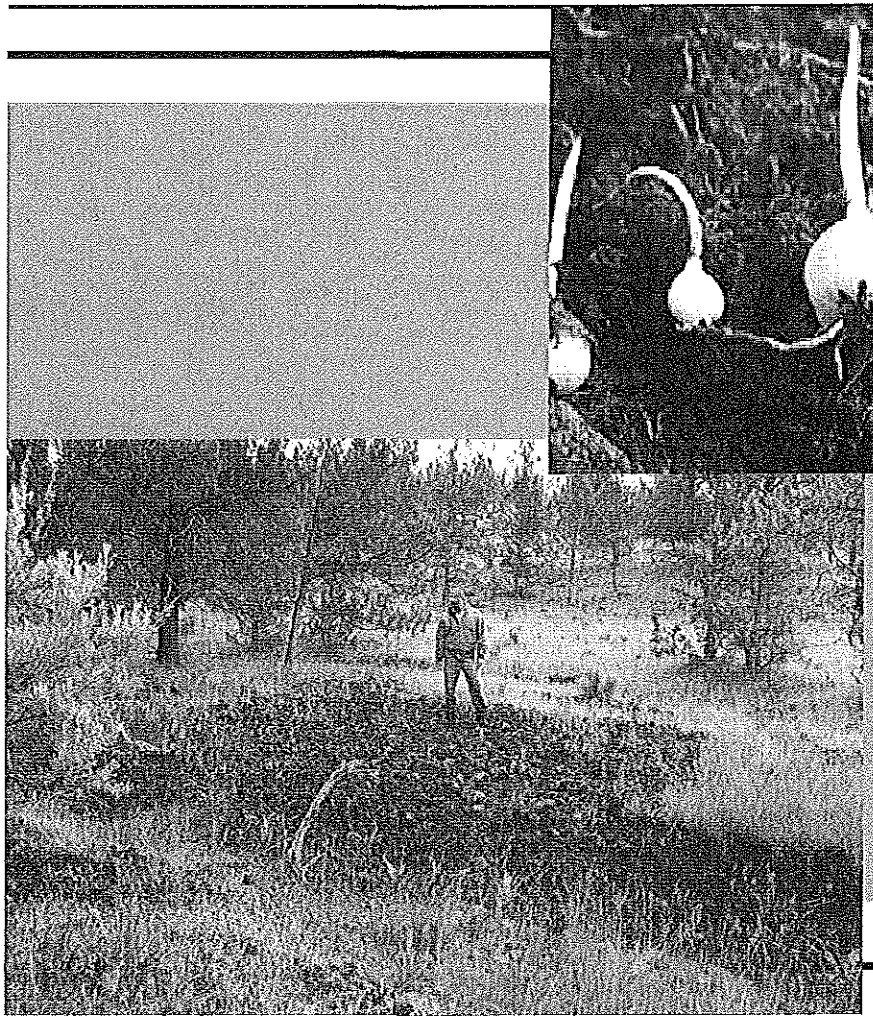
Biology

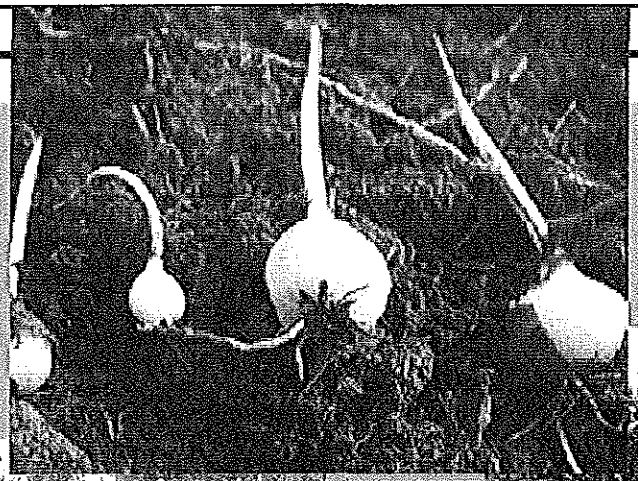
- The average litter size is 4 to 8, and as many as 10 to 13 have been recorded
- Sows can produce 2 litters every 12 to 15 months
- With adequate nutrition, a feral hog population can double in four months

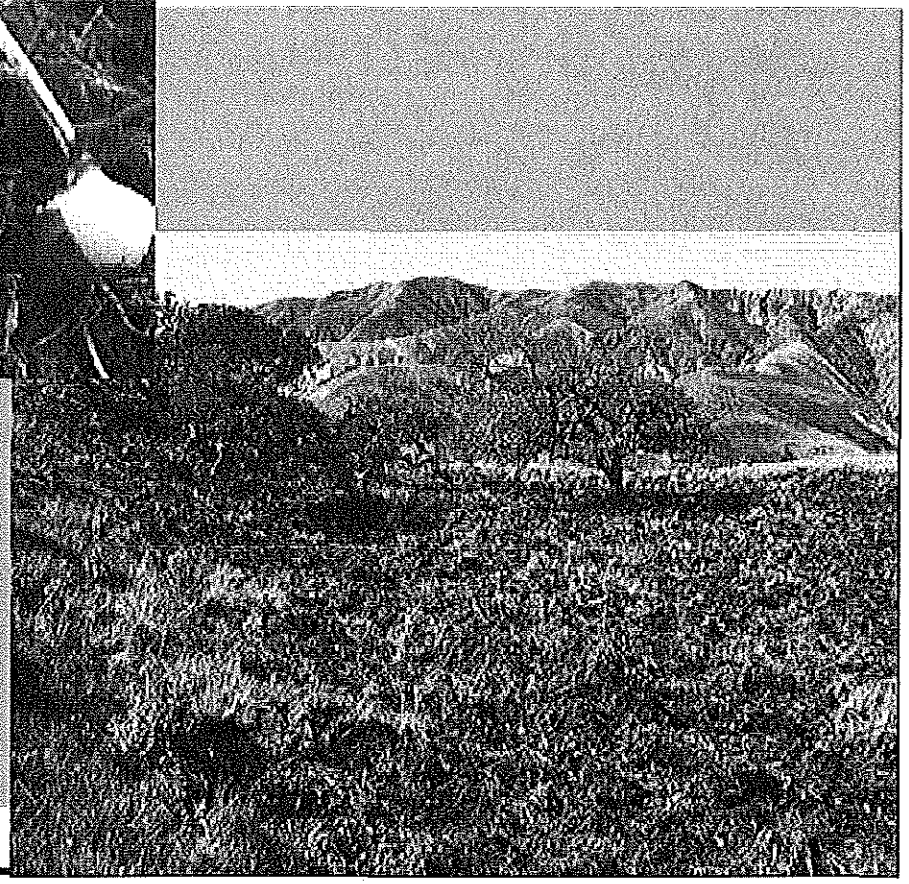
Biology

- When hunted or warm weather, they become almost exclusively nocturnal.
- Although their eyesight is poor, their hearing and sense of smell are excellent.

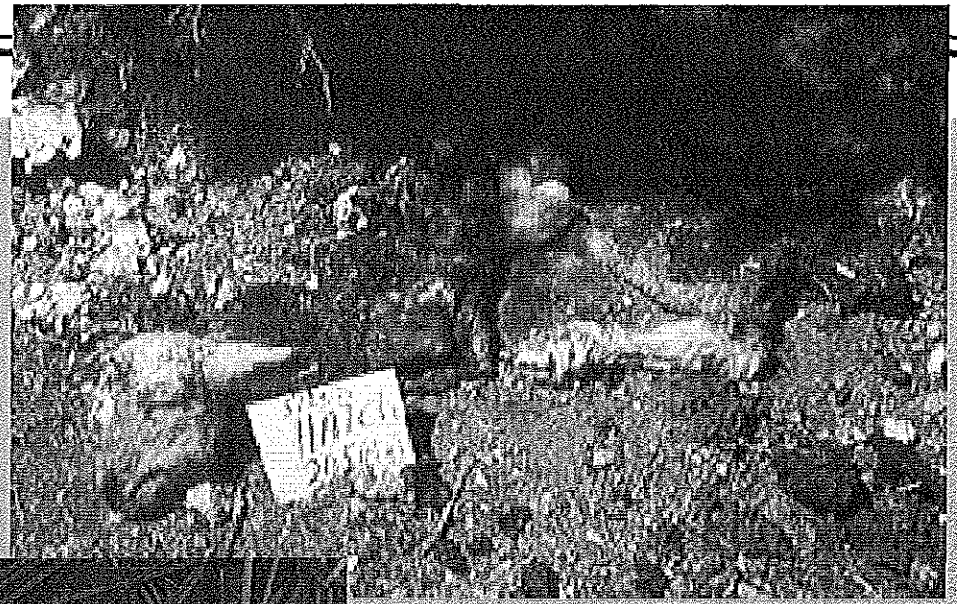
Feral Hog Damage in Oregon







Depredation



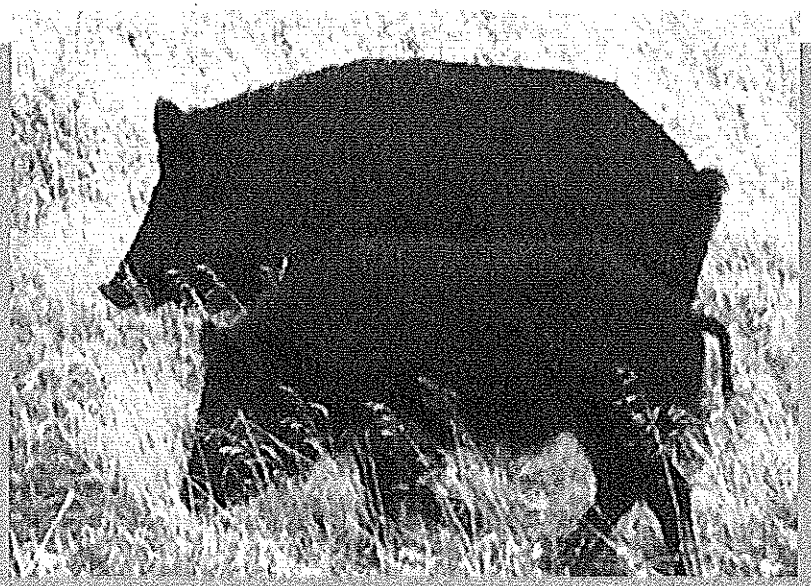
Potential For Disease Transmission

Feral Swine Diseases

- 30 major viral and bacterial diseases
- 32 parasites
- 13 zoonotic diseases

How are they Getting Here?

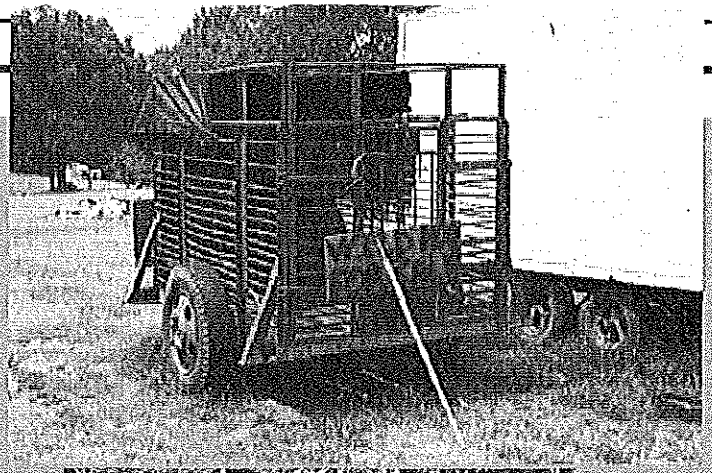
- **Accidentally**
  - Escape
  - Migrate

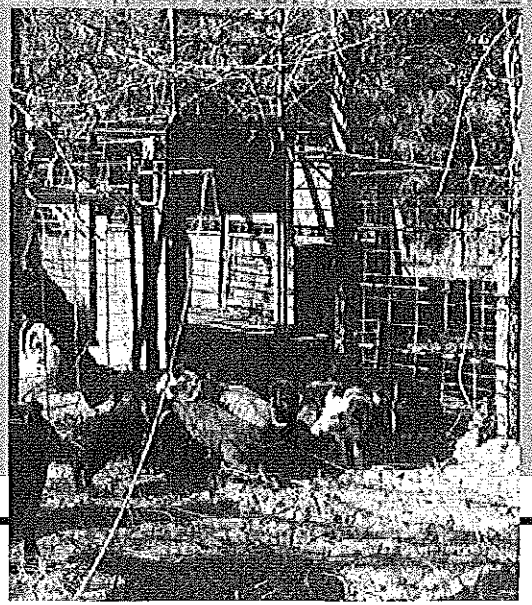


How are they Getting Here?

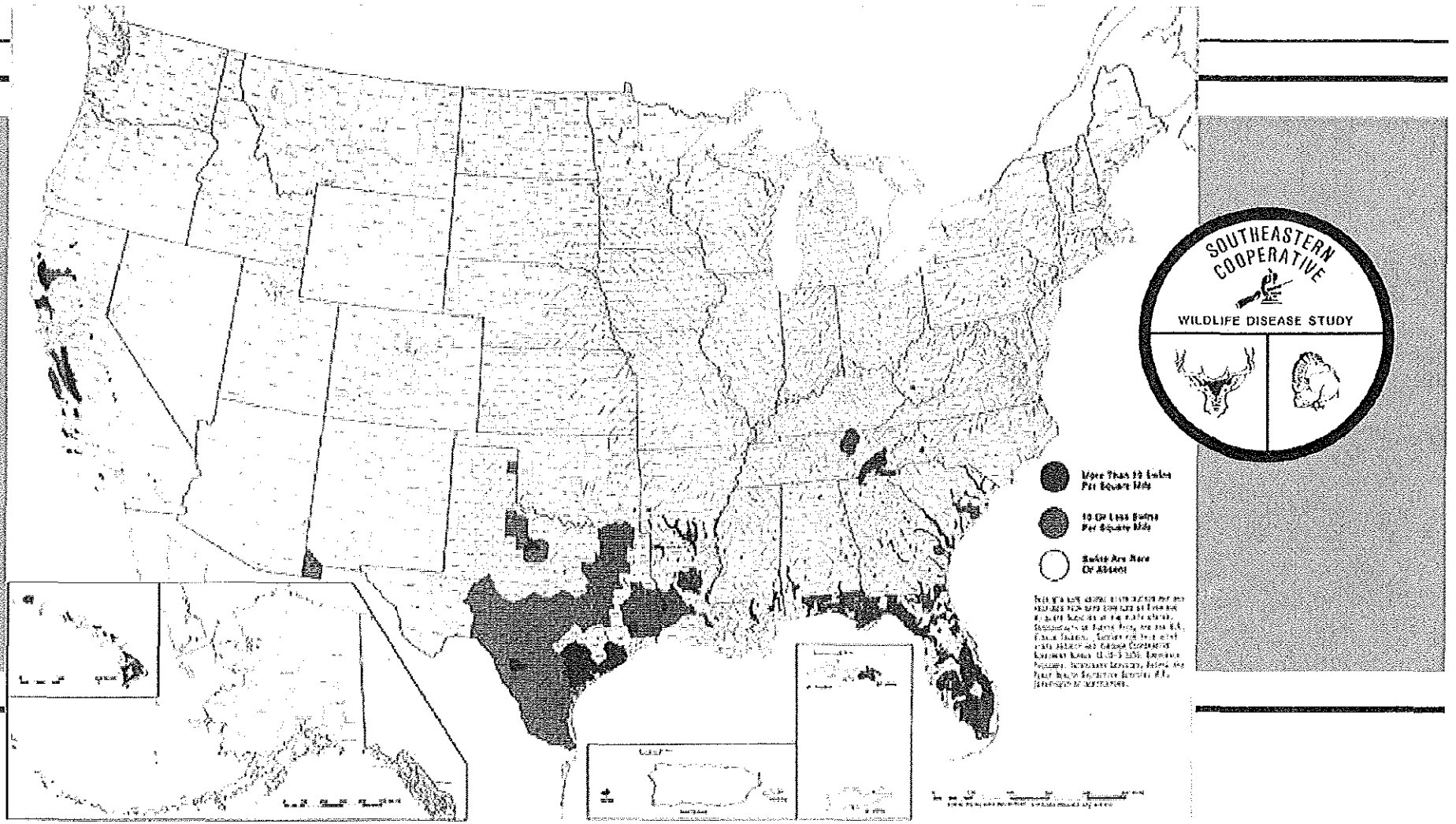
Intentionally

- Food supply
- Release them to hunt.
- Economic reasons.

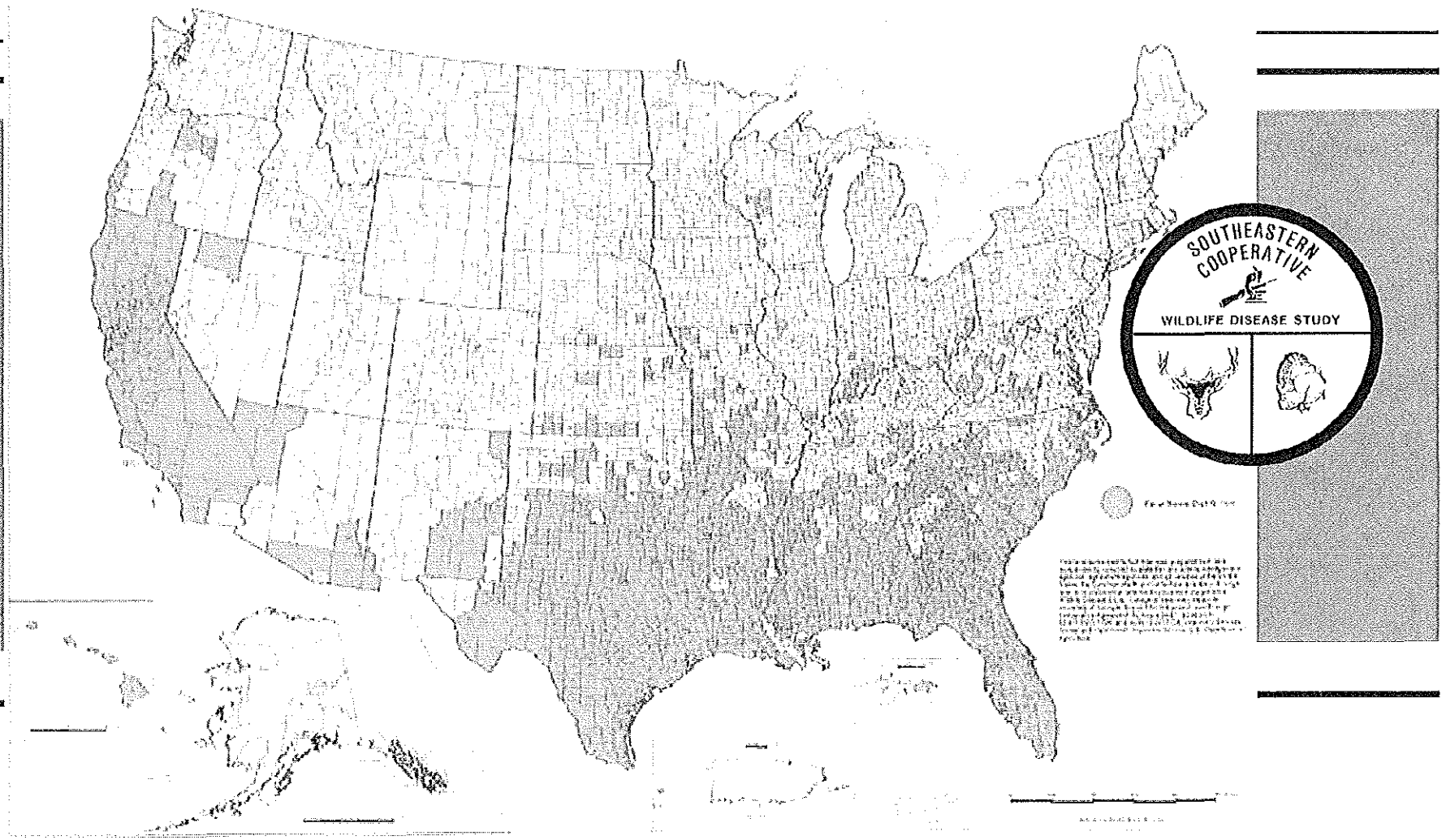




Feral Swine Distribution, 1982

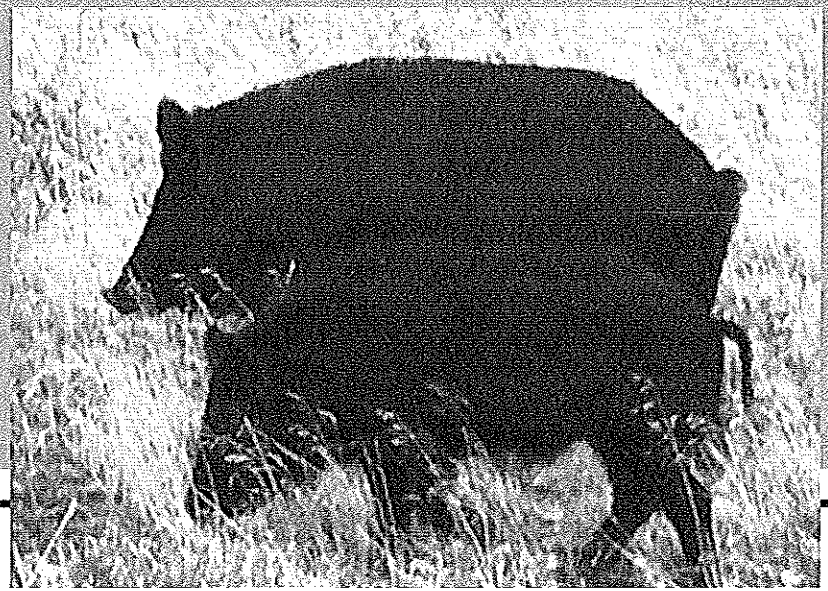


Feral Swine Distribution, 2004

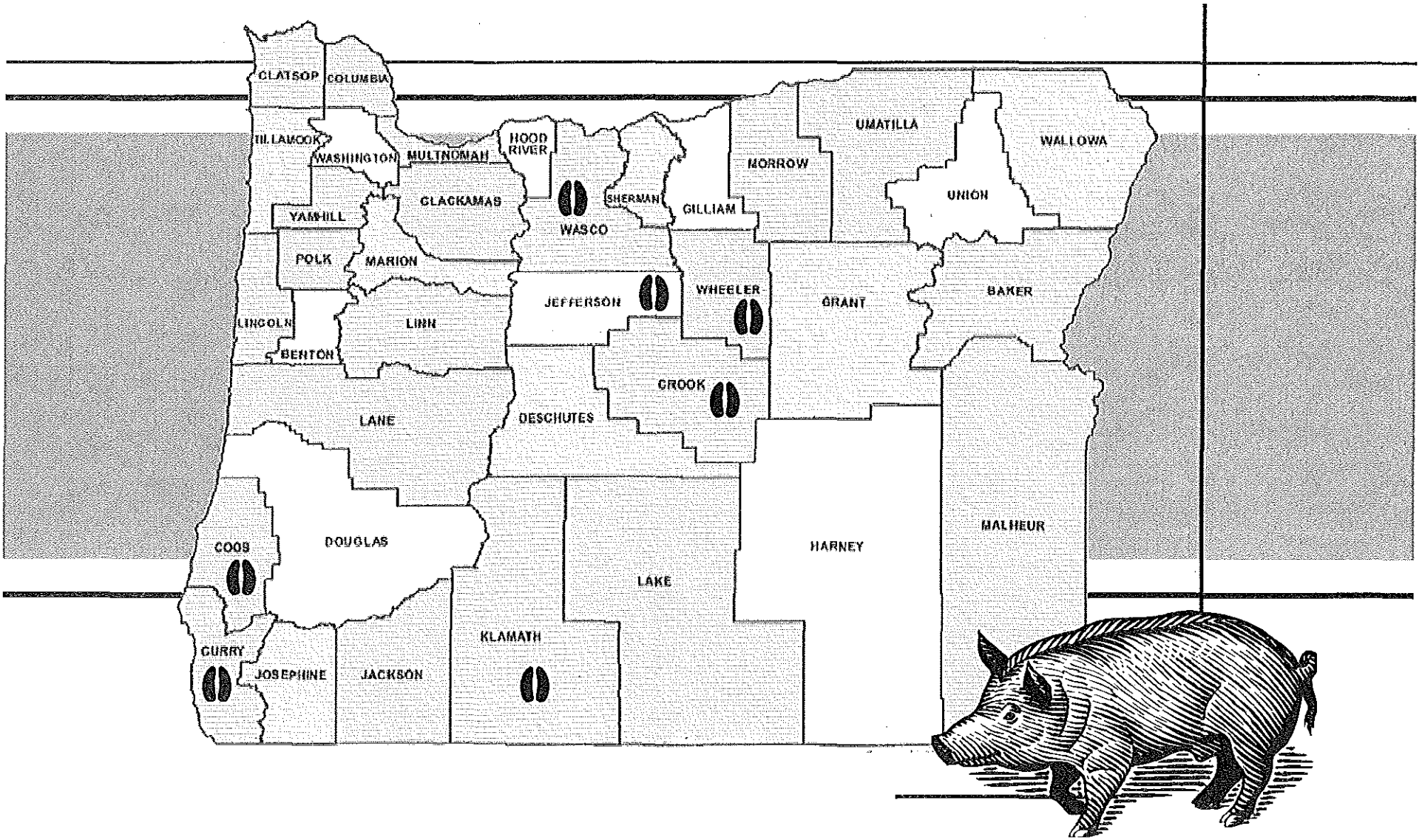


What is the cost?

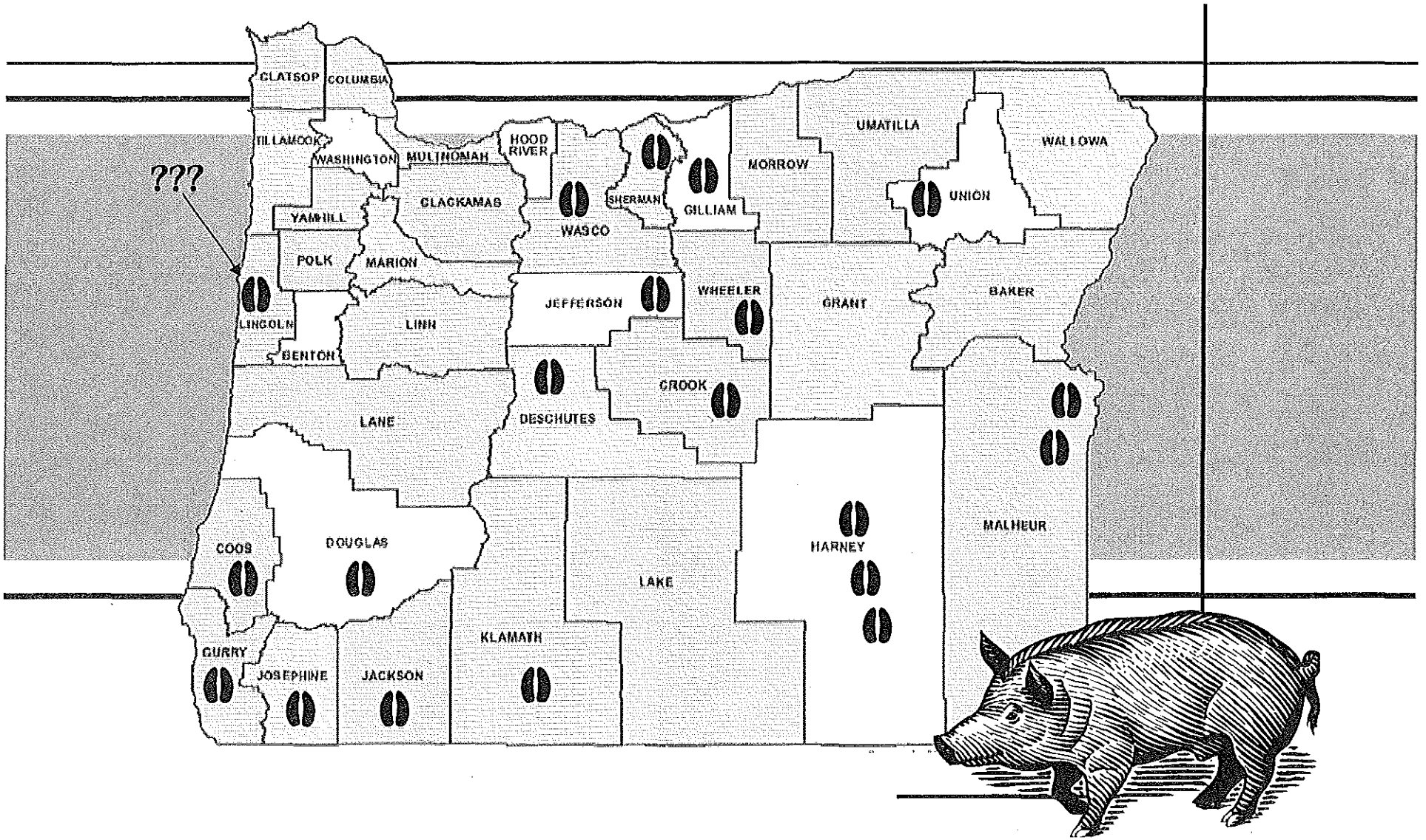
- Nationwide, $800 million.
- Texas (2006), $52 million.
- Florida (2004), $1.2-$4 million.



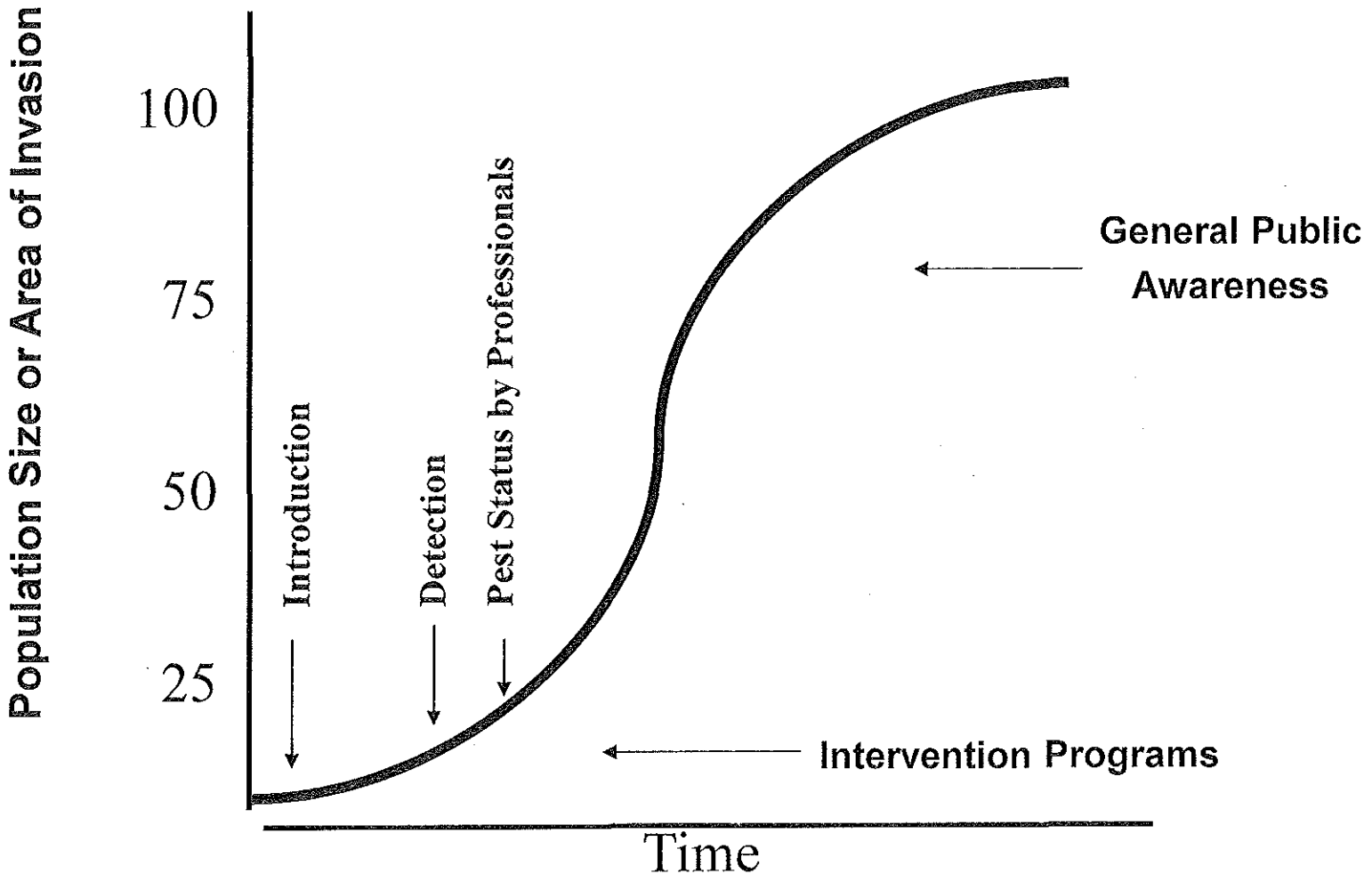
Oregon, 2004


CLATSOP
COLUMBIA
TILLAMOOK
WASHINGTON
MULTNOMAH
HOOD RIVER
CLACKAMAS
SHERMAN
GILLIAM
MORROW
UMATILLA
WALLOWA
UNION
YAMHILL
WASCO
POLK
MARION
JEFFERSON
WHEELER
GRANT
BAKER
LINCOLN
LINN
BENTON
CROOK
LANE
DESCHUTES
COOS
DOUGLAS
HARNEY
MALHEUR
LAKE
CURRY
JOSEPHINE
JACKSON
KLAMATH

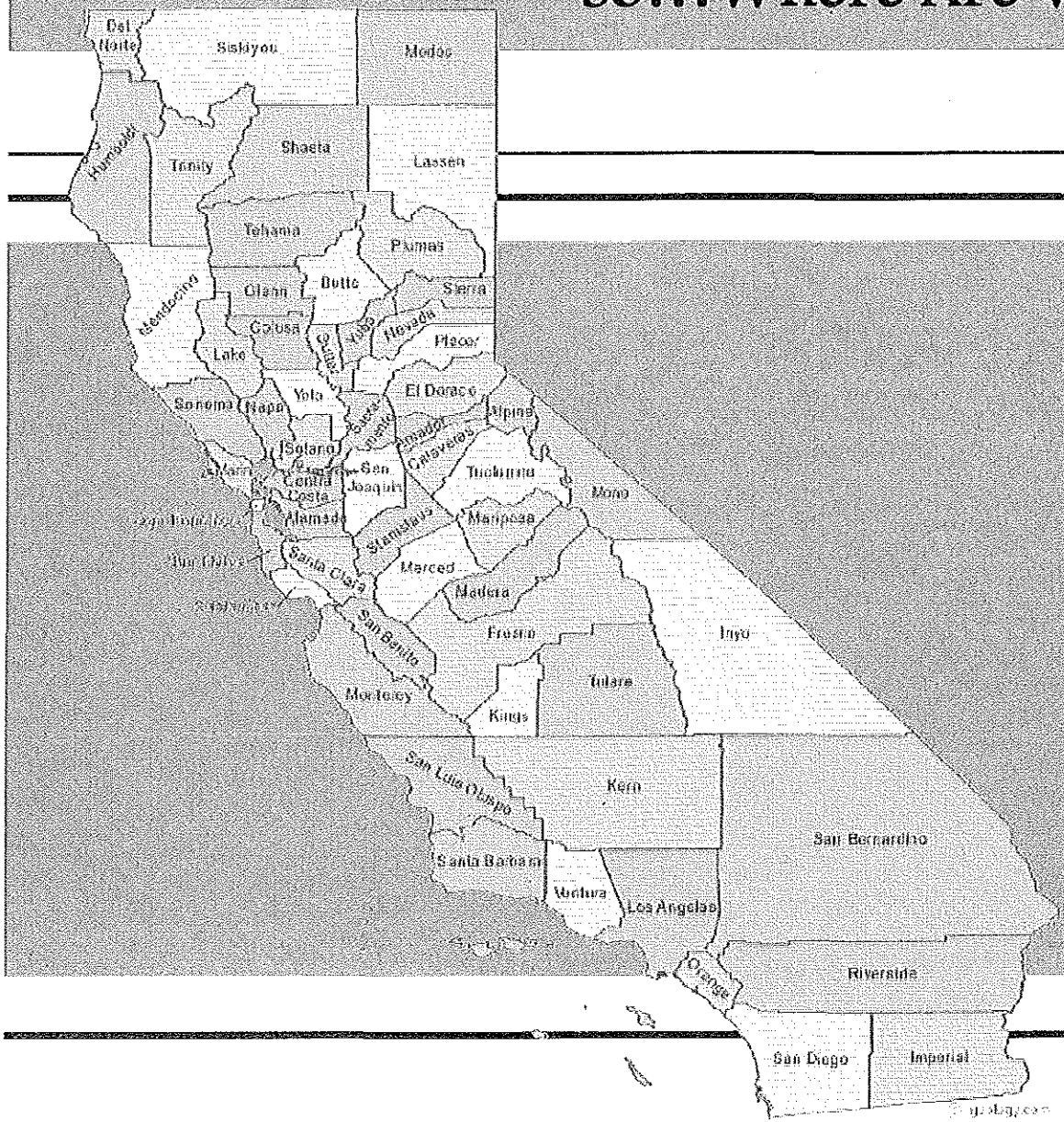
Oregon, 2008


???
CLATSOP
COLUMBIA
TILLAMOOK
WASHINGTON
MULTNOMAH
HOOD RIVER
CLACKAMAS
YAMHILL
POLK
MARION
LINCOLN
BENTON
LINN
WASCO
SHERMAN
GILLIAM
MORROW
UMATILLA
WALLOWA
UNION
JEFFERSON
WHEELER
GRANT
BAKER
CROOK
DESCHUTES
LANE
COOS
DOUGLAS
CURRY
JOSEPHINE
JACKSON
KLAMATH
LAKE
HARNEY
MALHEUR

Early Detection and Rapid Response

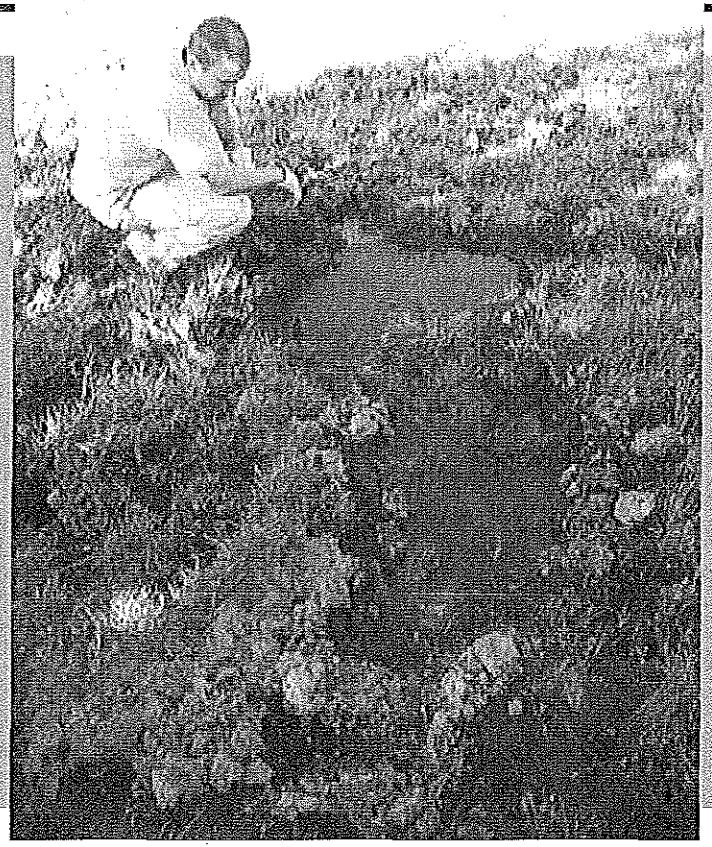


So…Where Are We??



- In the 1950's California had about 1,500 swine in a few counties.
- Today, all but 1 county in California has feral swine, and
- Their population is estimated to be between 200,000 and 1 million.

Feral Swine Sign



Wallows

Feral Swine Sign

Rub trees

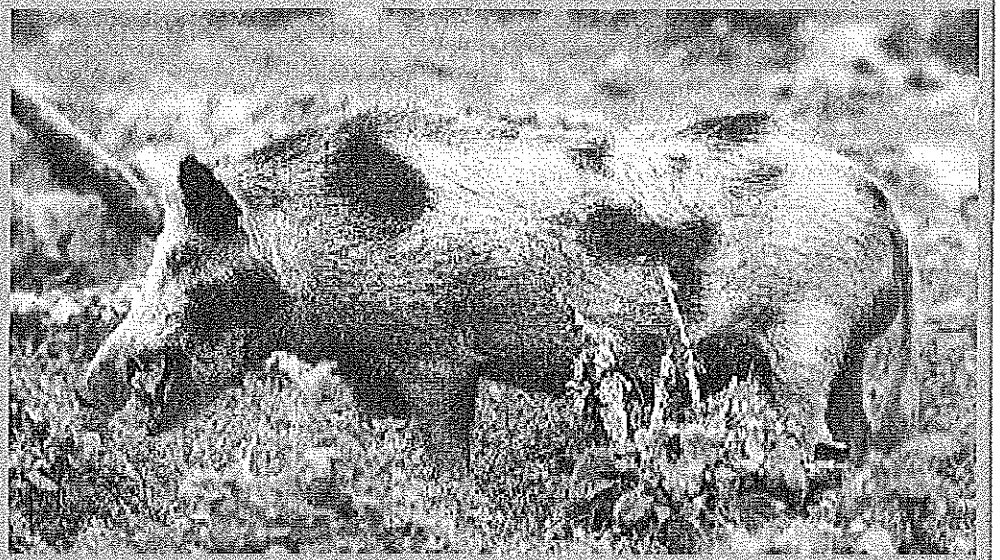
Management Tools

Status in Oregon

Feral swine are considered predatory animals on private property.

On public land you only need a hunting license.

No seasons, no limits.



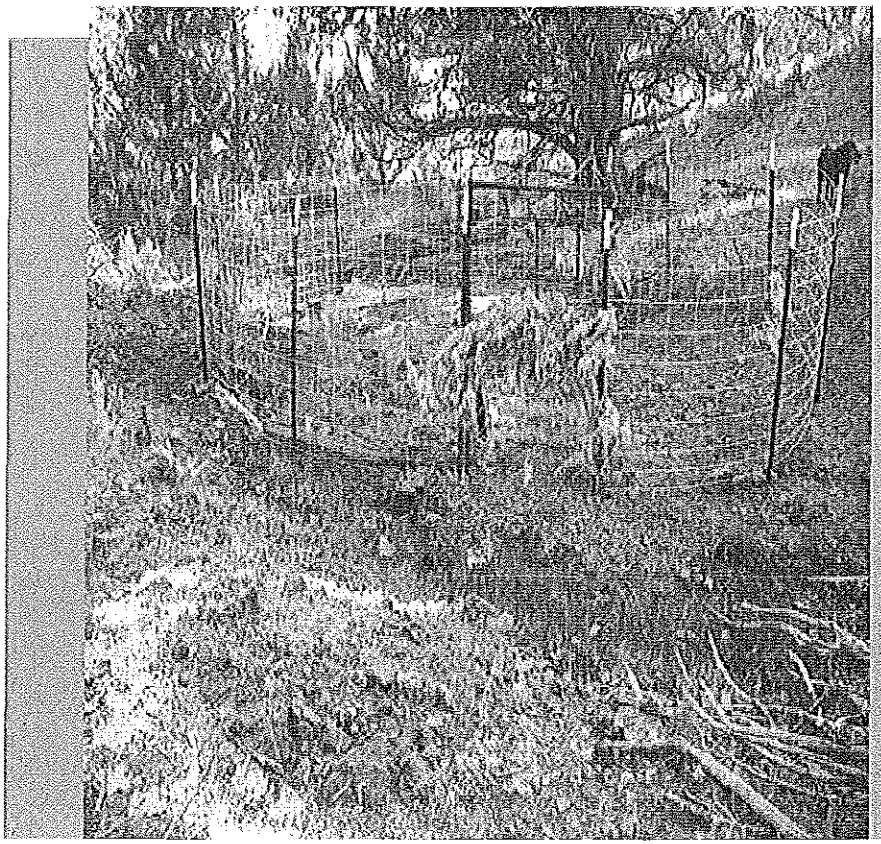
Management Tool

- Very fecund and thus 70% of a population must be removed <u>every year</u> to keep a population at its existing level.
- Hunters on average, even with unlimited hunting, only remove 40%-50%.

Management Tool

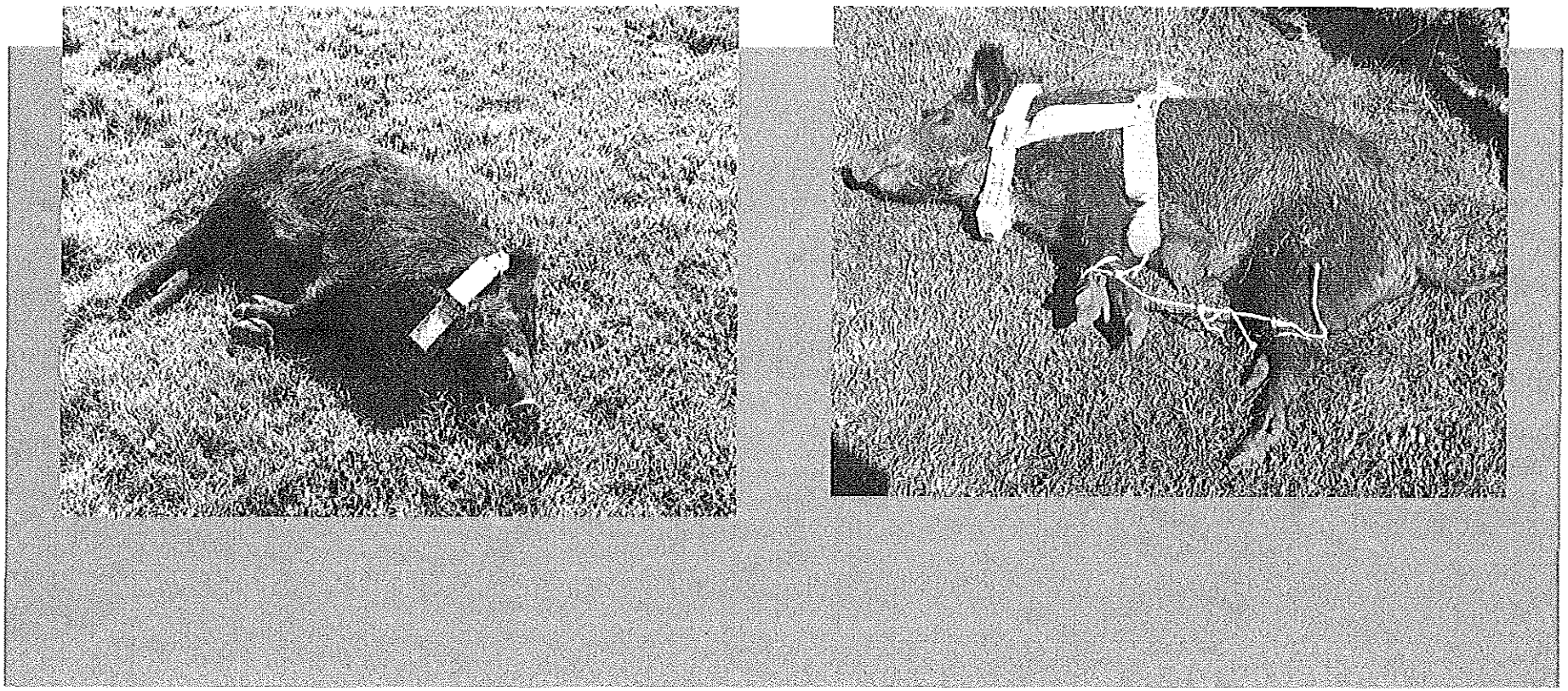
Remote Camera System

Management Tools



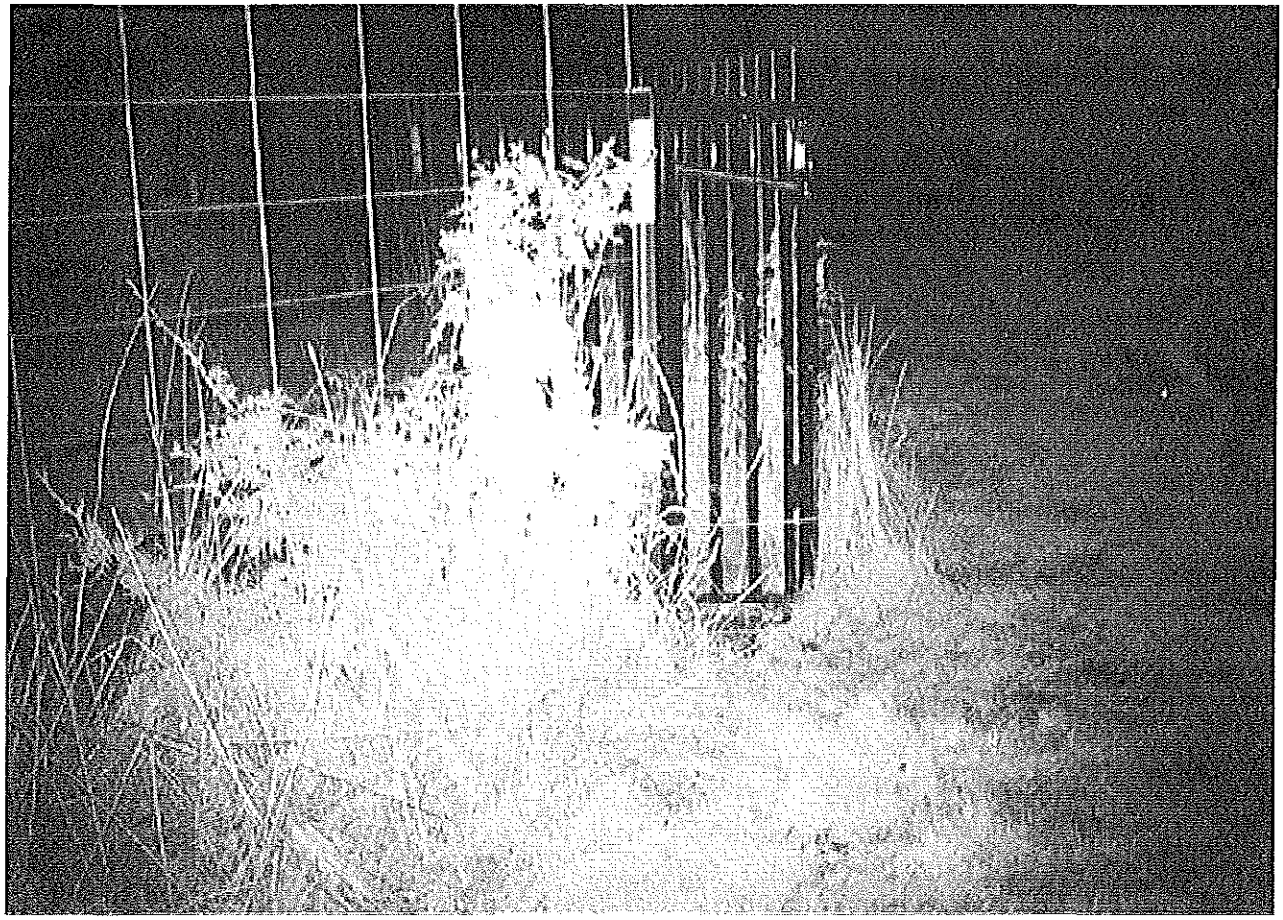
Corral Trapping

Management Tool



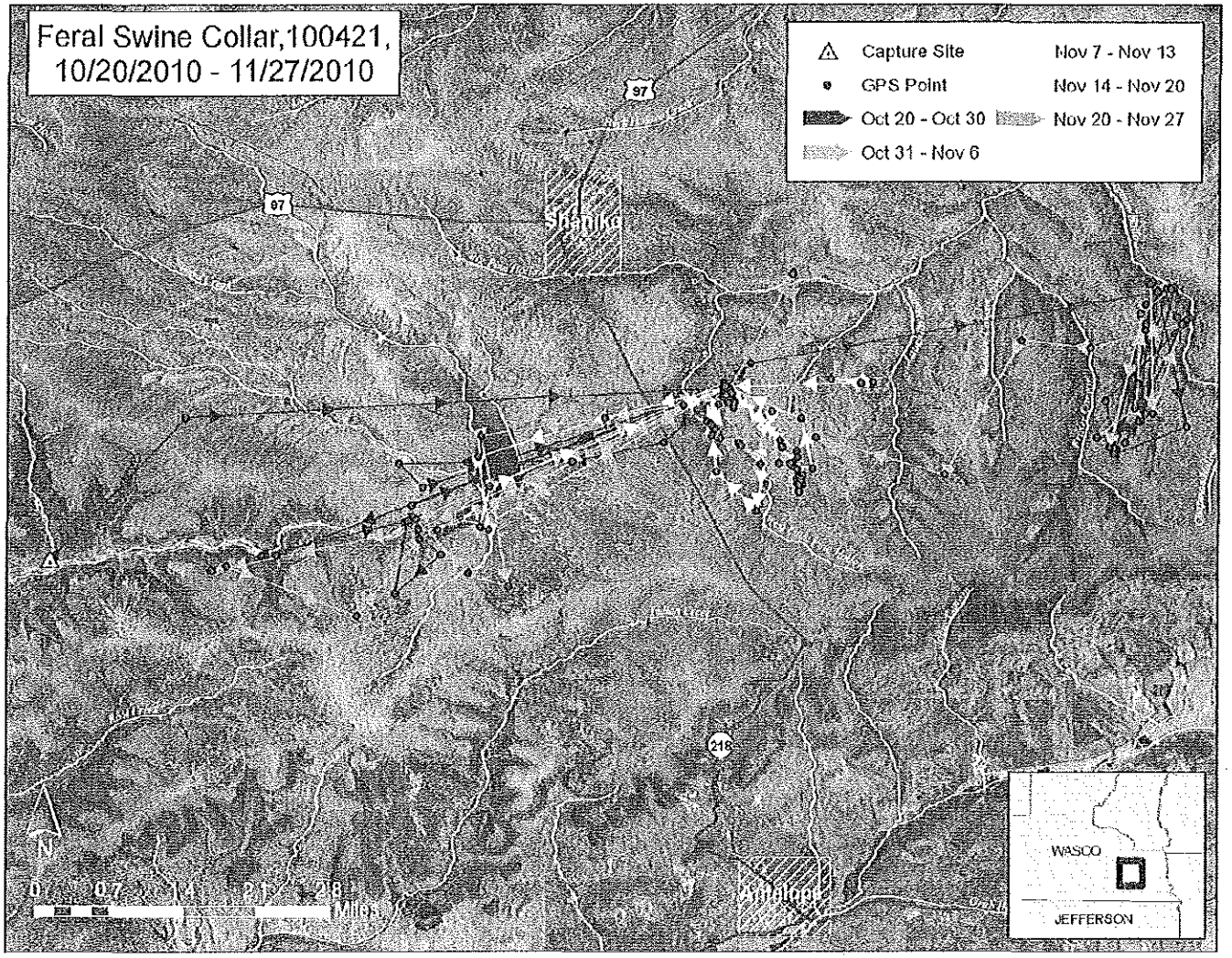
"Judas" Pig Operation

Management Tool

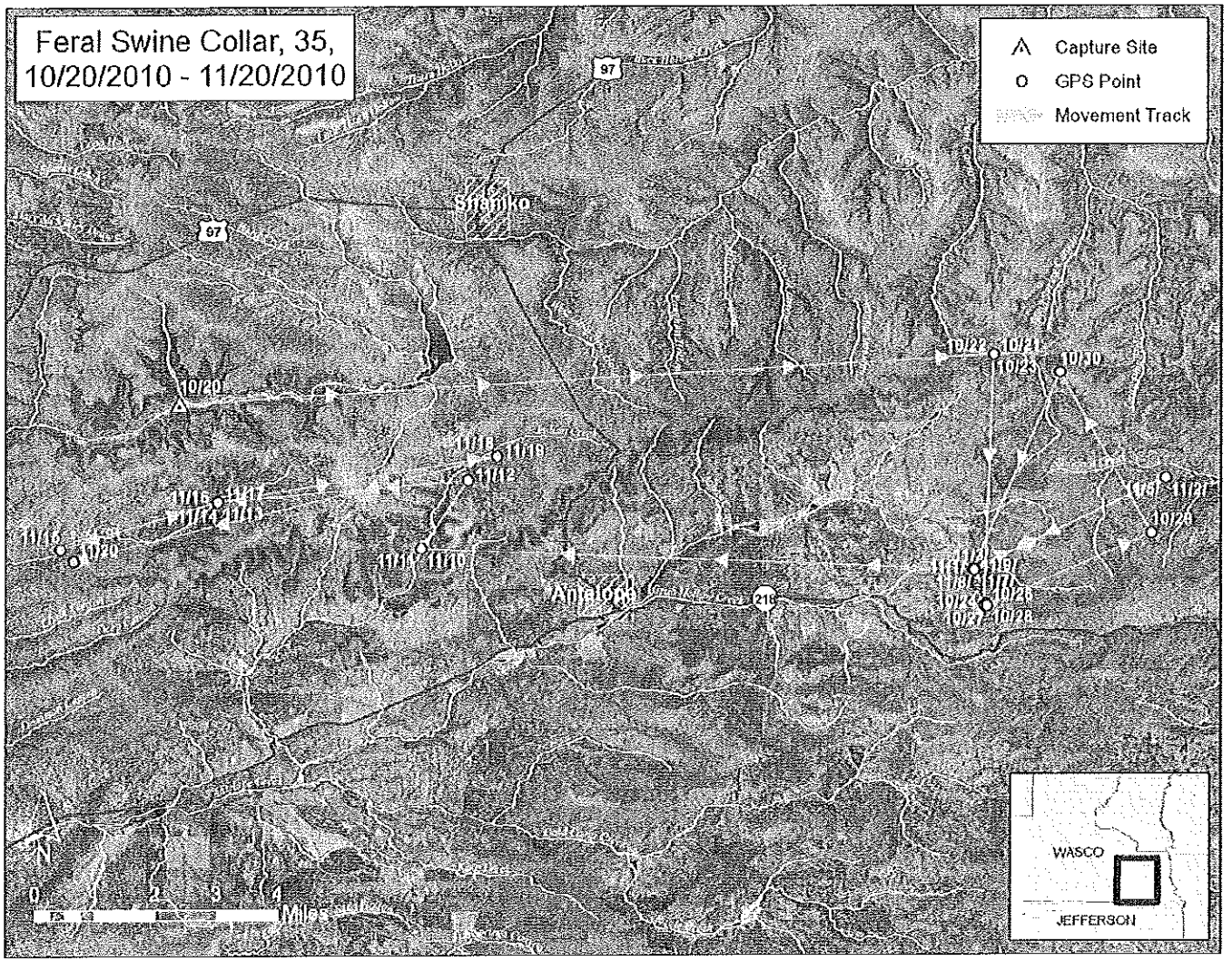


Collared Boar Caught on Camera

Management Tool



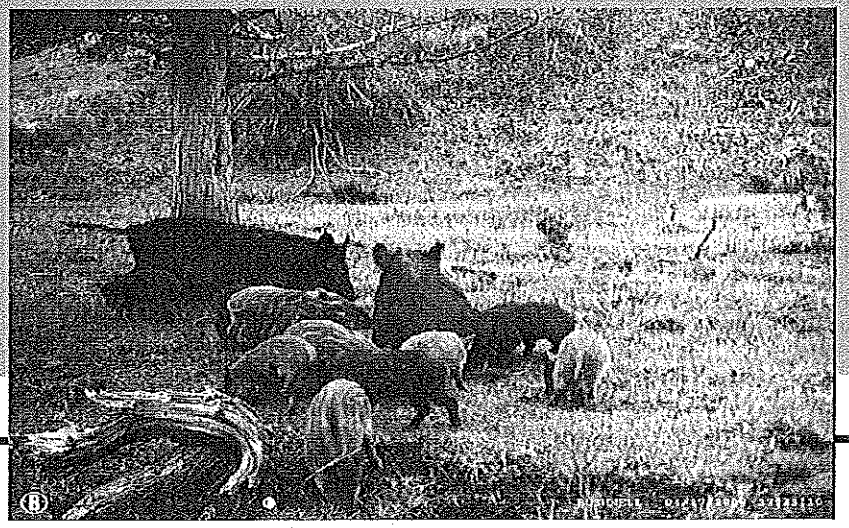
GPS Collar Locations



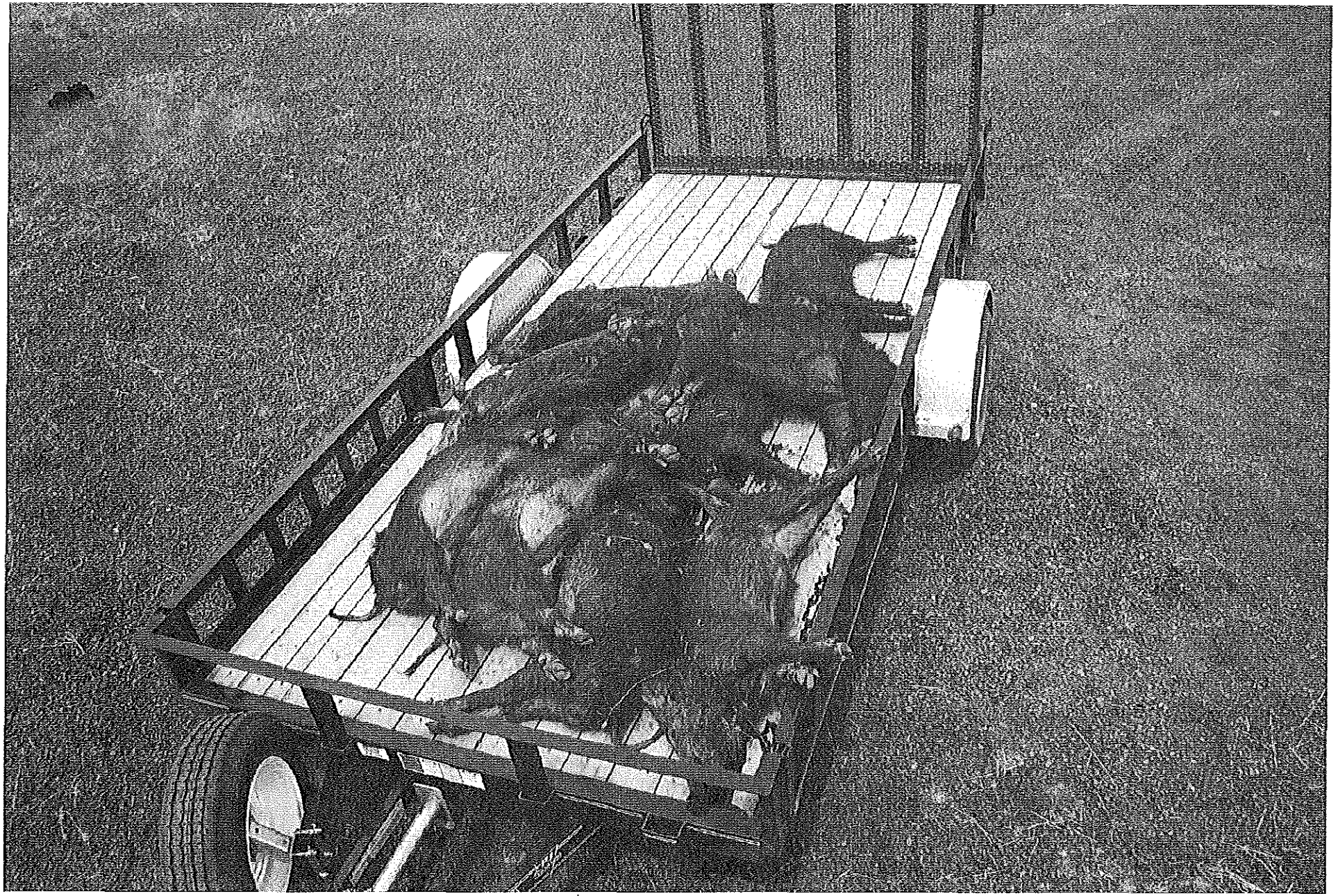
Management Tool

Aerial Gunning

New Rules

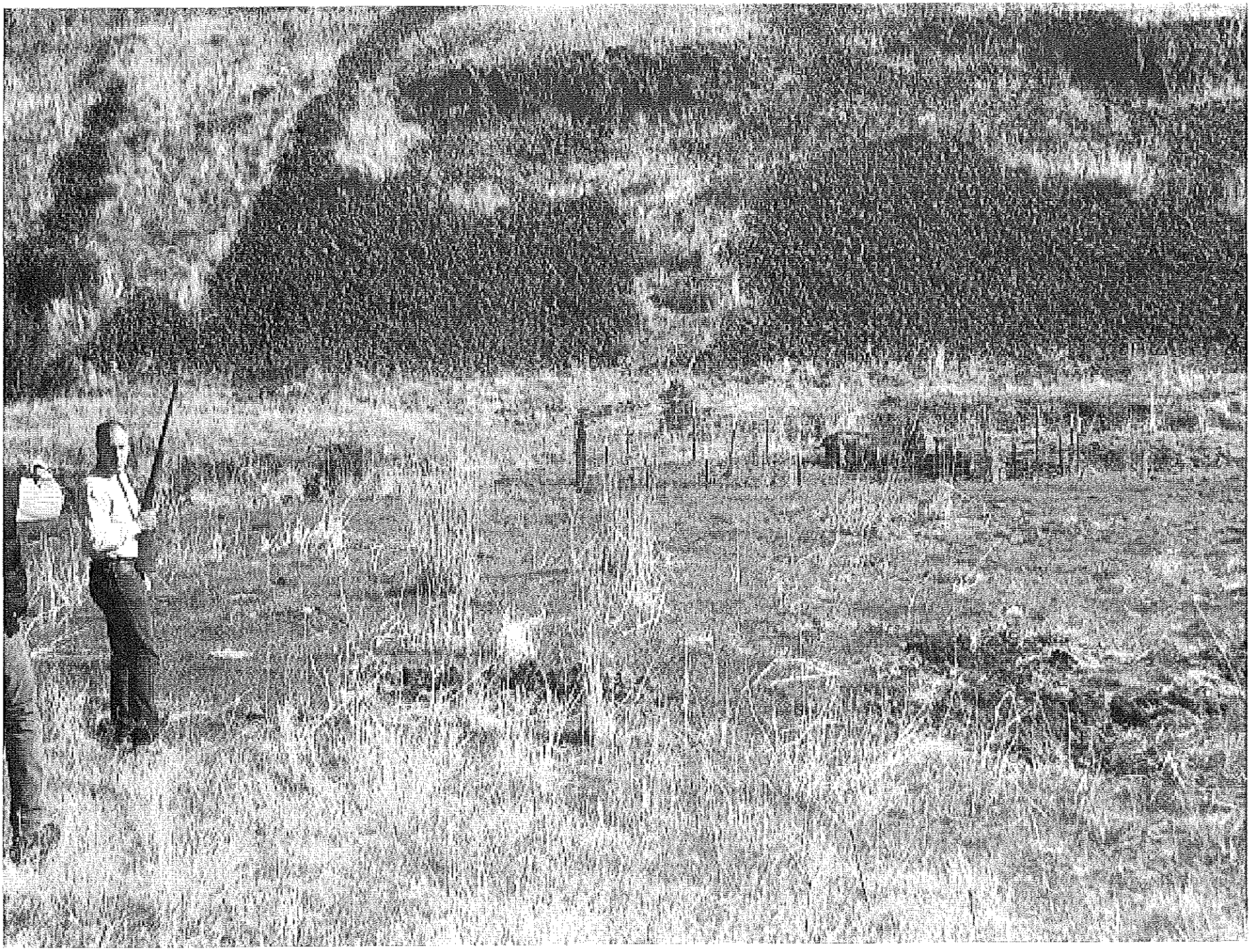


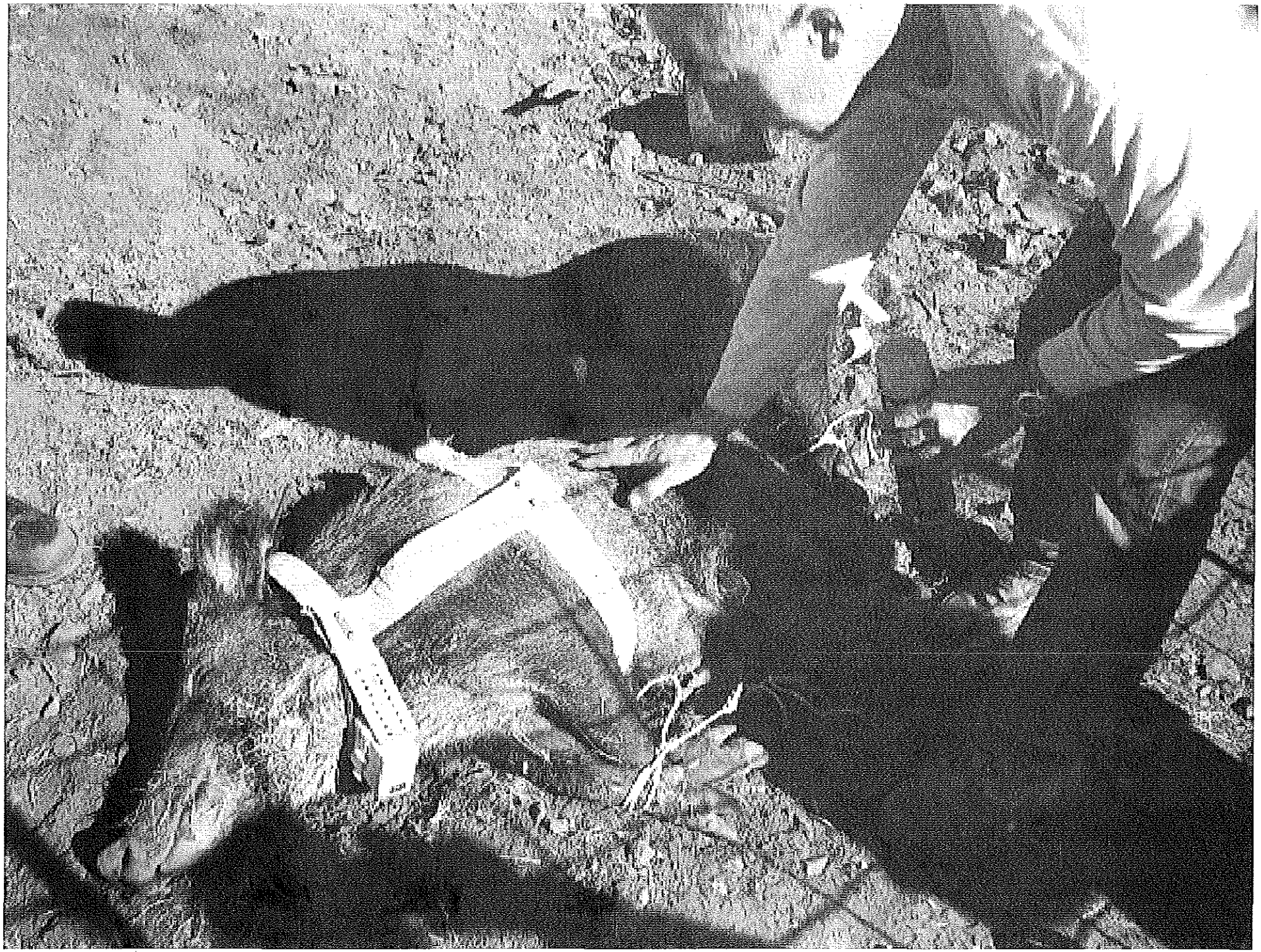
- Makes it a crime to offer for sale or sell of hunts for feral swine.
- Notify ODFW of presence of feral swine. Feral Swine Removal Plan.




N783FR


N783FB






10/19/2010


10/19/2010

Questions ?

Contact Information:

Josh Thompson
Conservation Planner
Wasco County SWCD
541-296-6178 x116
Josh.thompson@or.nacdnet.net

Exhibit E

Mid-Columbia Regional Home Repair Program

Policies and Procedures

2011

CONTENTS

MID-COLUMBIA REGIONAL
HOME REPAIR LOAN PROGRAM
POLICIES

INTRODUCTION

The Mid Columbia Regional Home Repair Program, funded through repayments through previous Oregon Community Development Block Grants (OCDBG), was initiated as a response to a community survey. As loans are repaid in each county, funds will first be targeted to that county, but not required to be used there.

The target area is chosen on the basis of housing conditions, income and availability of other sources of assistance and community support.

The goals of the Home Repair Loan Program are:

1. To alleviate health and safety problems, including lead-based paint hazards and correct structural deficiencies in target area homes.
2. To conserve and improve existing low income housing stock.
3. To increase housing opportunities for low and moderate income households.
4. To enable lower income residents of the targeted areas to remain in their homes.

SECTION 1: APPLICANT ELIGIBILITY

In order to be eligible for a Home Repair Loan, an applicant must meet all of the following requirements:

1:1 **Residency:** The applicant must own and occupy the property to be repaired. More than 50% of the floor space of the dwelling must be occupied by the applicant. The property must also be in Sherman, Wasco or Hood River Counties. Efforts will be made to ensure an equitable distribution of grants throughout the entire region.

1:2 **Homeowner preferences:** A preference of 1 point each will be given to homeowners who are:

a) Earning less than 50% of the county median income
b) Over the age of 65
c) Disabled Veterans
d) Other disabled
e) Families
f) Living in homes requiring immediate safety repairs

1:3 **Incomes:** Annual gross income of the applicant household should not exceed 50% of county median income limits established by Housing and Urban Development (HUD) and must not exceed 80%. The limits by family size are listed on page 12.

1:31 Total gross income includes, but is not limited to, the following: wages, tips, net income from operation of a business or profession, unemployment, interest, dividends, social security benefits, pensions, annuity income, alimony, child support, welfare payments, Veterans' benefits, disability benefits, stipends, or living allowances.

1:32 Annual income does not include the following:

a) Income from employment of children (including foster children) under the age of 18 years.

b) Earnings in excess of $480 for each full-time student 18 years or older (excluding the head of household and spouse).

c) Payments received for the care of foster children.

d) Lump-sum additions to family assets, such as inheritances, insurance payments (including payments under health and accident insurance and worker's compensation), capital gains and settlement for personal or property losses.

e) Amounts received by the family that is specifically for, or in reimbursement of the cost of medical expenses for any family member.

f) Income of a live-in aide.

g) Amounts of educational scholarships paid directly to the student or to the educational institution, and amounts paid by the Government to a veteran, for use in meeting the costs of tuition, fees, books, equipment, materials, supplies, transportation, and miscellaneous personal expenses of the student.

h) The special pay to a family member serving in the Armed Forces who is exposed to hostile fire.

i) Amounts received under training programs funded by HUD.

j) Amounts received by a disabled person that are disregarded for a limited time for purposes of Supplemental Security Income eligibility and benefits because they are set aside for use under a Plan to Attain Self-Sufficiency (PASS). Amounts received by a participant in other publicly assisted programs which are specifically for or in reimbursement of out-of-pocket expenses incurred (special equipment, clothing, transportation, child care, etc.) and which are made solely to allow participation in a specific program.

k) Temporary, nonrecurring or sporadic income (including gifts).

l) Amounts specifically excluded by any other Federal statute from consideration as income for purposes of determining eligibility or benefits under a category of assistance programs that includes assistance under the United States Housing Act of 1937.

1:33 For the purposes of this subsection, "Applicant" is the person(s) who own the property and any other persons sharing residency whose income and resources are available to meet the household's needs and who are either related by blood, marriage or operation of law, or who evidenced a stable family relationship for the six months prior to signing the application.

Evidence of "stable family relationship' may include any of the following: birth certificates of the children, joint tax return, prior lease (held jointly), joint bank accounts, insurance policies, prior joint credit history, or equivalent documentation as determined by the Program Manager.

1:34 To determine the applicant's income for eligibility purposes, one of the following methods will be used:

a) Applicant(s) where all the applicant(s) have full time employment will use their income for the three months prior to the date of application, annualize their year to date earnings, or use their latest federal income tax return.

b) Applicant(s) receiving social security and welfare will annualize their current monthly benefit prior to the date of application.

c) Applicant(s) where one or more of the applicant(s) have temporary, part-time or seasonal occupations will have income computed from their latest federal income tax return.

d) Applicant(s) where one or more of the applicant(s) are self employed will use income reported on their latest federal income tax return.

1:35 Income and employment information submitted by applicants will be subject to verification.

1:4 Net Worth: In order to qualify for a repair loan, the applicant should have a net worth of less than $50,000. The "net worth" is calculated according to the "Home Repair Loan Program Application Instructions". Excluded from the assets and liabilities used in the "net worth" calculation are the applicant(s) home, one automobile and household furnishings.

1:41 The property on which the home is located is excluded from the net worth calculation. The parcel can include more than one lot as long as the lots are adjacent to the lot on which the house is located and were purchased when the home was purchased.

1:5 **Exceptions:** Applicant(s) with an income that exceeds the limits in 1.3 or net worth that exceeds the limits in 1:4 must be approved by the Loan Committee. Some of the factors the Loan Committee will consider when approving loans where the applicant(s) income and/or net worth exceeds the limits of 1:3 and 1:4 are:

a) The amount that the applicant(s) will contribute toward the repair. Applicant(s) will be evaluated based upon the percentage of their assets that exceed the net worth requirements that will be contributed toward the repair work. The Loan Committee may require the applicant(s) to contribute a specific amount of funds for the repair work as a condition for receiving a home repair loan.

b) The amount that the income exceeds the limits of 1:3 or the amount that net worth exceeds 1.4. Applicant(s) that greatly exceed the limits will receive less consideration for approval than applicant(s) that exceed the limits by a small amount. The Loan Committee may require applicant(s) to contribute a specific amount of funds for the repair work based upon the amount that the applicant(s) net worth exceeds the limits and may make the applicant(s) contribution a condition for receiving a repair loan.

c) The age and health of the applicant(s). Applicant(s) who are elderly and/or are disabled will be given more favorable consideration for approval.

d) Any unusual financial hardship of the applicant(s).

SECTION 2: REPAIR LOAN REQUIREMENTS

All loans will be deferred, no interest loans that are due upon sale or transfer of ownership by the last surviving borrower, or when the property is no longer the primary residence of the borrower. Applicants will be required to use other private or public resources where possible to provide repair assistance. Applicants with household income above 50% of median income as shown on the table on page 8 will require review by the Loan Committee.

2:1 **Loan Amounts:** The maximum repair loan will be the lesser of:

2:11 $30,000, unless higher amount is approved by Loan Committee as outlined in 2:15.

2:12 Actual cost of approved repair work and fees.

2:13 50% of the Real Marker Value (RMV) of the structure BEFORE repairs are made.

2:14 The applicant's equity in subject property as determined by subtracting all liens and/or judgments of record from 90% of the county assessed or value, or appraised value as determined by a certified appraiser. The appraisal must have been completed within the past 12 months. An exception can be made if the repair loan and all other priority liens are less than the assessed or appraised value. Priority liens are liens that must be paid from the proceeds of the sale of the property before payment can be made for the repair loan. Questions about the priority of a specific lien should be referred to legal counsel if necessary.

2:15 Loans that exceed the limits allowed in 2:11 must be approved by the Loan Committee. Some of the factors that will be considered are:

a) The applicant(s) ability to finance some of the repair work. The applicant(s) will be evaluated based upon the percentage of income devoted to housing costs, the percentage of income devoted to total installment debt, the credit worthiness of the applicant(s) and the suitability of the house for financing.

b) The amount that the requested loan exceeds the limit allowed in 2:11. Loans that slightly exceed the limit will be given more favorable consideration than those that greatly exceed the limit.

2:16 Loans that exceed the limits of 2:13 must be approved by the Loan Committee. Some of the factors that will be considered are:

a) The credit worthiness of the applicant(s) as evidenced by a credit report. Generally, applicant(s) with a good credit report will receive more favorable consideration however the Loan Committee will carefully

examine the circumstances regarding negative credit information such as illness/disability, job loss or divorce.

b) The applicant(s) ability to finance some of the repair work through traditional sources. (Please refer to 2:14(a)).

c) The amount that the requested loan exceeds the limit.

2:2 Eligible Repair Costs: The repair loan may be used to pay for all the work necessary to achieve the repair standards of the Program including control or abatement of lead-based paint hazards as determined by the Repair Inspector. The minimum goal will be the HUD Section 8 Housing Quality Standard. The preferred goal will be the HUD Minimum Design Standard for Rehabilitation for Residential Properties and other improvements and repairs not required by this standard but determined to be necessary to reduce maintenance and operating costs by the Repair Inspector. Eligible repairs and costs also can include:

2:21 Removal of architectural barriers to meet the special needs of elderly and handicapped persons will be considered an eligible repair cost.

2:22 Recording, title insurance, appraisals, credit reports and other miscellaneous fees are eligible repair costs.

2:23 Additions that are necessary due to overcrowding are eligible repair costs. Guidelines used by the local housing authority and the repair standards of the program will be used to determine whether overcrowding exists.

2:24 Other repairs to structures as deemed needed by Loan Committee.

2:3 Ineligible Repair Costs:

2:31 New construction, expansion, addition or the finishing of unfinished spaces, such as attic or basement. Exceptions to this policy are; dwellings which do not meet guidelines used by the local housing authority and the repair standards of the program.

2:32 Materials, fixture, or equipment of a type or quality which exceeds that customarily used in properties of the same general type or value as the property being rehabilitated. Energy efficient upgrades are eligible.

2:33 Purchase, installation or repair of furnishings.

2:34 The applicant's labor or the labor of a member of the applicant's family or household.

2:4 Ineligible Structures: The existence of the following conditions will disqualify a structure for a Home Repair Loan:

2:41 The structure and/or use is in substantial nonconformity with the zoning regulations and/or the comprehensive land use plan of the city or county in which it is located, unless prior written approval is granted by the governing zoning agency.

2:42 Significant HQS violations exist which would be extremely difficult and/or economically unfeasible to correct.

2:43 The proposed expenditure would not increase the value of the property sufficiently to protect the owner's existing equity.

2:44 The cost of the repairs required to bring the dwelling up to minimum property standards will exceed the program's loan limit.

2:5 Consent from Holders of Prior Financing: Written consent from all holders of existing financing with recorded liens must be secured prior to loan closing if required under prior financing agreements. Prior financing includes but is not limited to prior but still active mortgages, trust deeds and land sales contracts.

2:6 **Prior Financing Balloon Payment Provisions:** Program participation where there is an existing financing lien containing balloon payment provisions must be approved by the Loan Committee. Some of the factors that will be considered are:

2:61 The amount of the balloon payment and the due date.

2:62 The present equity and projected equity when the balloon payment is due.

2:63 An assessment of the applicant's ability to refinance or pay the balloon payment.

2:7 **Judgments/Federal Tax Liens:** A judgment in excess of $3,000 at the time of entry will disqualify the property for a Home Repair Loan. All Federal tax liens must be satisfied prior to loan closing.

2:8 **Property Taxes:** All real property taxes that are due and payable at the date of loan closing must be paid before loan closing if the property taxes due, existing liens and the repair loan exceed 80% of assessed Real Market Value.

2:9 **Fire Insurance:** Applicants are required to have fire insurance equal to the amount of existing liens and the repair loan at the time of loan closing and to maintain the insurance during the term of the loan. All premiums for fire insurance coverage that are due and payable at the date of loan closing must be paid before loan closing.

SECTION 3: APPLICATION PROCESSING

3:1 **Application Verification:** All verification documentation except consent(s) from holder(s) of prior financing must be submitted within 60 days of the applicant(s) signing of the application. If the required documentation is not received within 60 days of signing of the application, the next eligible applicant may be considered for a loan.

3:2 **Property Inspection:** All dwellings must be inspected to determine needed repairs and improvements by the Repair Inspector. Input and participation by the homeowner is encouraged in determining needed repairs and improvements.

3.3 **Inspection Report/Bid Form:** After the Property Inspection, the Repair Inspector will prepare a written report based on the Property Inspection that describes the substandard conditions of the house and recommended corrections. The Report is not meant to be exhaustive: the loan is limited and there may be other work the house requires to meet HUD standards or local building codes or that is desired by the homeowner. Contractors interested in submitting bids for repair projects must use the Inspection Report/Bid Form for their proposal and cost estimate. The Repair Inspector will prepare a cost estimate for the file to evaluate cost reasonableness of bids provided by contractors. If repair estimates exceed project limits, Homeowner and Project Manager must agree on which repairs will be done, which repairs can be covered by other partners such as the Mid Columbia Community Action (CAP), United States Department of Agriculture, Rural Development (USDA RD) etc. and which repairs may not be done.

3.4 **Procurement of Bids:** Applicants are encouraged to obtain at least three bids; however, one bid can be accepted if it is less than the cost estimate prepared by the Repair Inspector. It is the responsibility of the applicant to procure a minimum of (1) acceptable bid for the repair work within 30 days unless the applicant authorizes the Program Manager to procure the bids. Contractors who have a record of poor performance with prior repair projects funded through the Repair Program will not be awarded contracts and will be removed from the list of approved contractors provided to homeowners. The decision to remove a contractor will be made by The Program Manager and the Loan Committee. Some of the factors that will be considered as evidence of poor performance are:

3:41 The quantity and severity of complaints from homeowners: Complaints will be documented from the Evaluation Form provided to the homeowner and complaints filed with the Construction Contractors Board. Complaints will be evaluated based upon project records and findings made by the Construction Contractors Board.

3:42 Failure to pay subcontractors and suppliers when payment is due, however failure to pay a disputed claim may or may not be evidence of poor performance. If the contractor fails to pay undisputed bills to subcontractors and suppliers when due, this may be considered as evidence of unsatisfactory performance.

3:43 Failure to complete work in a timely manner: Both the frequency and the magnitude of time will be evaluated and compared with the records of other contractors participating in the program.

3:44 Other material violations of previous contracts awarded through the Repair Program: Contractors may appeal the decision to have their name removed from the list to the Lender's Loan Committee.

3:5 Loan Approval: A Mid Columbia Regional Home Repair Loan Committee will be formed with at least 1 representative from each county. The Program Manager from Columbia Cascade Housing Corporation (CCHC) and the Loan Committee Chairperson will approve repair loans unless Committee Approval is needed. Applicants will be notified in writing of the final decision of the application. Applications will be decided in the order they are Received and deemed complete. All loans will be secured by a recorded trust deed and/or other instruments required by CCHC. Title insurance is required and can be included in the loan.

3:6 Other Repair Assistance: Program staff will assist the homeowner apply for weatherization grants/loans, bank loans for repair and/or refinancing and other assistance as appropriate. Necessary repair assistance and bank loans for repair and/or refinancing involved in the application must be committed, in writing, prior to loan closing. Weatherization grants/loans may be committed after loan closing.

SECTION 4: THE CONSTRUCTION CONTRACT

The parties to the contract are the homeowner and contractor. All Construction Contracts and related documents must be completed on forms supplied by the Program Manager. All contract modifications must be approved by the homeowner, contractor and the Program Manager.

4:1 Contractor Eligibility Requirements: All contractors and subcontractors awarded contracts through the Repair Loan Program must be registered with the Construction Contractor's Board and possess the required registration classifications and must have $100,000 liability insurance and Workmen's Compensation Insurance if required. Contractors and subcontractors performing lead-based paint hazard control or abatement work must submit certifications acceptable to the Program Manager to perform this kind of work. Contractors with a record of poor performance pursuant to paragraph 3:4 will not be eligible for repair contracts. Homeowners are encouraged to hire local contractors whenever possible. The homeowner is responsible for checking references and quality of work of the contractor.

4:2 Owner/Contractor: The owner may act as the general contractor for the repair work. The owner will be responsible for coordinating the work of the subcontractors and will be required to submit billings from subcontractors in order to receive payment. The owner is also responsible for ensuring that all subcontractors are registered with the Construction Contractors Board and with Columbia Cascade Housing.

4:3 Work Performed by Homeowner: Homeowners that can demonstrate competence will be allowed to do some or all of the work when, in the estimation of the Repair Inspector they are able to do so. The owner and members of the owner's household cannot receive any payment for their labor. The homeowner will be required to submit invoices for materials purchased in order to receive reimbursement.

4:4 Contract Completion Time: All work must be completed within 90 days from the date of the Notice to Proceed. The loan commitment may be terminated by the Program Manager if work has not begun within 45 days or less than 30% of the work is completed within 60 days of the Notice to Proceed. Time extensions may be approved due to weather and other reasons in accordance with the Construction Contract. Completion dates of less than 90 days may be required in order to complete the Repair Loan Program in a timely manner.

4:5 Contract Payments: Progress payments can be made for up to 90% of the value of acceptable work completed as represented on the Contractor Payment Request/Voucher Form. Payments will be made in accordance with the Accounts Payable Schedule for the Repair Loan Program. Before final payment can be authorized:

4:51 All contract work must be completed.

4:52 The borrower must sign the Owner's Certification and Acceptance of Improvements.

4:53 The contractor must sign the Contractor's Warranty and Lien Waiver.

4:6 **Contract Payments Withheld:** The Program Manager may withhold or, on account of subsequently discovered evidence, nullify the whole or a part of the Contract Sum owing to Contractor as may be necessary to protect CCHC from loss on account of:

4:61 Defective work is not remedied.

4:62 Claims filed or reasonable evidence indicating probable filing of claims by the Owner.

4:63 Failure of Contractor to make payments properly to subcontractors or for material, labor, or withheld taxes.

4:64 A reasonable doubt that the contract can be completed for the balance then unpaid.

4:65 Damage to another Contractor involved in the project.

4:66 Failure of Contractor to complete work within the time limits set forth in the Construction Contract.

4:67 Work not authorized under the Construction Contract or Contract Change Order approved by Applicant or Project Manager.

If a Contractor has been removed from the program and the problem listed above is corrected, Contractors may be allowed back on the program. Approval will be granted by the Project Manager and Loan Committee.

4:7 **Contract Change Orders:** Any modification of the Construction Contract must be approved, in writing, by the Program Manager which approval shall not be unreasonably withheld. The Program Manager is authorized to approve Contract Change Orders that do not exceed 20% of the contract amount or $4,000.00, whichever is less.

SECTION 5: CONFLICT OF INTEREST

No employee of CCHC, its agents, members and families of the Loan Committee, and other 'covered persons' pursuant to 24CFR 570.489(h) who exercise any functions or responsibilities in connection with administration of the Home Repair Loan Program shall be eligible for a Home Repair Loan, nor shall such a person have any interest, direct or indirect, in the proceeds of such a loan unless a waiver is granted in accordance with 24CFR 570.489(h).

SECTION 6: POLICY EXCEPTIONS

The Loan Committee may waive non-statutory program policies. The request for the waiver will be submitted by the Program Manager. Requests for waivers will be evaluated based upon whether the requested waiver is necessary to accomplish the goals of the Repair Loan Program and will apply only to the application for which a waiver was requested.

SECTION 7: DISPUTE RESOLUTION

Any controversy or claim arising out of or relating to the construction contract and the incorporated documents, whether acts of commission or omission, and including, without limitation, the making, performance, or interpretation of the construction contract and the incorporated documents shall be settled by the following process: If the dispute involves the homeowner and the contractor, the Repair Inspector will first be requested to mediate the dispute. If the Repair Inspector is not able to mediate the dispute to the mutual satisfaction of the homeowner and the contractor, then the Program Manager will review the case. The homeowner and/or contractor must make a written request within six months from the time the last payment was made to the contractor for review by the Program Manager. The Program Manager will issue a decision within 30 days of receipt of the request for the review. If the decision of the Program Manager is not acceptable to the homeowner or the contractor, then the case must be submitted to the Construction Contractor's Board. If the dispute involves the CCHC and agents or contractors of CCHC, the parties will first submit the dispute to the Construction Contractor's Board. If the case cannot be heard by the Construction Contractor's Board, the dispute shall be settled by arbitration administered by the American Arbitration Association, before a single arbitrator, using the rules of commercial arbitration of the American Arbitration Association. The parties shall be entitled to conduct discovery in accordance with the Oregon Rules of Civil Procedure, subject to limitation by the arbitrator to secure just and efficient resolution of the dispute. If the amount in controversy exceeds $10,000, the arbitrator's decision shall include a statement specifying in reasonable detail the basis for the computation of the amount of the award, if any. Judgment upon the arbitration award may be entered in any court having jurisdiction. Nothing herein, however, shall prevent a party from resorting to a court of competent jurisdiction in those instances where injunctive relief may be appropriate. Any claims must be commenced within one year of the date of the last payment to

the contractor. In no event may any claim be commenced after the agreed upon period of limitations has passed, and any claim not timely commenced is barred for purposes of mediation, arbitration, litigation or otherwise.

SECTION 8: PROGRAM INCOME

Program income shall be managed in accordance with requirements of Title 1 of the federal Housing and Community Development Act of 1984 as amended including, but not limited to, requirements for eligible costs compliance with national objectives, environmental review, labor standards, procurement, equal employment opportunity, affirmatively furthering fair housing, nondiscrimination against persons with disabilities, and relocation and real property acquisition. CCHC shall rely primarily on guidance from the State of Oregon in complying with these requirements, since the state is responsible for monitoring the local use of program income earned from Oregon Community Development Block Grant projects. The CCHC management fee shall be 15% of relent loans.

Program income earned as a result of this program shall be used for continuation of the Home Repair Loan Program as described in the approved application and the Home Repair Loan Policies included in the approved application.

SECTION 9: SUBORDINATION AGREEMENTS

The Loan Committee will not approve any subordination agreements after approval of the Repair Loan except to protect its security interest or unless approved prior to closing in the Notice of Loan Approval.

SECTION 10: INCOME GUIDELINES

The most recent HUD income guidelines used by the Mid-Columbia Housing Authority in administration of their Section 8 program will be used to determine 50 and 80 percent of the median income for the county of residence for the homeowner.

SECTION 11: FORMS

1. Home Repair Application
2. Application Summary
3. Initial Discussion with Homeowner
4. Bid Specifications Master
5. Property Inspection
6. Lead Paint Notification
7. Construction Contract
8. General Conditions and Performance Requirements Manual
9. Pre Construction Conference Checklist
10. Notice to Proceed, Statement of Non-Collusion & Hold Harmless
11. Contractor's Warranty and Lien Waiver
12. Permitting Form
13. Owners Certification and Acceptance of Improvement
14. Request for Verification of Fire Insurance
15. Contract Change Order
16. Notice of Right to Cancel
17. Truth in Lending Loan Disclosure Statement
18. Trust Deed
19. Note

ADOPTED _____, 2011, by the Mid-Columbia Regional Home Repair Program Committee:

_____

, Chair

_____

_____

_____

_____

Exhibit F

Mid Columbia Regional Home Repair Program

- Initially funded by loans repaid from County repair programs-No County processes any checks.
- Application for additional funds through CDBG grant to be submitted in 1st quarter of 2012. Wasco County is the likely applicant.
- The Loan Committee will have at least 1 representative from each County
- Funds repaid in each county will be targeted for that county
- Maximum income limit 80% Area Median Income
- Maximum Loan $30,000 without Loan Committee approval
- Priority for seniors, families, Veterans, disabled and very low income
- 15% on funds re-lent out for administration to CCHC to administer the program

Exhibit G

WASCO COUNTY BOARD OF COMMISSIONERS
REGULAR SESSION
OCTOBER 19, 2011

CONSENT AGENDA

1. Order in the matter of the reappointment of Rich Remington to the Wasco County Board of Review.

2. Order in the matter of the reappointment of Jerry Duling to the Wasco County Board of Review.

3. Order in the matter of the reappointment of David Cooper to the Wasco County Board of Review.

4. Order in the matter of the reappointment of Louise Sargent to the Wasco County Elderly & Handicapped Transportation Funds Advisory Committee.

5. Order in the matter of the reappointment of Dave Mason to the Wasco County Elderly & Handicapped Transportation Funds Advisory Committee.

6. Order in the matter of the reappointment of Lee Bryant to the Wasco County Elderly & Handicapped Transportation Funds Advisory Committee.

7. Order in the matter of the reappointment of Pam Petersen to the Wasco County Courthouse Safety Committee.

8. Order in the matter of the reappointment of Jeff McCall to the Wasco County Public Works Building Safety Committee.

9. Order in the matter of the reappointment of Don Lewis to the Wasco County Public Works Building Safety Committee.

10. Order in the matter of the reappointment of Don Uhalde to the Wasco County Public Works Building Safety Committee.

11. Regular Session Minutes of October 12, 2011.