HB

493

COMMITTEE REPORT

HOUSE

(9) FURTHER: FINANCE

1/9/84

Date: 1-31-84

Mr. Speaker:

The Committee on TRANSPORTATION has had HB 493

"An Act making a special appropriation to the Department of Transportation and Public Facilities for preventive measures related to collisions between motor vehicles and moose on the Glenn Highway; and providing for an effective date."

under consideration and reports it back as follows:

[ ] do pass [ ] do not pass

[ ] do pass with attached amendments(s)

[ ] replace with CS for _____ [ ] same title [ ] new title

and recommends _____

[ ] AND attaches a "Letter of Intent" [ ] New Fiscal Note

[X] reports it back without recommendation

[ ] referred to the _____ Committee

MEMBERS SIGNING
DO PASS

Do Pass

Bette Cats

MEMBERS HAVING
OTHER RECOMMENDATIONS:

No Rec

Do Not

No Rec

Do Not P

M.W. Miller No Rec

Bette Cats
CHAIRMAN

H 6C (Rev. 3/81)

FROM: CANDY/ANCHORAGE TO: JACK
TARGET: LJH7 SUBJ: H. TRANSPORTATION T/C

OMNI # 2

****

LEGISLATIVE TELECONFERENCE NETWORK SIGN-IN SHEET

****

DATE: 1/25/83
SITE: ANCHORAGE
SPONSOR/SUBJECT: H. TRANSPORTATION, AUTO/MOOSE COLLISIONS

TO TESTIFY:
****

1. MARGE FOUNDS
2. ALAN FAILEY (ADDED #2)

1. RILEY SNELL
2. KEITH MORBERG
3. DEAN REDECK

***** ALL OF THE 3 LISTED ABOVE ARE FROM DOT -- HERE AT THE REQUEST OF THE COMMITTEE

Alaska State Legislature

IN SESSION:
POUCH V
JUNEAU, ALASKA 99811
(907) 465-4949

BOX 142
EAGLE RIVER, ALASKA
99577

JAN 18 1984

Representative Randy Phillips

HOUSE DISTRICT 15

MEMORANDUM

TO: Representative Bette Cato, Chairman
House Committee on Transportation

FROM: Representative Randy Phillips R.E.P.

DATE: January 17, 1984

RE: House Bill 493

By way of this memorandum I respectfully request that House Bill 493, "An Act making a special appropriation to the Department of Transportation and Public Facilities for preventive measures related to collisions between motor vehicles and moose on the Glenn Highway; and providing for an effective date," be scheduled for hearing before the House Transportation Committee as soon as possible.

Thank you for your consideration.

STATE OF ALASKA 1984 LEGISLATIVE SESSION
FISCAL NOTE

Revision Date:

REQUEST
Bill/Resolution No.: HB 493
Title: Prevent collisions with Moose on Glenn Hwy.
Sponsor: Phillips & Liska
Requestor: House Trans. Committee
Date of Request: 1-20-84

FISCAL DETAIL
Agency Affected: DOT/PF
Program Category Affected: Transportation
BRU, Program or Subprogram(s) Affected: Central Region Design & Construc.

EXPENDITURES/REVENUES: (Thousands of Dollars)

	FY 84	FY 85	FY 86	FY 87	FY 88	FY 89
OPERATING						
100 PERSONAL SERVICES						
200 TRAVEL						
300 CONTRACTUAL						
400 SUPPLIES						
500 EQUIPMENT						
600 LAND & STRUCTURES						
700 GRANTS, CLAIMS						
800 MISCELLANEOUS						
TOTAL OPERATING	100.	100.	100.	100.	100.	100.
CAPITAL		3,000.0				
REVENUE						

FUNDING: (Thousands of Dollars)

GENERAL FUND		3,000.0				
FEDERAL FUNDS						
OTHER						
TOTAL						

POSITIONS:

FULL-TIME						
PART-TIME						
TEMPORARY						

SOURCE OF FUNDS TO OFFSET FISCAL IMPACT OF BILL:

ANALYSIS: Attach a separate page for analysis

Prepared By: Patricia A. Rodgers
Phone: 265-1483
Division: Administration - Central Region
Date: 01/23/84

Approved by Commissioner: Daniel T. Mallott
Date: 1-24-84
Agency: Acting Deputy Commissioner

Distribution (by Agency preparing fiscal note):
Legislative Finance
Legislative Sponsor
Requestor
Office of Management and Budget
Impacted Agency(ies)

12/1/83

ANALYSIS

The Department of Transportation and Public Facilities has determined that $2,784.0 is needed to reduce the number of moose killed by vehicles on the Glenn Highway from mile 132 to 140. The funds will be used to install continuous illumination. The estimated cost breakdown consists of $2,227.0 for construction contract, $267.0 for construction administration, $67.0 for preliminary engineering and $223.0 for contingencies. No additional staffing will be needed as current CIP employees will be utilized.

The Department had not requested funding for this project in the FY85 Capital Budget Request because of the budget ceiling and priorities given to other projects being considered.

STATE OF ALASKA

DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

4111 AVIATION AVENUE
POUCH 6900
ANCHORAGE, ALASKA 99502
(TELEX 25-185)

Date: 4-29-83
Prepared By: _____
Project Number: _____

PRELIMINARY CONSTRUCTION COST ESTIMATE FOR:

Project Name: GLENN HIGHWAY

From: MULDOON (MP) 132.0 To: HILAND (MP) 140.0

Total Length: 8.0 MILES

Location and Description: CONTINUOUS ILLIMINATION FROM MULDOON INTERCHANGE TO HILAND INTERCHANGE

Current ADT: _____ Design ADT: _____

Required Width: _____ Actual Width: _____

Assumed Structural Section H.A.P.: _____ in.

C.A.B.: _____ in.

Borrow: _____ in.

Estimated Costs (Dollars) Based Upon Above Assumptions:

1.	Construction Estimate:	$ 2,227,000
2.	Construction Administration (12 % of 1):	$ 267,000
3.	Subtotal:	$ _____
4.	Contingencies (10 % of 1):	$ 223,000
5.	Construction Total:	$ _____
6.	Preliminary Engineering (3 % of 1):	$ 67,000
7.	Right of Way ($ _____ /Acre):	$ -0-
8.	Utilities:	$ -0-
9.	Project Total:	$ 2,784,000

Sheet ____ of ____

Sheet 2 of 5
Project Name GLENN HIGHW.
Project Number
Prepared By E. Hunt
Date 4-24-03

TYPICAL SECTION

MILE 132.0 TO 140.0

PUT LIGHT EVERY 220 FT ON BOTH ROADWAYS (STEVE HORN)

$\frac{8 * 5280}{220} * 2 = 384$ ILLUMINAIRS

GENERAL NOTES

384 ILLUMINAIRS * ~~*~~ 5000 EACH = 1,920,000

+ 10% MOB

+ 3% TRAFFIC CONTROL

+ 3% SUEVEY CREW

TOTAL = 2,227,000

Bill Sheffield, Governor

DEPARTMENT OF TRANSPORTATION
and PUBLIC FACILITIES
CENTRAL REGION PLANNING & PROGRAMMING
Director's Office

4111 AVIATION AVENUE, POUCH 6900
ANCHORAGE 99502 (TELEX 25-163)
PHONE: 266-1462

October 13, 1983

Re: Glenn Highway Illumination

The Honorable Randy E. Phillips
Representative
S.R. Box 421
Eagle River, Alaska 99577

Dear Representative Phillips:

Attached is the report you requested concerning moose/vehicle collision deterrents along the Glenn Highway. The report concludes that the most feasible method of decreasing these accidents is to provide continuous illumination on both sides of the Glenn Highway from Muldoon to the Artillery Road Interchange. The cost estimate for illumination is $2,784,000 which would provide one luminaire approximately every 275 feet along the outside lanes. We anticipate the annual operating and maintenance cost to be approximately $50,000.

The Department is required by law to design and construct this type of project according to the standards established by the American Association of State Highway and Traffic Officials (AASHTO). These standards have been developed to insure that highway improvements are uniform, safe, and effective. The 275 foot spacing has been determined to be the maximum spacing that will still provide adequate levels of light. If these standards are not followed, the State could be found liable in case of an accident.

The Department has determined that this project would be eligible for Federal Safety Program Funds. However, DOT&PF's Central Region, which includes most of Alaska south of Cantwell and west of Valdez, receives a maximum of $67,500 per year for this program. To use this money to fund this illumination project would require 42 years worth of Federal Safety Program allocations. No other source of funding has been identified.

We have evaluated this project against other projects considered in our FY'85 CIP. Because of our budget ceiling and the low rating of this project as compared to other identified transportation needs, this project is not included in our FY'85 CIP request.

This summer the Department cleared additional brush near the scale house. Last summer there was extensive brush cutting along the Anchorage outbound

lane and a recent inspection by our maintenance and operations personnel found that there was not enough new growth to justify additional clearing. There has been only limited clearing on the in-bound lane to Anchorage at the request of the Municipality of Anchorage because of the desire to maintain a buffer along the bike path.

Please contact me if I can answer any questions.

Sincerely,

William R. Snell
Director

bjf

Enclosure

cc: Richard S. Armstrong, Director, D&C, Central Region
Ed Cronick, Special Assistant, Standards & Statewide Programs
Mike Gavin, Acting Director, M&C, Central Region
David W. Haugen, Deputy Commissioner, Central Region
Emil Notti, Legislative Assistant, Office of the Governor

PURPOSE

This report is a summary of the Department's efforts to identify and analyze alternative means of reducing moose/vehicle accidents on the Glenn Highway between Anchorage and Eagle River. The following paragraphs describe the nature of the problem, how the alternatives were identified and evaluated, and a recommended course of action.

INTRODUCTION

The corridor selected for construction of the Glenn Highway was chosen to take advantage of a relatively flat strip of land running between Anchorage and Eagle River. Unfortunately, this same strip of land is the traditional wintering area for up to 250 moose from Fort Richardson, the Ship Creek Valley, and nearby slopes of the Chugach Mountains. The result is a chronic problem of moose/vehicle accidents which has resulted in the death of 50-60 moose each year and annual vehicle damage of $40,000 along this 8 mile length of highway.

Each fall, as snow accumulates on the nearby slopes of the Chugach Mountains and in the Ship Creek Valley, moose begin an orderly and predictable migration down to the lowlands. Young stands of birch and willow adjacent to the highway provide optimum wintering habitat for moose. Seasonal movements of moose are not random, they correspond to the topography and location of prime wintering habitat. As a result, several "accident zones" exist where the highway bisects moose travel corridors. During the 10 year period between 1971 and 1981, 45% of the moose/vehicle accidents occurring between Anchorage and Eagle River happened between Miles 138.5 and 135.5. Between Miles 134 and 132, 35% occurred. These two areas directly correspond to the primary moose travel corridors and winter concentration areas.

Previous attempts to alleviate this problem have included the installation of reflectors designed to repel deer, the removal of brush from within the highway right-of-way, and the installation of moose crossing signs to warn motorists. None of these measures have proven to be significant in reducing the moose/vehicle accident problem. The volume of traffic on the Glenn Highway between Miles 132 and 140 in 1982 was 2.5 times greater than it was in 1972. Between 1981 and 1982, the traffic volume grew by 23%. Unless additional measures are taken, the moose/vehicle accident rate can be expected to increase.

METHODOLOGY

Material presented in this report was gathered from several sources. The Department of Transportation and Public Facilities' (DOT&PF) Highway Research Section conducted a literature search of the Highway Research Information Service (HRIS) in Washington, D.C. The resultant compilation of studies represents hundreds of thousands of dollars spent researching the problem of collisions between animals and vehicles in the continental United States and foreign countries (see HRIS report attached). Additional material and assistance was contributed by the Alaska Department of Fish and Game, the United States Army, and DOT&PF's Maintenance and Operations Division.

FINDINGS

The following measures have been implemented in the field and were found to have little or no effect upon the rate of collisions between game animals and vehicles:

- Illuminated game crossing signs (motorists disregard signs unless game is physically present)
- Highway underpasses (game unwilling to enter underpasses)
- Conventional fencing (game penetrated fence at open gates, crawled under, or walked over on snow drifts; game that penetrated the fence became trapped in the highway right-of-way)
- Reflecting mirrors (no apparent effect on game; difficult to maintain)
- Brush removal adjacent to highway (besides being ineffective, it is expected that both the State Division of Parks and the Municipal Parks and Recreation Department would object to this treatment since it would decrease the attractiveness of the bike trail adjacent to the highway)

The following measures have been implemented in the field and were found to be effective in reducing the rate of collisions between vehicles and game animals:

- Electrified fences (high construction and maintenance costs, potential safety hazard to humans, any animal that succeeds in penetrating the fence becomes trapped within the highway right-of-way)
- Highway illumination (high construction and operation costs)
- Deliberately placed animal carcass on shoulder of road (offensive to the public)

RECOMMENDATION

From an examination of the findings above, it appears that the only feasible method of decreasing moose/vehicle collisions is to construct continuous illumination on both sides of the Glenn Highway from Muldoon to Eagle River. The estimated cost of this project is $2,784,000.

The Department has determined that this project would be eligible for Federal Safety Program Funds. However, DOT&PF's Central Region, which includes most of Alaska south of Cantwell and west of Valdez, receives a maximum of $67, [illegible] year for this program. To use this money to fund this illumination project would require 42 years worth of Federal Safety Program allocations. No other source of funding has been identified.

We have evaluated this project against other projects considered in our FY85 CIP. Because of our budget ceiling and the low rating of this project as compared to other identified transportation needs, this project is not included in our FY85 CIP request.

Attachment

MDM/lbk

121 Foothill Drive
Eagle River, Alaska 99577

January 17, 1984

Ms. Bette Cato
House Transportation Committee
Alaska State Legislature
Pouch V (MS 3100)
Juneau, Alaska 99811

Dear Ms. Cato:

Reference is made to House Bill 493 sponsored by Representative Randy Phillips of Eagle River.

I hope you seriously consider passing the bill. One of my family members hit a moose on the Glenn Highway. It is a very dangerous highway. You have thousands of cars driving the highway and most exceed the 55 mph limit. I have seen a 4-car accident (involving both sides of the highway) where a moose crossed the highway and caused a chain reaction accident. It is almost impossible to see moose coming onto the road from the brush. Lighting or fencing would at least give us a chance to see the moose and then act accordingly. For certain, you cannot stop some of these jerks from going 60-70 mph on the highway. These are the same people who hit moose at a high speed and throw the moose into oncoming traffic.

Please help us.

Thank you for your time.

Sincerely,

Marge Founds

Mrs. Marge Founds

Lights along Glenn Highway sought

By CRAIG MEDRED
Daily News reporter

Lawmakers from Eagle River have asked Gov. Bill Sheffield for $2.8 million to install lights along an eight-mile stretch of the Glenn Highway to help cut down on collisions between moose and cars.

The state Department of Transportation has concluded that lighting the highway from Muldoon to the Artillery Road Interchange is the best way to reduce moose-car accidents.

Motorists have been killing 50 to 60 moose annually in that area, according to the state agency. It says vehicle damage has amounted to about $40,000 a year.

"Literally every other day a moose is hit," said Rep. Randy Phillips, R-Eagle River. "Something's got to be done on this problem. I hope the lights work."

Phillips joined Sen. Rick Halford, R-Chugiak, and Rep. John Liska, R-Eagle River, in asking for the money in the next state budget for capital improvement projects. Phillips said the governor is reviewing the request.

The Department of Transportation says illuminating the highway and its shoulders with overhead lights is the best way to prevent moose-car collisions. The agency rejected other ideas as infeasible.

The agency ruled out illuminated warning signs because, they say, drivers ignore them unless game is physically present. It also discounted highway underpasses for game because moose won't use them, and conventional fences because moose are likely to walk through them or over them.

Phillips said a reduction in the speed limit on the highway was discarded as unworkable. Studies have shown the most effective way to limit collisions between cars and big-game animals is to force drivers to slow down.

"I don't think that's possible," said Phillips. "I don't think it would be real practical to lower the speed limit, at least from 55."

A lower speed limit, he said, would increase the congestion on the highway, which the Department of Transportation already considers marginal for moving peak flows between Anchorage and its bedroom suburb of Eagle River.

'Stricter enforcement of the existing speed limit would help, however," Phillips said. "In a lot of these cases, a lot of these collisions can be avoided. You can usually spot moose on the right-hand side. You just have to keep an eye out to the right."

Phillips said drivers should be watching for dark blobs against the snowy background along the road. Often, he said, those dark spots turn out to be moose about to venture onto the pavement.

A lot of moose roam the area because the highway passes through the pasture, according to a Department of Transportation report.

"The corridor selected for construction of the Glenn Highway was chosen to take advantage of a relatively flat strip of land running between Anchorage and Eagle River," the report said. "Unfortunately, this same strip of land is the traditional wintering area for up to 250 moose from Fort Richardson, the Ship Creek Valley, and nearby slopes of the Chugach Mountains."

The worst stretches of road, the agency said, are between miles 138.5 and 135.5 of the Glenn — 45 percent of the accidents in the last 10 years — and miles 134 and 132 — 35 percent of the accidents in the past 10 years.

The Department of Transportation said it would cost about $50,000 a year to operate and maintain the lights along the road.

Liska views highway lighting project

Rep. John Liska is meeting with individuals and organizations in Chugiak - Eagle River in an effort to learn their priorities for funding during the 1984 legislative session.

The Chugiak Republican said it is uncertain how much money will be available for district needs this year, but he hopes to obtain an amount similar to the $10 million-plus which funded local projects from the 1983 session. Allocations could change, he said, since Rep. Randy Phillips was stripped of majority status after he withdrew from the leadership coalition which rules the state House of Representatives.

Although he is now the only one from the district in a majority position, Liska said he hopes to gain adequate funding for the area and will argue that as the fastest-growing part of the state, its needs must be met because of statewide impact. Funds which would have been allocated to ex-majority member Phillips "will have to be given to someone," Liska said, adding that he "will try to get it to stay here."

Schools, safety, water and sewer remain as top priority items, Liska said, and he expects these will receive funding. Funds for road work are uncertain, he said, although "I imagine they will be about the same as the $2.2 million obtained last year."

In looking for priority needs, Liska said he wants to see things which will "meet the needs of the most people."

One item which he said has been gaining support from many residents in a proposal to install lighting along Glenn Highway between Eagle River and Ship Creek where there have been many moose-vehicle collisions.

Lighting of portions of the area which are most heavily crossed by moose would enable motorists to see the large animals at night, thereby cutting down on the number which are hit by cars.

Highway engineers have estimated that one light every 275 feet would cost $2.8 million, Liska said, although he believes that figure is high. He said not all of the distance would have to be illuminated.

A major problem area is an island where the northbound and southbound lanes separate on a curve near Mi. 10, where Liska said trees and brush make it even more difficult to spot the animals. He said highway officials apparently are beginning to acknowledge that the trees should be cut. He said the city had also wanted to limit clearing beside the roadway in order to provide a buffer for the bicycle path but that this position may change, particularly in view of reported sexual assaults which have taken place on the secluded trail.

"We can't annihilate the moose," Liska said. The animals' habitat is in the remote areas around Eagle River and Ft. Richardson. But when the snow gets deep and browse gets thin, "they will come out of the hills for groceries and that's when we have problems."

Highway lights said best way to cut moose-vehicle collisions

Lights along the stretch of highway between Eagle River and Anchorage appear to be "the only feasible method of decreasing moose/vehicle collisions," according to a study by the state division of highways. Lights every 275 feet, which is said to be the maximum distance, would cost $2.8 million.

But no source of the funds has been identified other than a federal safety program allocation. And if Alaska's entire $67,500 share is used each year, it would take 42 years before there would be enough to pay off the job, engineers say.

The project does not rate highly in the division's list of priorities and is not included in its request for capital project funding for 1985.

Rep. Randy Phillips, who requested the study during the last legislative session, said he will ask Gov. Bill Sheffield to include the project in the administration's budget.

The report, completed last month and made available to district legislators, reviews findings of other jurisdictions in the United States and abroad where large animals frequently cross highways. Among them:

- Signs, even when illuminated, which warn of game crossing areas are ignored by motorists except when animals are actually present.
- Game is unwilling to use tunnels under the highways.
- Conventional fencing is penetrated by game which becomes trapped in the highway right-of-way.
- Reflecting mirrors have no apparent effect on game and are difficult to maintain.
- Brush removal adjacent to the roadway is ineffective and would be expected to be objectionable for parks and recreation uses, detracting from attractiveness of paralleling bicycle paths.
- Electric fences have high construction and maintenance costs and pose a safety hazard to humans. They also serve to trap animals within the highway limits.
- Illumination helps motorists see game on the sides of the roads and avoid some of the collisions. It has high construction and operation costs.
- Carcasses of dead animals deliberately placed along a road cause motorists to slow down and be more cautious, according to one study report. That method is considered offensive to the public.

Anchorage Times
4 Jan 1983 p. A-1

Bowhunters may solve urban moose problem

by Stephen J. Downes
Times Writer

A bowhunt designed to trim the Anchorage bowl's growing moose population may be opened this winter, state Department of Fish and Game officials said Thursday.

The department is looking for ways to control the migration of moose into residential areas, and its "primary management option" is a plan to open parts of the Hillside area to winter bow hunting, said Karen Lew, a spokeswoman for the department.

An aerial survey taken last week turned up at least 171 moose (130 adults and 41 calves) on the hillsides east of the city and south of Fort Richardson, said biologist Herman Griese.

He said the department wants to keep as many moose as possible out of Anchorage residential areas by harvesting them before their food supply at higher elevations is depleted and they head down into town.

Details of the proposal have not been finalized and no decision has been made on when a hunt would be open, Lew said.

But a press release issued by the department said that biologists believe the dangers caused by migrating moose can be lessened "by harvesting 20 to 30 percent of these moose during November and December."

The moose follow the drainages of Campbell, Rabbit and Potter creeks, looking for more food when their supply at higher elevations is used up, said department biologist Dave Harkness.

The moose then invade residential areas, creating hazards for area residents and motorists.

"We are aware that many people on the Hillside enjoy seeing their 'pet moose' wander at will through residential areas," Harkness said. "But this same moose, one block over, becomes a problem moose, chasing pets and children, eating expensive trees and stepping into rush-hour traffic."

Harkness said in years past, when winter hunting was permitted on Fort Richardson near the Glenn Highway, the rate of collisions with moose declined.

Department officials think the same tactic may reduce the moose population and decrease the number of moose entering residential areas.

In order to be eligible, a hunter would be required to obtain a special permit and could not have killed a moose this year.

Department statistics show that 26 moose were killed in vehicle collisions on Anchorage streets from October of last year to March. Another 65 were killed on the road between Elmendorf Air Force Base and Eagle River, and 22 were killed between Eagle River and the Knik River.

Griese speculates that as many as 40 moose could be killed on Anchorage streets this winter.

The Anchorage Times

Saturday, November 5, 1983

Moose bowhunt to open

by Stephen J. Downes
Times Writer

Bowhunters will be permitted to hunt up to 35 moose in the Anchorage bowl to control the moose's migration into residential areas, an official for the state Department of Fish and Game said Friday.

The controlled hunt will open Nov. 15 in certain remote hillside areas east of the city, said game director Lew Pamplin.

Department biologists hope the hunt will cut back on the number of moose wandering into residential areas in search of food.

"We would much rather see a moose harvested by a hunter than see it destroyed by a vehicle on the highway, with potential injury or death to the driver," said biologist Dave Harkness.

The hunt includes the area east of Hillside Drive, south of Tudor Road and the Upper Potter Creek and Rabbit Creek drainages.

That area also covers ski trails in the Hillside portion of Chugach State Park and ski trails linking Prospect Heights to Glen Alps.

Because that area is heavily used by weekend cross-county skiers, the hunt will be open only during the daylight hours on Tuesdays, Wednesdays and Thursdays, until 35 moose have been harvested.

An aerial survey taken last week turned up at least 171 moose (130 adults and 41 calves) in the hillside areas east of the city and south of Tudor Road.

The hunt will be strictly regulated: Hunters must take a state-sanctioned proficiency test, attend a bow hunting briefing, and obtain a special permit.

Hunters who bag a moose must return hunter reports within two days. Unsuccessful hunters or those who don't hunt must file reports within 15 days of the hunt.

Anchorage Times
20 Dec 1983

Train targets commuter 'dance of death'

by Al Campbell
Times Valley Bureau

Palmer — The Alaska Railroad will experiment with a week of free commuter train rides this winter to help determine whether daily passenger service would be practical between Anchorage and a central Matanuska-Susitna location.

If the program is deemed feasible, the federal railroad may initiate wintertime service, five days a week, from the Valley to Downtown Anchorage, provided sufficient revenue can be generated from daily fares and a state subsidy to pay the estimated $3,000-a-day operating costs. The round trip fare would be $10.

Backers of the plan hope to draw at least 200 commuters a day from the highways to the rails. Currently, an estimated 3,000 people travel each day by car between the Mat-Su area and Anchorage.

Those drivers merge with thousands more from Chugiak, Eagle River and the military bases. As the Matanuska-Susitna Borough population continues to expand, planners fear the traffic situation may worsen.

Already, particularly in the dark, icy winter months, some drivers refer to the daily, rush-hour trip as the "Dance of Death."

Mat-Su Borough Planning Director Robert Stickles says the borough government is interested in the rail-commuter proposal, advanced last week at a meeting between railroad, Anchorage and state transportation officials.

But, Stickles says, he does not see sufficient interest in the commuter system unless two conditions are met:

- The travel time between the Matanuska Junction is reduced from the current estimate of one hour.
- Would-be riders must be convinced they can save money compared to their current car costs, estimated at about 30 cents a mile.

Stickles said here Friday he feels the Anchorage bus service also should provide guarantees that connecting local bus service would be provided to disperse the commuters to their jobs or shopping throughout Anchorage.

Last week's meeting produced an estimated break-even per-passenger charge of $15 per round trip — $10 to be paid by the rider and a $5 daily subsidy to the railroad, probably paid by the state.

Those at the meeting proposed a central parking and pickup point where the tracks now cross the Glenn Highway at Mile 35. The site is about 10 miles from both central Palmer and Wasilla, where most of the commuters depart each day.

The commuter plan envisages three coaches and a diner/lounge departing Matsu Crossing at 6:30 a.m., arriving in Anchorage at 7:30. The return trip would leave Anchorage at 5:30 p.m. for the one-hour trip.

The diner would be open for coffee and donuts in the morning, and for alcoholic beverages on the evening run.

Officials at the meeting say although the initial winter service would be austere,

See Rail-commuter, page A-13

Rail-commuter plan

Continued from page A-1

providing only parking and direct service, it could be expanded to provide for plug-in parking, a permanent building and secure, lighted parking.

Stickles, and other Mat-Su Borough officials say the inconvenient location of the proposed station would be a disadvantage, as would the hour-long trip, necessitated by the deteriorated condition of the railbed. Trains now travel the route at about 30 mph, top speed.

"But the borough is interested," he said. "And if they can shave some time off the trip (which now takes about 45 minutes by car) they might come up with something."

The railroad has indicated it might expand to the Palmer and Wasilla areas if traffic warranted. At present the railroad is considering only winter commuter service, chiefly to avoid interfering with the profitable

The $3,000-a-day cost is based on a crew of four and fuel and service of the locomotive and passenger cars.

The Anchorage Times
18 January 1984

Funds sought to cut moose-car crashes

by Andy Ryan
Times Juneau Bureau

Juneau — Two lawmakers from Eagle River are seeking $3 million in state funds to help reduce accidents between moose and cars along the Glenn Highway between Anchorage and Eagle River.

The money, sought by Republican Reps. Randy Phillips and John Liska, would be used to install street lights along both sides of the highway, where 50 to 60 moose are killed by vehicles each year, with a resulting $40,000 worth of vehicle damage.

Phillips said he and Liska asked the state Department of Transportation to look into the problem after being besieged by constitutents who were alarmed at the carnage along the highway.

Department researchers then conducted an exhaustive study of international literature on the subject of collisions between motor vehicles and wild, hooved creatures.

Of eight schemes for preventing such collisions, researchers found that five — including the use of game crossing signs, conventional fencing, and brush removal — didn't work. Two others — electric fencing and the deliberate placing of animal carcasses along the side of the road to warn motorists — did work but were deemed unacceptable.

That left only street lighting, an effective but expensive undertaking. To comply with state law and federal standards, the department says it will be necessary to install one luminaire

See Signs, page A-12

Signs don't help

Continued from page A-1

every 275 feet along the outside lanes of the highway. Cost of the lights would be about $2.7 million, with an annual maintenance charge of $50,000.

The car-moose problem arises, the department report said, because the same strip of flat lowland chosen for the Glenn Highway is also the traditional wintering area for about 250 local moose.

"Each fall, as snow accumulates on the nearby slopes of the Chugach Mountains and in the Ship Creek Valley, moose begin an orderly and predictable migration down to the lowlands," the report says. "Young stand of birch and willow provide optimum wintering habitat for moose."

Previous attempts to end the slaughter — including reflectors designed to repel animals, removal of brush along the highway right-of-way and use of moose crossing signs — have been unsuccessful.

Looking at studies conducted by other states and in foreign countries, the department found:

- The use of lighted, animated deer crossing signs had no effect on reducing the number of deer killed by motorists, Colorado researchers found.
- A study of 400 deer/vehicle accidents in Buenos Aires, Argentina, concluded that humans were at fault most of the time.
- Swedish researchers, using five-wire electric fences, proved that such fences can significantly reduce the number of accidents between deer and elk and vehicles.

The highway moose problem

Dear Editor:

Re: The Anchorage Times, Jan. 18, "Moose kills on the highway spur plan."

Attitudes reflected in the article are the epitomes of most that is wrong, attitude-wise, with segments of the public and with a great number of legislators here and nationwide.

Irresponsible, selfish minority groups (numerically speaking) and self-serving politicians have taken us down a path of economic misery which will become worse if their attitudes don't change.

In the article, constituents reportedly besieged two Alaskan lawmakers about the annual $40,000 worth of vehicle damage caused by collisions with moose on the Glenn Highway. The lawmakers responded by proposing installation of $2.7 million worth of lights along a portion of the road with an annual maintenance cost of $50,000.

The article also indicated that, in most cases, the individuals involved in the collisions caused them. Result! The public should finance a safeguard to protect negligent individuals from themselves for an amount that exceeds the cost of their negligence. (Note: The article did not mention any deaths or injuries as a result of the collisions; only property damage.)

The lawmakers involved apparently care little about justice or the financial well-being of the state as a whole; or they may only be charlatans who seek to appease their constituents while knowing that such a proposal as theirs would never be funded.

The danger of such conduct to the public is that, sometimes, bills supporting such special interest schemes do get introduced in the legislature (and in Congress) and are sometimes passed soley because such self serving legislation has become a way of life for politicians who scratch each others' backs.

I have driven the Glenn Highway for 17 years. I am always amazed by the number of negligent drivers who exceed the legal speed limit, exceed prudent speeds under adverse conditions, weave in and out of traffic, drive with damaged headlights and taillights and drive with obscured windows.

I wonder how many are drunk. There are additional types of negligent drivers who seen to be increasing in numbers: The rearview mirror makeup specialist; the family argument antagonist; the jolly, arm-waving, good-natured conversationlist; and the daydreamer — all of whom pay more attention to what is going on inside the vehicle than without. Frankly, I don't care if they do have an accident, but I do sympathize with the moose.

The only legitimate solution that should be considered in this matter is legislation mandating vehicle insurance.

William D. Nielsen
4228 James Drive

ANCHORAGE TIMES 1-28-84

RUN NO. HALK515

ILLUMINATION, SIGNS, REFLECTORS FOR DEER OR WILDLIFE

HRIS FILE SEARCH

PREPARED FOR

MR. DAVID C. ESCH
CHIEF OF HIGHWAY RESEARCH
ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES
FAIRBANKS, ALASKA

03/30/83

Highway Research Information Service

National Research Council

National Academy of Sciences * National Academy of Engineering

Washington, D.C.

AVAILABILITY OF DOCUMENTS

When it is known by HRIS that full-text copies of documents are available from an organization other than the publishing agency, the name and address of the document distribution center are given in an availability statement below the abstract of the HRIS document record. When a document is ordered, the document title, author, and publisher should always be given.

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Reports emanating from research projects sponsored by the Federal Highway Administration and the Urban Mass Transportation Administration are normally available from the National Technical Information Service. If the abstract carries a document order number (PB or AD followed by six digits), the report is available from NTIS.

When no availability is specified, the user should consult an established transportation library.

A loan service for publications and a photocopy service for articles and papers are available at document delivery centers as explained on page vii.

A large number of documents are available from a few sources. The names, addresses, and telephone numbers of those sources are listed below under the abbreviation used for each.

ASCE
American Society of Civil Engineers
345 East 47th Street
New York, NY 10017
Telephone 212-644-7671

ASME
American Society of Mechanical Engineers
345 East 47th Street
New York, NY 10017
Telephone 212-644-7703

DOTL
U.S. Department of Transportation Library
400 Seventh Street, S.W.
Washington, DC 20590
Telephone 202-426-2565

ECMT
(All documents available through OECD)
European Conference of Ministers of Transport
2 rue André Pascal
Paris 75775, France
Telephone 524-97-22

ESL
Engineering Societies Library
United Engineering Center
345 East 47th Street
New York, NY 10017
Telephone 212-644-7611

GPO
U.S. Government Printing Office
Superintendent of Documents
Washington, DC 20402
Telephone 202-783-3238

IEEE
Institute of Electrical and Electronics Engineers
345 East 47th Street
New York, NY 10017
Telephone 201-981-0060

IPC
IPC (America), Inc.
205 East 42nd Street
New York, NY 10017
Telephone 212-889-0700

IRRD
International Road Research Documentation
19 rue de Franqueville
75 Paris, France
Telephone 1-524-92-42

ITS
Institute of Transportation Studies
University of California
412 McLaughlin
Berkeley, CA 94720
Telephone 415-642-3604

NAE/NAS/NRC
National Academy of Sciences
Publication Sales
2101 Constitution Avenue, N.W.
Washington, DC 20418
Telephone 202-334-3313

NTIS
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Telephone 703-487-4650

NTCL
Transportation Center Library
Northwestern University
Evanston, IL 60201
Telephone 312-492-5273

OECD
Organization for Economic Cooperation and Development
Publications Center, Room 1207
1750 Pennsylvania Avenue, N.W.
Washington, DC 20006
Telephone 202-298-8755

PPI
Pergamon Press, Inc.
Maxwell House, Fairview Park
Elmsford, NY 10523
Telephone 914-592-7700

RTAC
Roads and Transportation Association of Canada
875 Carling Avenue
Ottawa, Ontario K1S5A4, Canada
Telephone 613-521-4052

SAE
Society of Automotive Engineers
400 Commonwealth Drive
Warrendale, PA 15096
Telephone 412-776-4841

TRB
Transportation Research Board
Publications Office
2101 Constitution Avenue, N.W.
Washington, DC 20418
Telephone 202-334-3218

TRRL
Transport and Road Research Laboratory
Crowthorne, Berkshire RG11 6AU
England
Telephone Crowthorne 3131

TSCL
Technical Information Center
Transportation Systems Center
U.S. Department of Transportation
55 Broadway
Cambridge, MA 08619
Telephone 617-494-2300/2193/2783

UITP
International Union of Public Transport
19 avenue de l'Uruguay
B-1050, Brussels, Belgium
Telephone 73-33-25

XUM
Xerox University Microfilms
300 North Zeeb Road
Ann Arbor, MI 48106
Telephone 313-761-4700

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Transportation Center Library
Northwestern University
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312-492-5273
TWX 910-231-0872

Institute of Transportation Studies
Library
University of California
412 McLaughlin Hall
Berkeley, CA 94720
415-642-3604

and one is a Federal Center:

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U.S. Department of
Transportation
Washington, DC 20590
202-426-1792

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1. TRIS accession number (six-digit number at top of printout);
2. Title;
3. Author, including individuals and organizations responsible for the publication (for example, James, John J., West Virginia Department of Highways); and
4. Publication data, including publisher, periodical title, conference, date, paging, series numbers (for example, Public Roads, Dec. 1976, pp. 116-120; or National Technical Information Service, PB 259 688).

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OECD Publications Center
1750 Pennsylvania Avenue
Washington, DC 20006
Telephone 202-298-8755

Translations may be obtained through agencies listed in the yellow pages of the telephone book in metropolitan areas, through embassies in Washington, D.C., from language departments of universities, or from one of the translations centers listed below. Some of these, such as the National Translations Center, do not translate but maintain a registry of translations. Fees for translation services vary but in the Washington, D.C., area average about $10 per page for technical material.

International Translations Centre
Doelenstraat 101
Delft, Netherlands
World Index of Scientific Translations (quarterly)

National Translations Center
John Crerar Library
35 West 33rd Street
Chicago, IL 60616
Telephone 312-225-2526
Translations Register-Index (irregular annual)

Pan American Highway Congress
Pan American Union
Organization of American States
Room 1009
1725 I Street, N.W.
Washington, DC 20006
Telephone 202-381-8567

Division of Language Service
Room 2214
U.S. Department of State
320 21st Street, N.W.
Washington, DC 20520
Telephone 202-632-1528

International Road Federation
1023 Washington Building
Fifteenth Street and New York Avenue
Washington, DC 20005
Telephone 202-783-6722

Transport and Road Research Laboratory
U.K. Ministry of the Environment
Crowthorne, Berkshire RG11 6AU
England
Telex 848272

All Languages Translation Center
545 Fifth Avenue
New York, NY 10017
Telephone 212-986-1688

British Library Lending Division
Boston Spa
Wetherby, Yorkshire LS23 7BQ
England

IDENTIFICATION GUIDE FOR AN HRIS RECORD OF A PUBLISHED WORK

JOURNAL ARTICLE

Document Record Number
TRIS Accession Number
HRIS Subject Area Number — 32 345788

Title — EVALUATION FOR DURABILITY AND STRENGTH DEVELOPMENT OF A GROUND GRANULATED BLAST FURNACE SLAG

Authors — Bojan, FJ; Atlantic Cement Company, Incorporated
Heusel, JW; Atlantic Cement Company, Incorporated

Publication Data — ASTM Cement, Concrete, and Aggregates; American Society for Testing and Materials; 1916 Race Street; Philadelphia, Pennsylvania; 19103

Document Data — V3 N1; 81; pp 48-52; 23 Fig.; 12 Tab.; 25 Ref.

Abstract — This paper covers the evaluation of a ground granulated blast furnace slag as a partial replacement for portland cement in mortars and concrete. The ground slag was evaluated for strength-producing properties as well as durability performance when used to replace 40 to 65% portland cement. This study shows that the ground slag when used to replace 40 to 65% portland cement did significantly improve strengths, sulfate resistance, and alkali aggregate reactivity. (Author)

Availability — ORDER FROM:
Engineering Societies Library; 345 East 47th Street; New York, New York; 10017

RESEARCH REPORT

Document Record Number
TRIS Accession Number
HRIS Subject Area Number — 12 343723

Title — PARK-AND-POOL FACILITIES SURVEY RESULTS AND PLANNING DATA

Authors — Bullard, D
Christiansen, DL
Fitzgerald, AV

Publication Data — Texas Transportation Institute; Texas A&M University; College Station, Texas; 77843
Federal Highway Administration; Texas Division; Austin, Texas;
Texas State Department of Highways & Public Transp.; 11th and Brazos Streets; Austin, Texas; 78701

Document Data — Res Rpt.; RTTI-2-10-79-205-1); Feb. 81; 56p
(FHWA/TX-81/23)

Abstract — The report presents the results of a Park-and-Pool survey undertaken at selected locations around the San Antonio and Houston, Texas, metropolitan areas. This information should prove useful in a number of different ways including: the identification of various improvements which could be made in order to better meet the needs of area commuters; and the planning and design of future Park-and-Pool facilities.

Availability — ORDER FROM:
National Technical Information Service; 5285 Port Royal Road; Springfield, Virginia; 22161; PB81-231343

Document Order Data

SUPPLEMENTAL NOTE:
Sponsored in part by Texas State Dept. of Highways and Public Transportation, Austin.

HRIS Information Source — National Technical Information Service; us124

TECHNICAL PAPER IN A CONFERENCE PROCEEDINGS

Document Record Number
TRIS Accession Number
HRIS Subject Area Number — 28 198188

Title — EVALUATION OF PAVEMENT SERVICEABILITY ON THE INTERSTATE SYSTEM IN OREGON

Authors — Miller, TC; Portland Cement Association

Publication Data — New Mexico University, Albuquerque; 915 Stanford Drive, NE; Albuquerque, New Mexico; 87131; PPCCMI

Document Data — 91; pp 208-213

Abstract — Measurements of present serviceability index (PSI) using a PCA Road Meter have been made on the 318-mile Interstate system in Oregon annually since 1972. The system has been broken down into sections based on the pavement structure and construction contract. Structural strip maps were prepared and the PSI ratings plotted on this map show the pavement performance trend for each section. The superior performance of some pavements has been documented and sections that will be in need of early rehabilitation identified. Analysis of PSI vs Age and PSI vs Heavy Truck Traffic has been made and compared with the M. P. Prokau model equations for the concrete sections. The goal is to develop PSI trend curves and to predict when rehabilitation of the pavement will be required.

Availability — ORDER FROM:
Engineering Societies Library; 345 East 47th Street; New York, New York; 10017

SUPPLEMENTAL NOTE:
Proceedings of the 19th Paving Conference, held at the University of New Mexico, Albuquerque, January 7-9, 1981.

Engineering Index; PIN820180137

IDENTIFICATION GUIDE FOR AN HRIS RECORD OF AN ON-GOING RESEARCH PROJECT

Document Record Number
TRIS Accession Number
HRIS Subject Area Number → 13 3338701

Title of Project → FORECASTING REVENUES FOR THE VIRGINIA DIVISION OF MOTOR VEHICLES UNDER ENERGY AND TRANSPORTATION SUPPLY CONSTRAINTS

PERFORMING AGENCY:
Virginia Polytechnic Institute & State University; Department of Civil Engineering; Department of Aerospace and Ocean Engineering; Blacksburg, Virginia; 24061; 4568

INVESTIGATOR:
Hobeika, AG; Associate Professor; *(703) 961-7407

FUNDING AGENCY:
Virginia Department of Highways and Transportation; Division of Motor Vehicles; 2220 West Broad Street; Richmond, Virginia; 23220

AS = project status
RD = reporting date
AD = funding approval date
CD = contract date
SD = project start date
DC = estimated project completion date
TF = total funds
FT = type of funding
CN = contract/grant number
CT = contract type
FY = funds by fiscal years

→ AS-Active; RD-Feb 81; SD-01 Sep 80; DC-Aug 81 EST; TF-$79000; FT-Contract; CN-8481141

Summary Statement of Research Project Includes Objectives, Scope and Methods →

The objective is to estimate the needed revenues to meet the Highway expenditures in the coming decade under different socio-economic conditions and technological developments in the Commonwealth of Virginia.

CITATIONS:

Tra, TK
Forecasting Highway Revenues Under Different Taxation Policies, Transportation Supplies and Gasoline Shortages
Virginia Division of Motor Vehicles
Exec Summary 8008

Gordon, P
Alternative Transportation Taxation Policies Volume I
Virginia Division of Motor Vehicles
8008

Tran, TK; Young, SR; Paulkner, T; Seeman, DA
Impacts of Transportation Supply and Gasoline Shortages on Virginia Gas Tax Revenues, Volume II
Virginia Division of Motor Vehicles
8008

HRIS Information Sources → Virginia Polytechnic Institute & State University

FORM 500 CARDS RUN NUMB. HALK616

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NAMR. DAVID C. ESCH
NBCHIEF OF HIGHWAY RESEARCH
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NGILLUMINATION, SIGNS, REFLECTORS FOR DEER OR WILDLIFE
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T04 67$$ 31   O ANIMALS                              07 05 XX
T05 57$$ 24   A 51                                   02 VV 06
T06 57$$ 24   O 54                                   02 VV XX
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54 097030

EFFECTIVENESS OF A LIGHTED, ANIMATED DEER CROSSING SIGN

Pojar, TM

Journal of Wildlife Management; Wildlife Society; Suite S-176, 3900 Wisconsin Avenue, NW; Washington, D.C.; 20016

V39 N1; Jan 75; pp 87-91

Two lighted, animated deer crossing signs were installed adjacent to State Highway 82 south of Glenwood Springs, Colorado, delineating a 1.61km (1-mile) segment of highway where deer-vehicle accidents frequently occurred. Crossings per kill ratios were nearly identical with the signs off (56.5:1) and with the signs on (56.9:1). When the motorist was presented with evidence that a danger existed (i.e., deer carcasses in emergency lane), the response was much greater than when they were merely warned (via the deer crossing sign) of a potential danger. With evidence of danger, the response was the same regardless of whether or not the warning signs were on. Motorists' response in the form of speed reduction and/or increased awareness was not sufficient to affect the crossings per kill ratio. Since these lighted, animated signs were not effective in reducing the number of deer-vehicle accidents, it seems reasonable to assume that conventional deer crossing signs are not effective either. However, in areas where deer-vehicle accidents are especially numerous, warning signs may be useful for public relations and liability reasons.

25 098607

BEHAVIORAL RESPONSE OF MULE DEER TO A HIGHWAY UNDERPASS

Reed, DF
Woodward, TN
Pojar, TM

Journal of Wildlife Management; Wildlife Society; Suite S-176, 3900 Wisconsin Avenue, NW; Washington, D.C.; 20016

V39 N2; Apr 75; 00 361-367

A concrete box underpass 3.05 x 3.05 m (10 feet) and 30.48 m (100 feet) long under Interstate 70 in west central Colorado was monitored for deer use during four years following its completion in early 1970. A seasonal mean of 345.1 plus or minus 133.0 (50) mule deer (Odocoileus hemionus) passed through the structure when moving to or from their summer range. A video time-lapse surveillance system recorded behavioral responses during four migration periods, spring-summer and fall in 1972 and 1973. On the basis of video tape playback of 4,450 approaches and 1,739 entrances, deer displayed three basic overt responses: look-up, tail-up, and muzzle-to-ground. The frequency of the look-up response was indicative of the reluctance of the animals to go through a structure of this size and character. The underpass was successful in permitting about 61 percent of the local deer population to migrate safely under the highway. /Author/

51 125287

ANALYSIS OF ROAD ACCIDENTS
UN ANALISIS DE LOS ACCIDENTES DE TRANSITO

Bandel, E
Yanez, J

Decimo Concurso de Trabajossobre Temas Viales; Ministerio de Obras Publicas; C/7 Numero 1175, La Plato; Buenos Aires; Argentina

N84; Conf Paper; Oct 68; pp 47-73; 16 Fig.; 12 Tab.; Spanish

400 accidents which occurred in buenos aires during 1967 and which represent 40% of the total number of accidents are analyzed in detail. The analysis is divided as follows: monthly, daily and hourly distribution of accidents and casualties, classification of accidents per types, main factors recurring in these accidents, and economic evaluation of the latter. It was found that the main causes of accidents were: the human factor (driver or pedestrian) which accounted for 84% of accidents; the road for 9% and the vehicle 7%. A more detailed study showed the following results: driver/pedestrian factor: excess speed (2%), carelessness (53%), drunkenness (3%), other causes 24%; road factor: wet road (43%), bad weather conditions (27%), bad road conditions (11%), bad visibility caused by vegetation or obstruction (9%), animals roaming on the road (7%), defective shoulders (3%), other causes (7%); vehicle factor: lighting defects (33%), defective brakes (19%), punctures (5%), other mechanical faults (9%). The number of the covering abstract is IRRD Abstract No. 100834.
/TRRL/

Transport and Road Research Laboratory; IRRD 100835

51 138435

EFFECTS OF MULTIPLE LAND USE PRACTICES ON BIG GAME HABITAT & BEHAVIOR IN THE CENTRAL ROCKY MOUNTAINS

PERFORMING AGENCY:
Wyoming University; Laramie, Wyoming; 82071; FS RM

INVESTIGATOR:
Ward, AL

FUNDING AGENCY:
Department of Agriculture; Independence Avenue, Between 12th and 14th Streets, SW; Washington, D.C.; 20250; RM-1804

AS-Active; RD-Jun 80; SD-Nov 68; DC-Nov 81 EST

Determine the environmental impacts and the interrelationships of major land use practices on the spectrum of habitats essential for optimum elk and other big game populations. Determine patterns of elk behavior and movements following harvest and activities related to increased human ingress, studies will be made of plant succession on harvested areas of various ages, silvicultural systems, and site conditions. The effects of increased numbers of people on the game populations will be evaluated. Also the behavioral characteristics of big game in the vicinity of road systems of various standards will be monitored through he use of radio telemetry and time lapse photography. Pre- and post-construction situations will be evaluated in conjunction with various practices to mitigate unfavorable effects of the road developments. Elk behavior in relation to timber harvest operations in South-central Wyoming was studied using telemetry, time-lapse photography and fecal and track counts. Elk preferred to be at least one-half mile from harvest and clean-up operations. Elk can be expected to move back to a harvest site witnin three weeks after humans leave. Traffic on Forest Systems roads has little effect on elk activity, especially beyond 300 yards. Resident populations of mule deer are living adjacent to the heavy traffic on I-80 near Laramie, Wyoming. In other areas deer migrate across I-80 to move from summer to winter ranges. Available underpasses are not being utilized and highway accidents are common. Pronghorn antelope are kept off I-80 where right-of-way fences are in good shape and snow has not drifted, creating a bridge for the antelope. Antelope are not using underpasses. I-80 acts as a barrier for elk although they are seen regularly within 300 yards.

CITATIONS:
Ward, AL

Effects of Timber Harvest on Mule Deer and Elk
Proc. 18th Rocky Mountain Industries Conf, Wyoming
75

Ward, AL; Diem, KL; Weeks, RW
The Impact of Snow on Elk
Final Report of the Medicine Bow Ecology Project, U of Wyo.
380 pp, Figs. 75

Cupal, JJ; Ward, AL; Weeks, RW
A Repeater Type Biotelemetry System for Use on Wild Big Game Animals
11th Ann Rocky Mtn Bioeng Symp-Intl ISA Biomed Sci Symp
8 pp, Vol. 10 7404

Hiller, PK; Cupal, JJ; Weeks, RW; Ward, AL
An Automatic Wildlife Tracking System
11th Ann Rocky Mtn Biorng Symp-Intl ISA Biomed Sci Symp
4 pp, Vol. 10 7404

Current Research Information Service; CRIS 0018563

51 145098

DEER-CAR ACCIDENTS IN SOUTHERN MICHIGAN

Allen, RE; Michigan University, Ann Arbor
McCullough, DR; Michigan University, Ann Arbor

Journal of Wildlife Management; Wildlife Society; Suite S-176, 3900 Wisconsin Avenue, NW; Washington, D.C.; 20016

V40 N2; Apr 76; pp 317-325; Figs.; Tbls.; 20 Ref.

Collisions of cars with white-tailed deer (Odocoileus virginianus) were studied in southern Michigan in 1966 and 1967. Most of the 2,566 accidents studied occurred at dawn, dusk, or after dark with peaks at sunrise and 2 hours after sunset. Accidents were highest on weekends when evening traffic was greatest. A low seasonal peak in collisions occured in May and a high one in November. Sex ratio of the annual kill was predominately female, but it shifted in favor of males during seasonal peaks. Causes of the peaks seemed to be primarily rutting activities, with hunter disturbance and food of lesser importance. Accidents were related to habitat type approximately according to the prevalence of the type. Accidents were most common at speeds of 80-95 km/h (50-59 mph), and the deer was killed in 92 percent of the accidents. Human injuries occurred in less than 4 percent, and most resulted from secondary collisions.

Highway Safety Research Institute; HSRI-35511
National Safety Council, Safety Research Info Serv; 770653J

51 153873

HIGHWAY FENCES AS VEHICLE-DEER COLLISION DETERRENTS

Bellis, ED
Graves, HB, III

Pennsylvania State University, University Park; Institute for Research on Land and Water Resources; University Park, Pennsylvania; 16802; 432-41 (3502)

Final Rpt.; #FHWA-PA-74-9; Jun 76; 26 pp

FT-Contract; CN-53029

A survey of highway fencing along Interstate 80 in Centre County showed that 7 1/2 foot, type 3-modified fence has little value as a vehicle-deer collision deterrent; many deer crawl under the fence to the planted right-of-way and abundance of gaps underneath provides for easy penetration. From December 1974 through March 1976 numbers and position of deer were observed from a vehicle driven along 6 miles of I-80 at night. Bimodal patterns of abundance were found, deer were most numerous in spring and fall; of 2577 deer sightings, 74.5% were on the highway side and 25.5% on the far side of the fence. Comparisons between a control area (north side of highway) where the fence was unmodified and test areas (south side) where gaps underneath were plugged and/or top five wires removed or repaired showed that the critical weakness in the fence is the underside but also that large numbers of deer cross a fully repaired fence. Only 6 deer were reported killed during the 16 months of study and no live deer were seen on the highway; these results, relative to previous findings beginning in 1967, strongly suggest that high traffic volume prevents deer from venturing onto the highway, thus reducing collisions.

ORDER FROM:
National Technical Information Service; 5285 Port Royal Road; Springfield, Virginia; 22161; PB264875/AS

Federal Highway Administration
National Technical Information Service

21 153962

EFFECTS OF HIGHWAY CONSTRUCTION AND USE ON BIG GAME POPULATIONS

Ward, AL
Cupal, JJ
Goodwin, GA
Morris, HD

Rocky Mountain Forest & Range Experiment Station; Colorado State University, 240 West Prospect Street; Fort Collins, Colorado; 80521; FHA-3-1-1517
Federal Highway Administration; 400 7th Street, SW; Washington, D.C.; 20590

Final Rpt.; #FHWA/RD-76-174; Mar 76; 101 pp

FUNDING AGENCY:
FHWA Code E-0231

FT-Contract; CN-P.O. 3-1-1517

Pronghorn antelope, mule deer, and elk are affected by right-of-way fences and highway traffic. At least 153 antelope, 561 mule deer, and 10 elk have been killed through vehicle accidents along a 55-mile section of I-80 west of Laramie, Wyoming, during a 5.5-year period. Since antelope are reluctant to jump fences and use underpasses, I-80 is a barrier and the herds are managed accordingly. Antelope can be kept off the highway by maintaining good woven wire fences and preventing snow from drifting over the right-of-way fence. Mule deer jump right-of-way fences, but can be forced to use underpasses by using deer-proof fencing. Both resident and migratory mule deer are affected by roads and traffic. Proper management should provide safe deer crossings thus increasing the safety of the highway user. Since elk are large, they present a greater hazard to motorists, and should be discouraged from crossing highways by proper fencing and road location. New techniques using heart-rate telemetry shows great potential for use in further studies of animal behavior in relation to the ever increasing activities of man.

ORDER FROM:
National Technical Information Service; 5285 Port Royal Road; Springfield, Virginia; 22161; PB-264633/9ST

National Technical Information Service; u7712

51 159750

THE ANIMAL ACCIDENT PROJECT
VILTOLYCKSPROJEKTET

Peterson, BE
Imre, E

National Swedish Road Administration; Fack S-10220; Stockholm 12; Sweden

Monograph; #Report No 16; 76; 10 pp; 1 Fig.; Swedish

This report is included as number 12 in a series of working reports within the animal accident project. The publication is a situation report briefly dealing with the background, the results and the future. The results contain statistical accident analysis, study of existing measures and new measures. /TRRL/

National Swedish Road & Traffic Research Institute
Transport and Road Research Laboratory; IRRD 225875

51 163949

TESTS WITH ELECTRICAL GAME PRESERVES DURING 1975-76
FOERSOEK MED VILT STAENGSEL TYP NITRO-NOBEL ELSTAENGSEL I D-LAEN AAR 1975-76

National Swedish Road Administration; Fack S-10220; Stockholm 12; Sweden

Intrm Rpt.; #NR 19; 77; 15 pp; 4 Fig.; 5 Tab.; 1 Phot.; Swedish

Electrical fences were tested as game preserves on roads in Sweden for 1.5 years. The purpose was: (1) to study different types of uprights and number of wires and their position, (2) to obtain a value of management safety, (3) to determine construction and management costs, and (4) to study the effect on animal accidents. Of the types tested a 130 cm high fence with 5 wires on pressure impregnated uprights of wood (space 6 M) has proved the best. The construction costs have been low. Mechanical wear an soiling from the road have created some problems. In particular the wire (a laminated band) has been damaged. There were no animal accidents after the erection of the fence. At present a new wire with an expected endurance of 5 to 7 years is being tested.
/TRRL/

National Swedish Road & Traffic Research Institute
Transport and Road Research Laboratory; IRRD-226904

51 174180

WIRE NET FENCES
NAETSTAENGSFL

Almkvist, B

Stockholm University, Sweden; Zoologiska Institutionen, Raadmansgatan 70A; S-11385 Stockholm; Sweden

Monograph; #Report No. 11; 30 Apr 76; 13 pp; 3 Fig.; 2 Tab.; 1 Phot.; 4 Ref.; Swedish

This report reviews the ability of cloven-footed animals to pass various types of wire net fences. Furthermore accident statistics of fenced roads are presented. Taking this as A basis, recommendations for fence design are given. /TRRL/

Transport and Road Research Laboratory; IRRD 231013
National Swedish Road & Traffic Research Institute

51 179855

THE EFFECTIVENESS OF DEER FLAGGING MODELS AS DETERRENTS TO DEER ENTERING HIGHWAY RIGHTS-OF-WAY

Graves, HB
Bellis, ED

Pennsylvania State University, University Park; Institute for Research on Land and Water Resources; University Park, Pennsylvania; 16802; 432-41 (8772)

Final Rpt.; #FHWA-PA-78-12; Jun 78; 21 pp

FUNDING AGENCY:
FHWA Code E-0328

FT-Contract; CN-55108

To determine whether rear-view silhouette models of deer with raised-tails would be effective in keeping deer off planted interstate highway rights-of-way, such models were tested in four experiments along Interstate 80 in Centre County, PA. Results of counts of deer in experimental and control areas obtained from a moving vehicle or examination of tracks through gaps under the fence revealed that the models were ineffective as deterrents to deer gaining access to the right-of-way. It is not recommended that they be used to reduce vehicle-deer collisions. /FHWA/

ORDER FROM:
National Technical Information Service; 5285 Port Royal Road; Springfield, Virginia; 22161; PB-284422/AS

SUPPLEMENTAL NOTE:
Sponsored by Pennsylvnaia DOT.

Federal Highway Administration
National Technical Information Service

51 179860

HIGHWAY LIGHTING TO PREVENT DEER-AUTO ACCIDENTS

Reed, DF
Woodard, TN
Beck, TDI

Colorado Division of Wildlife; 6060 Broadway; Glenwood Springs, Colorado; 81601; CDOH-P&R-R-77-5

Final Rpt.; #FHWA-CO-77-5; Sep 77; 26 pp

FUNDING AGENCY:
FHWA Code E-0331

FT-Contract; CN-1478

Deer vehicle accidents have been the cause of considerable property damage and the loss of biotic resources. This is especially the case in rural areas in mountainous terrain where nighttime driver visibility is poor. The purpose of this research was to determine if deer-vehicle accidents were affected by fixed highway illumination. This was done by comparing responses of motorists to deer on the highway and deer responses to the motorists, with and without fixed illumination. Estimated deer crossings per kill was 9.7 percent higher with the lights on compared to lights off. When a deer simulation was present under lighted conditions mean vehicle speeds decreased by 13.9 km (8.6 miles) per hour with brake lights observed on 50.6 percent of the approaching vehicles. The Roadway Lighting Committee (1972) recommends lighting standards based on mean horizontal illumination and illumination uniformity ratios for different roadway and area classifications. /FHWA/

ORDER FROM:
National Technical Information Service; 5285 Port Royal Road; Springfield, Virginia; 22161; PB-284312/6ST

SUPPLEMENTAL NOTE:
Sponsored by Colorado Division of Highways.

Federal Highway Administration
National Technical Information Service

21 183646

WIRE-NETTING FENCES FOR GAME ACCIDENT PREVENTION
NAETSTAENGSEL FOER VILT

Ljungqvist, S

National Swedish Road Administration; Fack S-10220; Stockholm 12; Sweden

Monograph; #VTU Internrpt 23; Apr 78; 8 p.; 8 Fig.; 2 Tab.; Swedish

This report deals with the technical and geometric design of wire-netting fences for the prevention of accidents involving wild animals. Details of fences, nettings, posts, stays and assembly are presented. Finally, the installation procedure is described.

Transport and Road Research Laboratory; IRRD-234402
National Swedish Road & Traffic Research Institute

51 193924

THE ANIMAL ACCIDENT PROJECT. PART 2. SITUATION REPORT SEPTEMBER 1978
VILTOLYCKSPROJEKTET 2. LAEGESRAPPORT SEPT 1978

Almkvist, B
Andre, T
Ekblom, S
Aaberg, L
Rempler, S-A

National Swedish Road Administration; Fack S-10220; Stockholm 12; Sweden

Monograph; #Interarapport Nr 33; Sep 78; 16 p.; 3 Fig.; Swedish

An analysis of accidents involving moose and deer shows that 70% of all accidents occur in the summer, with peaks in June, and end of September and end of January. Almost 40% occur at dawn. On newly constructed roads, the number of accidents during the first year is about 2.5 times the normal; even after three years, the number of accidents is twice that normally expected. 50% of accidents occur where distance between road and forest is 5 M, and over 90% where distance is up to 20 M. On roads in open country less than 20% of accidents occur. Peaks involving moose are influenced by behaviour of the calves. Measures to counteract such accidents are (1) game fences; deer usually crawl underneath while moose jump over. Where fence consists of a mesh with single strands above, animals are often injured, and fences should therefore consist of mesh over full height. (2) game mirrors; these are used extensively, and an investigation of their efficacy is in progress. (3) clearance along roads; it appears that this is effective in reducing accidents. New measures are the use of visual or smell signals, and speed restrictions. Driver attitude is also significant. Further studies are planned. /TRRL/

Transport and Road Research Laboratory; IRRD 237666
National Swedish Road & Traffic Research Institute

51 221301

COLLISION OF VEHICLES WITH DEER STUDIED ON PENNSYLVANIA INTERSTATE ROAD SECTION

Bellis, ED
Graves, HB

Highway Research News, Hwy Res Board

71; No 43, pp 13-17, 8 REF

IN 1968 AND 1969 THE NUMBERS OF WHITE-TAILED DEER REPORTED KILLED ON PENNSYLVANIA HIGHWAYS WERE 21,607 AND 21,246, RESPECTIVELY. DEER-VEHICLE COLLISIONS ALSO OFTEN ENTAIL EXTENSIVE VEHICLE DAMAGE AND INJURY OR DEATH TO THE HUMAN OCCUPANTS. A LONG-TERM STUDY HAS BEEN UNDERTAKEN, EMPLOYING AN EIGHT-MILE STRETCH OF I-80, TO DETERMINE THE ACTIVITY, BEHAVIOR, AND MORTALITY OF DEER. PARAMETERS IN THE STUDY ARE DESCRIBED, DATA ARE CITED, AND TENTATIVE CONCLUSIONS ARE DRAWN.

51 221684

"DEER CROSSING" SIGNS MAY PROVE VALUABLE IN REDUCING ACCIDENTS AND ANIMAL DEATHS

Pojar, TM
Reseigh, TC
Reed, DF

Highway Research News, Hwy Res Board

N46; Jan 72; pp 20-3; 1 Fig; 2 Phot; 1 Ref

A SECTION OF COLOADO HIGHWAY WITH THE HIGHEST FREQUENCY OF DEER ACCIDENTS PER MILE IN THE STATE WAS CHOSEN FOR THE STUDY. A REFLECTORIZED DIAMOND SIGN WITH "DEER XING" IN NEON LIGHTS WAS COMPARED WITH A REFLECTORIZED DIAMOND WITH 4 ANIMATED SILHOUETTES IN NEON TUBING, LIT IN SEQUENCE. BOTH SIGNS RESULTED IN A SMALL, BUT STATISTICALLY SIGNIFICANT REDUCTION IN TRAFFIC SPEEDS PAST THE SIGN. THE SECOND SIGN APPEARED TO INITIATE A GREATER RESPONSE ON THE PART OF THE MOTORIST.

51 221688

DEER MIRRORS IN MISSOURI

American Highways

V51 N1; Jan 72; p 17

THE EFFECTIVENESS AND USE OF DEER MIRRORS BY THE MISSOURI HIGHWAY DEPARTMENT ARE REPORTEDLY FAVORABLE. THE NUMBER OF DEER-VEHICLE ACCIDENTS WERE CUT DOWN ENORMOUSLY WHILE IN USE. THE DEVICE CONSISTS OF TWO ROUND THREE INCH MIRRORS MOUNTED AT 45 DEGREE ANGLES ABOUT FOUR FEET ABOVE THE GROUND. THESE ARE INSTALLED ON A STAGGERED SYSTEM AT ABOUT 75 FT INTERVALS ON BOTH SIDES OF THE HIGHWAY DEPENDING ON THE TERRAIN BORDERING THE HIGHWAY AND THE NUMBER OF DEER CROSSING. HEADLIGHTS FROM PASSING CARS REFLECT AGAINST THE MIRRORS CAUSING LIGHT TO FLICKER SHARP, PENCIL-LIKE BEAMS STARTLING THE DEER AND CAUSING THEM TO STOP. ONCE THE LIGHT BEAMS STOP FLICKERING, THE DEER SAFELY CROSS.

51 221927

LIGHTED DEER CROSSING SIGNS AND VEHICULAR SPEED

Pojar, TM
Reed, DF
Resigh, TC

Colorado Dept Natural Resources; /Div Games, Fish, & Parks

Inter Rept; Aug 71; 12 pp

A COOPERATIVE STUDY BY THE COLORADO DIVISION OF HIGHWAYS AND THE COLORADO DIVISION OF GAME, FISH AND PARKS CONCERNING DEER-VEHICLE ACCIDENTS WAS INITIATED IN 1968. THESE AGENCIES ARE IN THE PROCESS OF EVALUATING PROCEDURES AND DEVICES THAT MAY HELP REDUCE THE NUMBER OF DEER-VEHICLE ACCIDENTS. SOME OF THE DEVICES BEING EVALUATED ARE TWO TYPES OF LIGHTED DEER CROSSING SIGNS. /AUTHOR/

National Technical Information Service

51 222425

USE OF ONE-WAY GATES BY MULE DEER

Reed, DF
Pojar, TM
Woodard, TN

Journal of Wildlife Management

V38 N1; Jan 74; pp 9-15

GATES DESIGNED TO ALLOW PASSAGE OF MULE DEER (ODOCOILEUS HEMINOUS) IN ONLY ONE DIRECTION WERE TESTED UNDER CONTROLLED AND FIELD CONDITIONS. TWO GATE TYPES HAD SIGNIFICANTLY DIFFERENT FREQUENCIES OF USE UNDER CONTROLLED CONDITIONS. EIGHT GATES OF THE TYPE DEEMED MOST EFFECTIVE WERE INSTALLED IN EIGHT-FOOT (2.44-M) FENCES ADJACENT TO INTERSTATE HIGHWAY 70 NEAR VAIL, COLORADO. A TOTAL OF 558 PASSAGES WERE RECORDED THROUGH THESE GATES DURING 1970-72 AND 96 PERCENT OF THESE WERE IN THE ONE-WAY DIRECTION FOR WHICH THE GATE WAS DESIGNED. BASED ON TRACK COUNTS, IT WAS ESTIMATED THESE GATES PERMITTED ABOUT 223 DEER TO ESCAPE THE IMMEDIATE HIGHWAY RIGHT-OF-WAY. /AUTHOR/

54 226320

MIRRORS QUELL DEER KILL

Better Roads

Dec 71; p 6

THE MISSOURI HIGHWAY DEPARTMENT IS INSTALLING MIRRORS ALONG CERTAIN SECTIONS OF THEIR HIGHWAYS IN AN ATTEMPT TO CUT DEER-VEHICLE ACCIDENTS. TWO ROUND, THREE-INCH MIRRORS MOUNTED AT 45-DEGREE ANGLES ABOUT FOUR FEET ABOVE THE GROUND ARE INSTALLED AT 75-FOOT INTERVALS ON BOTH SIDES OF THE HIGHWAY. HEADLIGHTS FROM PASSING CARS REFLECT AGAINST THE MIRRORS CAUSING LIGHT BEAMS TO FLICKER INTO THE CUTS, DRAWS, AND TIMBER ALONGSIDE ROADWAYS. THESE SHARP PENCIL-LIKE LIGHT BEAMS STARTLE THE DEER AND CAUSE THEM TO STOP. ONCE THE LIGHT BEAMS STOP FLICKERING, THE DEER THEN CROSS IN SAFETY. /AUTHOR/

51 262462

DEER MORTALITY ON A MICHIGAN INTERSTATE HIGHWAY

Reilly, RE
Green, HE

Journal of Wildlife Management; Wildlife Society, Suite S-176; 3900 Wisconsin Avenue, NW; Washington, D.C.; 20016

V38 N1; Jan 74; pp 16-19

Yearly totals of white-tailed deer (Odocoileus virginianus) killed by automobiles in a northern white cedar (Thuja accidentalis) deer wintering area in Upper Michigan's Mackinac County were compiled for a 13-year period from 1960 through 1972. Mackinac Trail, a two-lane highway (formerly US 2), intersects approximately a five-mile stretch of this wintering area. In 1963, Interstate 75 was constructed roughly parallel to US 2 and about 0.25 mile east of it and thus also intersected the wintering area. In 1964, car-deer kills in the study area increased by approximately 500 percent over the average of the previous four years. This car-deer kill declined slightly through 1967, and has recently fluctuated about an average which is approximately twice that of the pre-Interstate yearly mortality figure. /Author/

21 300989

GAME FENCES. LOCATION, COSTS AND MANAGEMENT
VILTSTAENGSEL. PLACERING, KOSTNADER OCH DRIFT

National Swedish Road Administration; Fack S-10220; Stockholm 12; Sweden

Monograph; #TU 1979:1; 79; 26 p.; 4 Fig.; Swedish

This report is a summary of present knowledge concerning game fencing for traffic accident prevention. Costs of construction, operation and maintenance are studied together with how the fence can be adapted to prevailing terrain conditions and adjacent roads. Results from tests of special take-off mounds for elks that have wandered into fenced areas are also included in the report. Different types of fences are studied. Some results from the report: net fence is more costly to erect than electrified fence, but it has lower maintenance costs. A combination fence also has a maintenance cost lower than that for the electrified fence. The accident prevention effect of the net fence was studied with aid of accident statistics from the Stockholm region. It was found that a reduction of accidents by 70-80 percent is well within the reach of what can be obtained by game fencing. /TRRL/

Transport and Road Research Laboratory; IRRD 241314
National Swedish Road & Traffic Research Institute

51 305661

WHITE-TAILED DEER (ODOCOILEUS VIRGINIANUS) ON THE DEPARTMENT OF ENERGY'S OAK RIDGE RESERVATION: DATA ON ROAD-KILLED ANIMALS, 1969--1977

Story, JD
Kitchings, JT

Oak Ridge National Laboratory; Post Office Box X; Oak Ridge, Tennessee; 37830
Department of Energy; 1000 Independence Avenue, SW; Washington, D.C.; 20585

Jul 79; 36 p.

FT-Contract; CN-W-7405-ENG-26

During nine years (1969--1977), 126 white-tailed deer (Odocoileus virginianus) were killed by highway vehicles on the Department of Energy's Oak Ridge, Tennessee Reservation. Mortality was highest in the fall, and more males than females were killed among both fawns and adults. While traffic volume increased 8.2% annually, deer road-kills increased 42.8% annually. Increased road-kills were attributed primarily to an increase in the resident population.

ORDER FROM:
National Technical Information Service; 5285 Port Royal Road; Springfield, Virginia; 22161; ORNL/TM-6803

National Technical Information Service; u8003

51 315659

THE EFFECT OF DEER REFLECTORS ON DEER-VEHICLE ACCIDENTS

PERFORMING AGENCY:
Iowa Department of Transportation; 826 Lincoln Way; Ames, Iowa; 50010; HR-210

INVESTIGATOR:
Gladfelter, L; #(515) 432-2823

FUNDING AGENCY:
Iowa Department of Transportation; 826 Lincoln Way; Ames, Iowa; 50010
Iowa Conservation Commission; Wild Life Research Station; R.R. #1; Boone, Iowa; 50036

AS-Active; RD-Dec 81; SD-Jun 79; DC-Sep 83 EST; TF-$30072; FT-Contract; CN-HR-210

The objective is to evaluate the "Swareflex" reflector system in reducing deer-vehicle accidents, to determine a cost benefit ratio for the system and to identify deer crossing areas throughout the state for possible implementation of the system.

CITATIONS:
Gladfelter, L
The Effect of Deer Reflectors on Deer-Vehicle Accidents
Iowa DOT, Office of Materials
Progress Report 8106

Iowa Department of Transportation

23 315778

SURVEY OF 1977 DEER KILL IN MINNESOTA

PERFORMING AGENCY:
Minnesota Department of Transportation; Environmental Affairs, 807 Transportation Building; St Paul, Minnesota; 55155

INVESTIGATOR:
Peterson, R; #(612) 296-1640
Sullivan, R

FUNDING AGENCY:
Minnesota Department of Transportation; Environmental Affairs, 807 Transportation Building; St Paul, Minnesota; 55155

AS-Completed; RD-Dec 81; SD-Oct 78; TF-$10000; FT-0

The purpose of this study is to identify the location of deer roadkill throughout the state. Once chronic kill areas have been located they will be field checked to identify possible treatment measures to reduce the kill problem. Data source are the confiscation reports on road-killed deer filed by the Conservation Officers.

Minnesota Department of Transportation

23 315784

DEER-PROOF FENCE AND ONE-WAY GATES

PERFORMING AGENCY:
Minnesota Department of Natural Resources; Farmland Wildlife Research Center; Madelia, Minnesota; 56062

INVESTIGATOR:
Ludwig, J; #(507) 642-8478

FUNDING AGENCY:
Minnesota Department of Natural Resources; Farmland Wildlife Research Center; Madelia, Minnesota; 56062
Minnesota Department of Transportation; Office of Environmental Affairs; 408 Transportation Building, John Ireland Boulevard; St Paul, Minnesota; 55155
Minnesota Department of Transportation; 408 Transportation Building, John Ireland Boulevard; St Paul, Minnesota; 55155;

AS-Active; RD-Mar 81; SD-Aug 77; TF-$15000

To determine effectiveness of 8' fencing in preventing deer access to highway and effectiveness of one-way gates in facilitating the safe exist of deer gaining access for fenced highway corridors on I 90 at Walnut Lk and I 94 at St. Joseph. Fence and gates monitored by use of counters and track beds. Also monitored location of road-killed deer. Obtained pre-fence data with track counts of crossing over road bed. Aerial counts used to evaluate deer density.

CITATIONS:
Bellis, E; Graves, H
Deer Mortality on a Pennsylvania Interstate Highway
J. Wildl Manage
35(2):232-237

Roper, RL; Olson, P; Evans, R
Using Wildlife Values in Benefit/Cost Analysis and Mitigation of Wildlife Losses
Colarado Division Wildl.
17p

Pils, C
The Cost and Chronology of Wisconsin Deer-Vehicle Collisions
Wisconsin Dept. Nat. Res.
Res. Rpt. 103, 5p

Puglisi, M; Lindsay, J; Bellis, E
Factors Associated with Highway Mortality of White-Tailed Deer

J. Wildl. Manage
38(4):799-807 74

Reed, D
Deer Vehicle Accidents Statewide and Methods and Devices to Reduce Them
Colorado Div. Wildl fed Aid
pp 1-22, Part 1 7907

Reed, D; Pojar, T; Woodard, T
Use of One-Way Gates by Mule Deer
J.Wild l. Manage
38(1): 9-15 74

Reilly, R; Gren, H
Deer Mortality on a Michigan Interstate Highway
J. Wildl. Manage
38(1):16-19 74

Minnesota Department of Transportation

51 322118

INVESTIGATION OF ELK ACCIDENTS IN THE COUNTY OF NORRBOTTEN, SWEDEN 1978
UNDERSOEKNING AV AELGOLYCKOR I NORRBOTTENS LAEN 1978

Pettersson, G
Svedberg, AA

Trafiksaekerhetsverket; Oevre Norra Distriktet; Luleaa; Sweden

Monograph; 79; 29p; 15 Fig.; 20 Tab.; Swedish

The study aims at obtaining answers to questions such as, when, where and how do elk accidents occur and who meets with them. It draws upon 294 police reports of elk accidents during 1978 in the province of Norrbotten. The drivers involved were asked to answer a questionnaire comprising the following variables: vehicle, light conditions, traffic conditions, lighting, when was the elk discerned, speed, road standard, surrounding terrain, knowledge, damage/injury, previous experience. The answers received were compiled in frequency and cross tables. The results show that the drivers, irrespective of speed, speed limit or knowledge of elk danger often did not see the elk before the collision, or saw it so late that he was unable to react. There was no over-representation of any age group or sex of driver. Accidents mainly occurred in darkness and at dawn. Surprisingly enough one fourth of the accidents occurred at places described by drivers as open field with good visibility. The author concludes that measures aimed at drivers to reduce the number of accidents have limited effect. Instead long-term measures must be taken to prevent elks from coming into conflict with road traffic. In the meantime the number of elks must be kept at a suitable level by shooting. (TRRL)

Transport and Road Research Laboratory; IRRD 247889
National Swedish Road & Traffic Research Institute

51 322719

EFFECTS OF HIGHWAY OPERATIONS PRACTICES AND FACILITIES ON ELK, MULE DEER, AND PRONGHORN ANTELOPE

Ward, AL
Formwalt, NE
Henry, SE
Hodorff, RA

Rocky Mountain Forest and Range Experiment Station; 240 West Prospect Street; Fort Collins, Colorado; 80526
Federal Highway Administration; 400 7th Street, SW; Washington, D.C.; 20590

Final Rpt.; #FHWA-RD-79-143; Mar 80; 52p

FUNDING AGENCY:
FHWA Code E-0469

Vegetative ground cover under snowdrifts formed behind snowfences used along Interstate 80 to control blowing and drifting snow has not changed appreciably over a five-year period. Sagebrush (Artemisia tridentata) has decreased significantly under snowdrifts where deep drifts occurred every year and is being replaced by grasses and forbs. Mule deer (Odocoileus heminous) use machinery and box-type underpasses to cross under Interstate 80 when big game fencing 8 feet (2.44 m) high is constructed in place of the regular right-of-way fence. Deer-vehicle accidents were reduced over 90 percent, which is a large savings of deer life and vehicle damage. Only one pronghorn antelope (Antilocarpa americana), out of several hundred in the area, has been known to use the same underpasses. Elk (Cervus canadensis) have not had occasion to use the underpasses. Hunted mule deer and elk cross Forest roads most in areas where their feeding sites are adjacent to the road. Elk show a perference to stay over 0.1 mile (160 m) from streams when crossing roads, while deer are not so sensitive. Elk show a preference to stay a minimum of 0.25 mile (400 m) from traffic while deer prefer a minimum of 100 yards (91.m), and antelope use the habitat up to the right-of-way fence. All three species are more responsive to people walkering; elk prefer a distance of 0.5 mile (800 m), deer 200 yards (182 m) and antelope somewhere between the two distances, depending on habitat and experiences. The displacement reaction is definitely the most serious response. Camera systems using microwave sensors and lights are useful in recording animal activities at underpasses. (FHWA)

ORDER FROM:
National Technical Information Service; 5285 Port Royal Road;

Springfield, Virginia; 22161; PB81-107898

Federal Highway Administration

51 323385

REGIONAL DEER-VEHICLE ACCIDENT RESEARCH

Reed, D
Woodard, TN
Beck, TDI

Colorado Division of Wildlife; 526 Pine Street; Glenwood Springs, Colorado; 81601
Federal Highway Administration; Region 8, 555 Zang Street; Lakewood, Colorado; 80225

Final Rpt.; #FHWA-CO-79-11; Nov 79; 61p

FUNDING AGENCY:
FHWA Code E-0485

FT-HPSR; CN-3(3)

The purpose of this study was to evaluate and test the effectiveness of methods, devices, or structures related to reducing the number of deer-vehicle accidents. Consistent with this purpose was the need to locate and examine potentially critical deer-vehicle accident areas and recommend methods or structures which could have reduced these accidents. In addition, the effects of the methods recommended and investigation of deer responses to various experimental structures was conducted.

ORDER FROM:
National Technical Information Service; 5285 Port Royal Road; Springfield, Virginia; 22161

Federal Highway Administration

51 330483

THE GAME ACCIDENT PROJECT (VIOL). FINAL REPORT, MAY 1980
VILTOLYCKSPROJEKTET (VIOL). SLUTRAPPORT MAJ 1980

National Swedish Road Administration; Pack S-10220; Stockholm 12; Sweden

Monograph; STU 146; May 80; 117p; Figs.; Tabs.; Refs.; Apps.; Swedish

The number of police reported accidents with game and motor vehicles increased heavily in the 1960's. As a result the government assigned to the National Road Administration the task to carry out research and experimental work for the purpose of reducing the number of such accidents. The work has been going on between 1970 and 1979. Basic facts about game, traffic and accidents have been collected and analysed. The analyses have led to an estimation of game accident hazards under different conditions. Accident preventive measures have been thoroughly studied through practical experiments, statistical accident analyses and economic assessments. The investigation comprises elk, roe deer, fallow deer and red deer with the accent on elk. Game accidents have increased no less heavily in the 1970's and they are likely to constitute about 15% of the total number of road accidents. A number of measures are discussed, ie game fences, mirrors, improved visibility through clearing, big game signs, repellents, information to road users, reduction of the stock of game. Fences have an accident reducing effect of approx 80% whereas mirrors show no significant effect. Clearing is an expensive measure. Further research is necessary to establish the effect of signs. Repellents in the form of evil-smelling preparations seem to have some effect. (TRRL)

Transport and Road Research Laboratory; TRRD 251162
National Swedish Road & Traffic Research Institute

51 330484

GAME AND TRAFFIC: REPORT OF HUNTING AND WILDLIFE MANAGEMENT COMMISSION
VILT OCH TRAFIK: BETAENKANDE AV JAKT- OCH VILTVAARDSBEREDNINGEN

Jordbruksdepartementet; Fack; Stockholm; Sweden; 0375-250X; 91-38-05660-7

Monograph; #SOU 1980:29; 80; 120p; Figs.; Tabs.; Swedish

There are no simple ways of solving the problem of accidents involving game. These proposals are only limited efforts which might contribute to reducing the risks. A somewhat increased hunting ought not to cause any greater risks for the fauna. In contrast to traffic safety demands, the aim should be to create one balanced elk stock in larger regions. Lower speed on the roads, especially where and when the accident risk is high, leads to fewer and less serious accidents. It can be done with speed limits and use of warning signs. Education (driving-school) and information (eg forwarding the police knowledge about temporary elk accumulations) can also help to decrease the number of accidents. To reduce the accident risk several actions in connection with the carriageway have been tried, for instance fences, land clearance and game mirrors. The game mirrors, however, have not proved to have any considerable efficiency. Biotope actions are seldom justified, at least not concerning elk. Light, sound and odour signals have not yet been used in any great degree. Tests have showed that odour signals have a high effect. (TRRL)

Transport and Road Research Laboratory; IRRD 251201
National Swedish Road & Traffic Research Institute

51 331459

ACCIDENTS BETWEEN WILD ANIMALS AND VEHICLES. THE BEHAVIOUR OF ROAD USERS, AND POSSIBILITIES OF CHANGING IT
VILTOLYCKOR. TRAFIKANTERS BETEENDE OCH MOEJLIGHETER ATT PAAVERKA DETTA

Swedish Transport Research Delegation; Wenner-Gren Center, Sveavaegen 166; S-11346 Stockholm; Sweden; 91-85562-27-0

Monograph; #No. TFD 1980:3; 80; 47p; 9 Fig.; 10 Tab.; Phots.; Ref.; Swedish

This is the final report of a three year research project. The general purpose of the project has been to investigate the possibility of changing driver behaviour in order to reduce the risks of accidents between wild animals and vehicles. Only accidents involving moose and car drivers have been considered. Four different investigations have been carried out. The first two studies consist of analyses of survey data from drivers sampled from three Swedish counties. In the first study relations between the probability of a collision with moose and drivers' experiences with knowledge and attitudes about moose were explored. In the second study the problem was to investigate and compare circumstances in accidents and near-accidents and to relate the results to differences in driver behaviour. In the third study the relation between the attention distribution of drivers and their detection of moose dummies was studied experimentally. The effect of the wild animal crossing warning sign is investigated in the fourth and final study as manifested in drivers' detection of moose dummies. (TRRL)

Transport and Road Research Laboratory; IRRD 252765
National Swedish Road & Traffic Research Institute

51 333600

AN EVALUATION OF THE EFFECTIVENESS OF SWAREFLEX WILDLIFE WARNING REFLECTORS IN REDUCING DEER-VEHICLE COLLISIONS

PERFORMING AGENCY:
Minnesota Department of Natural Resources; Farmland Wildlife Research Group; Madelia, Minnesota; 56062

INVESTIGATOR:
Ludwig, J; Wildlife Research Biologist; #(507) 642-3478
Alter, R
Mauver, M

FUNDING AGENCY:
Minnesota Department of Transportation; P.O. Box H, 301 Laurel Street; Brainerd, Minnesota; 56401

AS-Active; RD-03 Mar 81; SD-Oct 80; DC-Oct 83 ESP; TF-$17301; FT-Contract; CN-364

The objective is to evaluate the effectiveness of the SWAREFLEX "Wildlife Warning Reflectors" in reducing the number of deer-vehicle collisions. Historical number of deer-vehicle collisions, as tabulated from Conservation Officer reports, will be compared to number of collisions after installation of reflectors.

Minnesota Department of Natural Resources

51 333603

EVALUATION OF THE EFFECTIVENESS OF "BOSCH" WILD ANIMAL WARNING MIRRORS IN REDUCING DEER-VEHICLE COLLISIONS

PERFORMING AGENCY:
Minnesota Department of Transportation; Office of Environmental Services; 807 Transportation Building; St Paul, Minnesota; 55155

INVESTIGATOR:
Peterson, R; #(612) 296-1640

FUNDING AGENCY:
Minnesota Department of Transportation; 408 Transportation Building, John Ireland Boulevard; St Paul, Minnesota; 55155;
Minnesota Department of Natural Resources; Centennial Office Building, 658 Cedar Street; St Paul, Minnesota; 55155
Valley Archery Club

AS-Active; RD-Oct 81; SD-Oct 81; DC-Dec 84 EST; TF-53000

The study objective is to evaluate "Bosch" Wildlife Warning Mirrors in reducing deer-vehicle collisions on a stretch of TH 169 north of St. Peter, Minnesota which has a chronic deer-kill problem. Reflectors will be purchased by Valley Archery Club and installed in October 1981. Deer-Kills will be monitored for 3 years by Mn/DNR.

Minnesota Department of Transportation

21 334660

TRAFFIC SAFETY EFFECT OF GUIDE POSTS
TRAFIKSAEKERHETSEFFEKTEN AV KANTSTOLPAR

National Swedish Road Administration; Fack S-10220; Stockholm 12; Sweden

Monograph; #Meddelande Tu 1980:7; 80; 26p; 8 Tab.; Swedish

The number of accidents on twenty road sections with guide posts provided with reflectors, was compared to the number on twenty control sections. The test started in January 1977 and has been in progress for somewhat more than two years. During this time 584 police reported accidents occurred on the stretches with guide posts and 615 on the control sections. After a correction of the numbers with regard to differences in vehicle kilometers, the increase of safety with guide posts, was calculated to three percent.a closer analysis of the accidents shows that the guide posts have little effect on accidents involving wild animals, while the effect on accidents involving one or several vehicles can be as high as 5-10 percent. Earlier, tests were done with reflectors on snow guide posts on almost the same road sections, but with a considerably higher effect. The causes of the different results are discussed in the report. (TRRL)

Transport and Road Research Laboratory; IRRD 252937
National Swedish Road & Traffic Research Institute

51 336523

WILDLIFE RESEARCH REPORT. PART ONE

Colorado Division of Wildlife; Fort Collins, Colorado

Jul 80; 178p

Methods, devices, or structures related to reducing the number of deer-vehicle accidents were evaluated or experimentally tested after obtaining preliminary data on study areas and methodology. These methods, devices, or structures were highway lighting, underpasses, overpasses, 2.44-m fences and one-way deer gates, and deer guards. During the highway lighting study, 84 deer-vehicle accidents occurred, 45 and 39 with lights off and on, respectively. Behavioral responses of deer to the Vail deer underpass did not change substantially over the 10 years (1970-1979) of study. Five deer guard prototypes were evaluated. Highway lighting, as tested in this study, did not result in significantly fewer accidents.

ORDER FROM:
National Technical Information Service; 5285 Port Royal Road; Springfield, Virginia; 22161; PB81-124638

National Technical Information Service; u8107

21 341499

EVALUATION OF HIGHWAY DEER KILL MITIGATION ON SIE/LAS-395 (1976-1979)

Ford, SG

California Department of Transportation; Division of Transportation Planning; Sacramento, California; 95814; 13140-604103
Federal Highway Administration; 400 7th Street, SW; Washington, D.C.; 20590

Final Rpt.; #FHWA/CA/80/01; May 80; 45p

FUNDING AGENCY:
FHWA Code E-0458

FT-Contract; CN-A-8-34

The project was developed to determine the effectiveness of deer-crossing structures, deer-proof fence, and one-way deer gates in preventing deer-vehicle collisions on a section of highway which crosses a deer migration route. All information on this study was gathered by direct and indirect observation. It has been determined that the wide open type of deer crossing system is effective in providing deer a safe passage across the highway. It took three years before the major portion of the herd approached the crossings directly rather than moving to them along the fence. Until that time, every weak spot in the fence was challenged by the deer moving to the structures. Man was the major cause for openings in the crossing system during this study. The opening that accounted for the major portion of the deer killed during the study was a drive through gate, frequently left open by a local rancher. (FHWA)

ORDER FROM:
National Technical Information Service; 5285 Port Royal Road; Springfield, Virginia; 22161; PB81-246795

51 348055

FENCES FOR PROTECTION OF TRAFFIC AND DEER. SUMMARY

Lehtimaki, R

Central Organization for Traffic Safety, Finland; PL 239; 00120 Helsinki 12; Finland; 0355-6670; 951-9431-32-2

Monograph; No. 37/1981; Feb 81; 14p; 1 Fig.; 2 Tab.; 8 Ref.

The effect of 12 short wire-net fences built along the road network on deer accidents and on the movement of deer were studied by accident analysis and observation at the test fences. It was found the number of deer accidents decreases if fences are built, but only where the fences are located there was a corresponding increase in the number of accidents at both ends of the short wire-net fences studied. Thus the short wire net fences have no effect on the total number of deer accidents.
(TRRL)

Transport and Road Research Laboratory; IRRD 250697

51 360126

EVALUATION OF DEER MIRRORS FOR REDUCING DEER VEHICLE ACCIDENTS

PERFORMING AGENCY:
Maine University; Hampden Highlands, Maine; 04445

INVESTIGATOR:
Gilbert

FUNDING AGENCY:
Federal Highway Administration; Environmental Design and Control; 400 7th Street, SW; Washington, D.C.; 20590

AS-Active; RD-Dec 81; SD-09 Sep 77; TF-$8000; FT-Contract; CN-PO-7-3-0152

The study will evaluate the effectiveness of metal mirrors placed along the highway row in redu ing deer-vehicle accidents. The operating theory is that car lights reflecting of the mirrors will cause deer to stop as the vehicle passes.

Federal Hig! way Administration; 298017352; 33F2182 54; A

52 348119

THE HUMAN FACTOR IN GAME-VEHICLE ACCIDENTS. A STUDY OF DRIVERS' INFORMATION ACQUISITION

Aaberg, L

Uppsala University, Sweden; P.O. Box 227; S-751 05 Uppsala; Sweden; 0586-8858; 91-554-1185-1

Monograph; #No. 6; 81; 130p; 17 Fig.; 15 Tab.; 2 Phot.; Refs.;

The problem of game-vehicle accidents is discussed in terms of driver's strategies for visual search in driving. To find possible measures for reducing the number of wildlife accidents, four studies were undertaken. Initially, two exploratory investigations were made: a survey of drivers' expectancies concerning moose in traffic and a study involving reports of accidents and near-accidents with moose. The results of these investigations give no evidence that drivers' experience, knowledge, or attitude concerning moose are related to wildlife accidents. Instead they suggest that the visual search patterns of drivers might explain some of the effects obtained. In a series of field experiments, drivers' ability to detect moose dummies was explored and in a final study the effectiveness of the game crossing sign was investigated experimentally. The results were interpreted as evidence that in rural driving, drivers normally scan the view ahead in a systematic and almost automatic way which is not effective for the task of detecting moose. Drivers can easily change their automatic scanning into a controlled search for animals but this search is demanding and can probably not be sustained for any length of time without feedback. (TRRL)

Transport and Road Research Laboratory; IRRD 258809
National Swedish Road & Traffic Research Institute

121 Foothill Drive
Eagle River, Alaska 99577

29 June 1983

RE: Moose-Auto Accidents on Glenn Highway

Representative Randy Phillips
Box 142
Eagle River, Alaska 99577

Dear Representative Phillips:

Thank you for your letter of May 9, 1983 and also for sending along the copy of the letter from the Department of Transportation.

It sounds as though you are trying to get someone on the ball about the moose situation on Glenn Highway. You said that maybe sometime in June the research on the problem of lighting Glenn Highway would be completed. Have you heard anything yet? I hope they can do something before darkness falls again.

Could you please check into it again. Please don't let them drop the ball.

Also, I am really upset about you being kicked off the committee. Is there anyone in particular I could write about it? I would be glad to let them know how we feel about it.

Thank you very much for helping.

Sincerely,

Marge Founds

Marge Founds

694-2985 (H)
552-4230 (W)

STATE OF ALASKA

Bill Sheffield, Governor

DEPARTMENT OF TRANSPORTATION
and PUBLIC FACILITIES
CENTRAL REGION PLANNING & PROGRAMMING
Director's Office

4111 AVIATION AVENUE, POUCH 6900
ANCHORAGE 99502 (TELEX 25-185)
PHONE: 266-1462

May 16, 1983

The Honorable Randy Phillips
Representative
Alaska State Legislature
Pouch V
Juneau, AK 99811

Dear Representative Phillips:

Per your conversation with Michelle Michaud regarding moose-automobile accident prevention measures along the Glenn Highway, Alan Bennett, a biologist with the U.S. Army has indicated that illumination may reduce moose-auto accidents by 20% whereas fencing and underpasses could reduce these accidents by up to 70%. Since a higher reduction in accidents would occur with fencing and underpasses, this method will be considered first.

I have requested the Central Region's Design & Construction Division to investigate the possibility of using federal safety funds for the design portion of the project. They have indicated that the report should be completed in about two weeks. I will forward a copy of that report to you at that time.

In the meantime if I can be of further assistance please call.

Sincerely,

Gina M. Lindley for

William R. Snell
Director

WRS:MM/ey

cc: Emil Notti, Legislative Assistant
Office of the Governor

Alan Bennett, U.S. Army

Bill Sheffield, Governor

DEPARTMENT OF TRANSPORTATION
and PUBLIC FACILITIES
CENTRAL REGION PLANNING & PROGRAMMING
Director's Office

4111 AVIATION AVENUE, POUCH 6900
ANCHORAGE 99502 (TELEX 25-185)
PHONE: 266-1462

May 4, 1983

The Honorable Randy Phillips
Representative
Alaska State Legislature
Pouch V
Juneau, AK 99811

Dear Representative Phillips:

Sorry for the delay in responding to your request regarding protective/preventive measures along the Glenn Highway (Fort Richardson to Eagle River) to reduce the number of moose-auto accidents.

I requested the Department's Research Section in Fairbanks to do a literature search (attached) to determine various types of methods used in other states and countries to reduce moose-auto accidents. As you can see from the attached list of studies, many thousands of dollars have been spent researching the problem with some success.

A reflector device has been utilized along the Glenn Highway with little success. This has been mainly due to the fact that excess dust and winter snow covers the devices and maintenance of the reflectors has been insufficient as well as costly. Also note that studies directly related to roadway illumination did not tend to show a decrease in vehicle/wildlife accidents.

Herman Griese, a game biologist for the Department of Fish and Game (DF&G) in Anchorage, and Alan Bennett, a biologist for the U.S. Army indicated that the following would probably be the best solution for reducing the occurrence of moose related auto accidents along this section (Mile 132-140) of the highway.

1. Clear at least 35 feet on each side of the road bed. This allows both the driver to see the moose and the moose also does not walk directly onto the road from the trees.

   Mr. Griese mentioned that if 35 feet is cleared on each side of the road that this should occur after the buds have begun to open up around the middle or end of June. Also the brush would need to be cut back periodically (approximately every 3 years) to prevent prime "moose habitat" vegetation from growing back.

2. Install fencing and underpasses for the moose to travel from one side of the road to the other (the attached map shows where the fencing and underpasses should be placed).

3. Install lighting on the both sides of the highway to provide continuous illumination from Muldoon Road to Hiland Road.

Mr. Bennett indicated that 80% of the moose-auto accidents occur within two main areas. He also indicated that approximately 53 mooses were killed on this stretch of the highway last year. Mr. Griese said that ADF&G and the U.S. Army only have accident records in which the accident caused the death of the moose. Mr. Griese also pointed out that moose behave differently than deer, hence those measures used to reduce deer related auto accidents may not work where moose are involved.

Mr. Griese and Mr. Bennett have indicated that the moose herd in this area has remained relatively stable; however, travel along this section of the highway will continue to increase and without some type of prevention measures moose related auto accidents will most likely increase.

A cost estimate has been prepared to determine the costs for: 1) lighting (continuous illumination), 2) fencing and underpasses, and 3) clearing of road side. This cost estimate should give you some indication of the costs involved. The Department has not had time to fully analyze the possibilities of installing any of the above mentioned prevention measures.

In the interim, the Department's Central Region Maintenance & Operations Division will clear certain areas along the roadway pending availability of funds; however, a long-term solution will need to be funded, fully or partially by the Legislature.

Mr. Bennett has indicated that the U.S. Army would be willing to fund part of any project that the Department may construct. The Department is looking into possibly securing federal "safety" funds.

If I can be of further assistance to you regarding this matter please call.

Sincerely,

William R. Snell

William R. Snell
Director

WRS:MM/ey

Attachments

cc: Alan Bennett U.S. Army

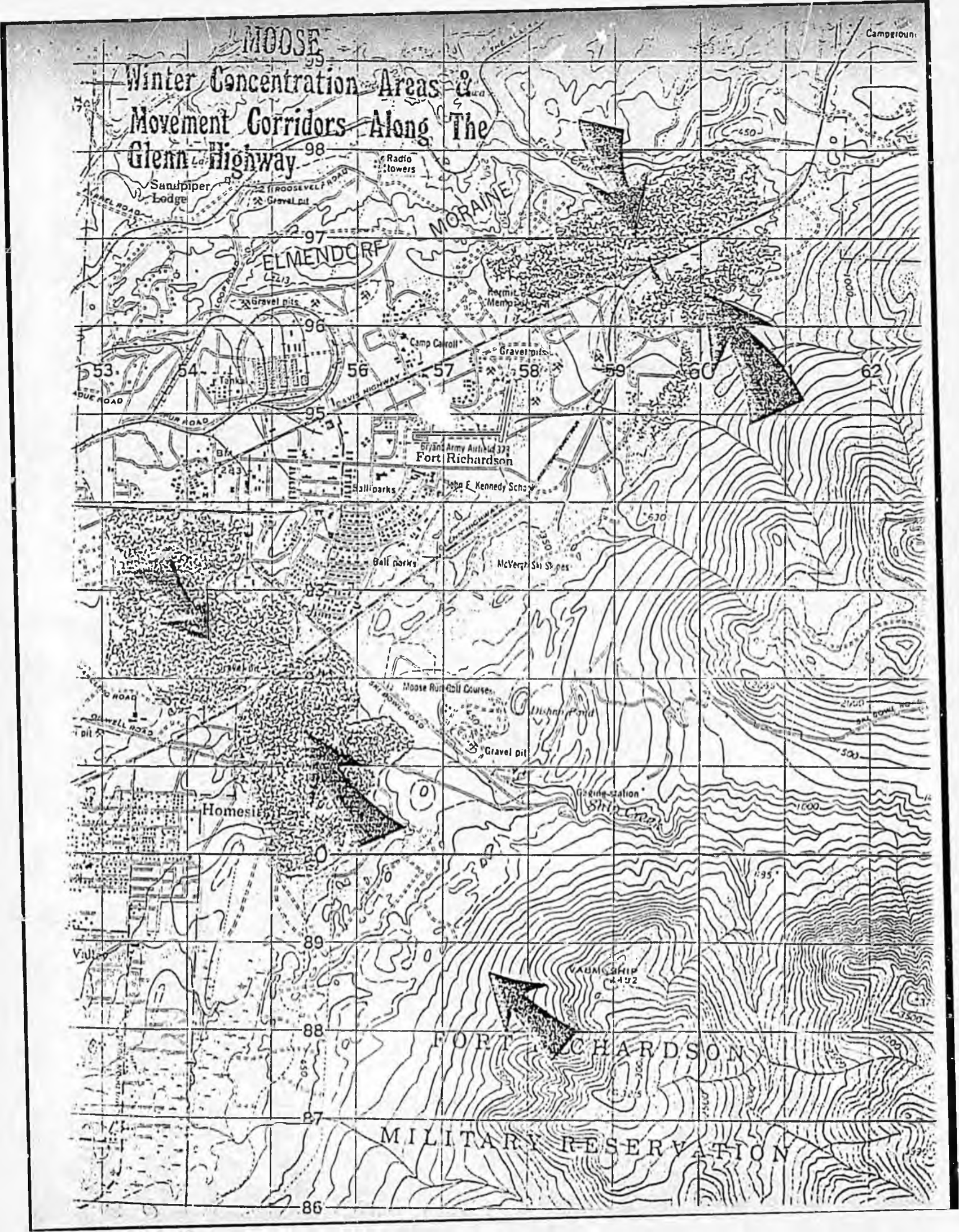
Herman Griese, ADF&G

Emil Notti, Legislative Assistant
Office of the Governor

GLENN HIGHWAY

Muldoon Road to Hiland Road (8 miles)

Fencing along both sides of highway with 5-moose underpasses		$2,596,250.00
Continous Illumination		2,784,000.00
Clearing and Grubbing 35 feet on each side of road		288,000.00
	TOTAL	$5,668,250.00


MOOSE
Winter Concentration Areas &
Movement Corridors Along The
Glenn Highway
99
98
97
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88
87
86
53
54
56
57
58
59
60
62
Radio towers
Sandpiper Lodge
Gravel pit
MORAINE
ELMENDORF
Gravel pits
Camp Carroll
Gravel pits
Fort Richardson
Ball parks
John E. Kennedy Schools
Ball parks
McVerg Ski Slopes
Moose Run Golf Course
Gravel pit
Homesite
Gasoline station
VAUM SHIP
FORT RICHARDSON
MILITARY RESERVATION

RUN NO. HALK515

ILLUMINATION, SIGNS, REFLECTORS FOR DEER OR WILDLIFE

HRIS FILE SEARCH

PREPARED FOR

MR. DAVID C. ESCH
CHIEF OF HIGHWAY RESEARCH
ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES
FAIRBANKS, ALASKA

03/30/83

Highway Research Information Service

National Research Council

National Academy of Sciences * National Academy of Engineering

Washington, D.C.

51 330434

GAME AND TRAFFIC: REPORT OF HUNTING AND WILDLIFE MANAGEMENT COMMISSION
VILT OCH TRAFIK: BETAENKANDE AV JAKT- OCH VILTVAARDSBEREDNINGEN

Jordbruksdepartementet; Fack; Stockholm; Sweden; 0375-250X; 91-38-05660-7

Monograph; #SOU 1980:29; 80; 120p; Figs.; Tabs.; Swedish

There are no simple ways of solving the problem of accidents involving game. These proposals are only limited efforts which might contribute to reducing the risks. A somewhat increased hunting ought not to cause any greater risks for the fauna. In contrast to traffic safety demands, the aim should be to create one balanced elk stock in larger regions. Lower speed on the roads, especially where and when the accident risk is high, leads to fewer and less serious accidents. It can be done with speed limits and use of warning signs. Education (driving-school) and information (eg forwarding the police knowledge about temporary elk accumulations) can also help to decrease the number of accidents. To reduce the accident risk several actions in connection with the carriageway have been tried, for instance fences, land clearance and game mirrors. The game mirrors, however, have not proved to have any considerable efficiency. Biotope actions are seldom justified, at least not concerning elk. Light, sound and odour signals have not yet been used in any great degree. Tests have showed that odour signals have a high effect. (TRRL)

Transport and Road Research Laboratory; IRRD 251201
National Swedish Road & Traffic Research Institute

51 330483

THE GAME ACCIDENT PROJECT (VIOL). FINAL REPORT, MAY 1980
VILTOLYCKSPROJEKTET (VIOL). SLUTRAPPORT MAJ 1980

National Swedish Road Administration; Fack S-10220; Stockholm 12; Sweden

Monograph; #TU 146; May 80; 117p; Figs.; Tabs.; Refs.; Apps.; Swedish

The number of police reported accidents with game and motor vehicles increased heavily in the 1960's. As a result the government assigned to the National Road Administration the task to carry out research and experimental work for the purpose of reducing the number of such accidents. The work has been going on between 1970 and 1979. Basic facts about game, traffic and accidents have been collected and analysed. The analyses have led to an estimation of game accident hazards under different conditions. Accident preventive measures have been thoroughly studied through practical experiments, statistical accident analyses and economic assessments. The investigation comprises elk, roe deer, fallow deer and red deer with the accent on elk. Game accidents have increased no less heavily in the 1970's and they are likely to constitute about 15% of the total number of road accidents. A number of measures are discussed, ie game fences, mirrors, improved visibility through clearing, big game signs, repellents, information to road users, reduction of the stock of game. Fences have an accident reducing effect of approx 80% whereas mirrors show no significant effect. Clearing is an expensive measure. Further research is necessary to establish the effect of signs. Repellents in the form of evil-smelling preparations seem to have some effect. (TRRL)

Transport and Road Research Laboratory; IRRD 251162
National Swedish Road & Traffic Research Institute

51 322719

EFFECTS OF HIGHWAY OPERATIONS PRACTICES AND FACILITIES ON ELK, MULE DEER, AND PRONGHORN ANTELOPE

Ward, AL
Fornwalt, NE
Henry, SE
Hodorff, RA

Rocky Mountain Forest and Range Experiment Station; 240 West Prospect Street; Fort Collins, Colorado; 80526
Federal Highway Administration; 400 7th Street, SW; Washington, D.C.; 20590

Final Rpt.; #FHWA-RD-79-143; Mar 80; 52p

FUNDING AGENCY:
FHWA Code E-0469

Vegetative ground cover under snowdrifts formed behind snowfences used along Interstate 80 to control blowing and drifting snow has not changed appreciably over a five-year period. Sagebrush (Artemisia tridentata) has decreased significantly under snowdrifts where deep drifts occurred every year and is being replaced by grasses and forbs. Mule deer (Odocoileus heminous) use machinery and box-type underpasses to cross under Interstate 80 when big game fencing 8 feet (2.44 m) high is constructed in place of the regular right-of-way fence. Deer-vehicle accidents were reduced over 90 percent, which is a large savings of deer life and vehicle damage. Only one pronghorn antelope (Antilocarpa americana), out of several hundred in the area, has been known to use the same underpasses. Elk (Cervus canadensis) have not had occasion to use the underpasses. Hunted mule deer and elk cross Forest roads most in areas where their feeding sites are adjacent to the road. Elk show a perference to stay over 0.1 mile (160 m) from streams when crossing roads, while deer are not so sensitive. Elk show a preference to stay a minimum of 0.25 mile (400 m) from traffic while deer prefer a minimum of 100 yards (91.m), and antelope use the habitat up to the right-of-way fence. All three species are more responsive to people walkering; elk prefer a distance of 0.5 mile (800 m), deer 200 yards (182 m) and antelope somewhere between the two distances, depending on habitat and experiences. The displacement reaction is definitely the most serious response. Camera systems using microwave sensors and lights are useful in recording animal activities at underpasses. (FHWA)

ORDER FROM:
National Technical Information Service; 5285 Port Royal Road;

51 322118

INVESTIGATION OF ELK ACCIDENTS IN THE COUNTY OF NORRBOTTEN, SWEDEN 1978
UNDERSOEKNING AV AELGOLYCKOR I NORRBOTTENS LAEN 1978

Pettersson, G
Svedberg, AA

Trafiksaekerhetsverket; Oevre Norra Distriktet; Luleaa; Sweden

Monograph; 79; 29p; 15 Fig.; 20 Tab.; Swedish

The study aims at obtaining answers to questions such as, when, where and how do elk accidents occur and who meets with them. It draws upon 294 police reports of elk accidents during 1978 in the province of Norrbotten. The drivers involved were asked to answer a questionnaire comprising the following variables: vehicle, light conditions, traffic conditions, lighting, when was the elk discerned, speed, road standard, surrounding terrain, knowledge, damage/injury, previous experience. The answers received were compiled in frequency and cross tables. The results show that the drivers, irrespective of speed, speed limit or knowledge of elk danger often did not see the elk before the collision, or saw it so late that he was unable to react. There was no over-representation of any age group or sex of driver. Accidents mainly occurred in darkness and at dawn. Surprisingly enough one fourth of the accidents occurred at places described by drivers as open field with good visibility. The author concludes that measures aimed at drivers to reduce the number of accidents have limited effect. Instead long-term measures must be taken to prevent elks from coming into conflict with road traffic. In the meantime the number of elks must be kept at a suitable level by shooting. (TRRL)

Transport and Road Research Laboratory; IRRD 247888
National Swedish Road & Traffic Research Institute

21 300989

GAME FENCES. LOCATION, COSTS AND MANAGEMENT
VILTSTAENGSEL. PLACERING, KOSTNADER OCH DRIFT

National Swedish Road Administration; Fack S-10220; Stockholm 12; Sweden

Monograph; #TU 1979:1; 79; 26 p.; 4 Fig.; Swedish

This report is a summary of present knowledge concerning game fencing for traffic accident prevention. Costs of construction, operation and maintenance are studied together with how the fence can be adapted to prevailing terrain conditions and adjacent roads. Results from tests of special take-off mounds for elks that have wandered into fenced areas are also included in the report. Different types of fences are studied. Some results from the report: net fence is more costly to erect than electrified fence, but it has lower maintenance costs. A combination fence also has a maintenance cost lower than that for the electrified fence. The accident prevention effect of the net fence was studied with aid of accident statistics from the Stockholm region. It was found that a reduction of accidents by 70-80 percent is well within the reach of what can be obtained by game fencing. /TRRL/

Transport and Road Research Laboratory; IRRD 241314
National Swedish Road & Traffic Research Institute

51 222425

USE OF ONE-WAY GATES BY MULE DEER

Reed, DF
Pojar, TM
Woodard, TN

Journal of Wildlife Management

V38 N1; Jan 74; pp 9-15

GATES DESIGNED TO ALLOW PASSAGE OF MULE DEER (ODOCOILEUS HEMINOUS) IN ONLY ONE DIRECTION WERE TESTED UNDER CONTROLLED AND FIELD CONDITIONS. TWO GATE TYPES HAD SIGNIFICANTLY DIFFERENT FREQUENCIES OF USE UNDER CONTROLLED CONDITIONS. EIGHT GATES OF THE TYPE DEEMED MOST EFFECTIVE WERE INSTALLED IN EIGHT-FOOT (2.44-M) FENCES ADJACENT TO INTERSTATE HIGHWAY 70 NEAR VAIL, COLORADO. A TOTAL OF 558 PASSAGES WERE RECORDED THROUGH THESE GATES DURING 1970-72 AND 96 PERCENT OF THESE WERE IN THE ONE-WAY DIRECTION FOR WHICH THE GATE WAS DESIGNED. BASED ON TRACK COUNTS, IT WAS ESTIMATED THESE GATES PERMITTED ABOUT 223 DEER TO ESCAPE THE IMMEDIATE HIGHWAY RIGHT-OF-WAY. /AUTHOR/

30/03/83 HRIS RUN NO. HALK616 SELECTION

51 193924

THE ANIMAL ACCIDENT PROJECT. PART 2. SITUATION REPORT SEPTEMBER 1978
VILTOLYCKSPROJEKTET 2. LAEGESRAPPORT SEPT 1978

Almkvist, B
Andre, T
Ekelom, S
Aaberg, L
Rempler, S-A

National Swedish Road Administration; Fack S-10220; Stockholm 12; Sweden

Monograph; *Interarapport Nr 33; Sep 78; 16 p.; 3 Fig.; Swedish

An analysis of accidents involving moose and deer snows that 70% of all accidents occur in the summer, with peaks in June, and end of September and end of January. Almost 40% occur at dawn. On newly constructed roads, the number of accidents during the first year is about 2.5 times the normal; even after three years, the number of accidents is twice that normally expected. 50% of accidents occur where distance between road and forest is 5 M, and over 90% where distance is up to 20 M. On roads in open country less than 20% of accidents occur. Peaks involving moose are influenced by behaviour of the calves. Measures to counteract such accidents are (1) game fences; deer usually crawl underneath while moose jump over. Where fence consists of a mesh with single strands above, animals are often injured, and fences should therefore consist of mesh over full height. (2) game mirrors; these are used extensively, and an investigation of their efficacy is in progress. (3) clearance along roads; it appears that this is effective in reducing accidents. New measures are the use of visual or smell signals, and speed restrictions. Driver attitude is also significant. Further studies are planned. /TRRL/

Transport and Road Research Laboratory; IRRD 237666
National Swedish Road & Traffic Research Institute

51 163949

TESTS WITH ELECTRICAL GAME PRESERVES DURING 1975-76
FOERSOEK MED VILT STAENGSEL TYP NITRO-NOBEL ELSTAENGSEL I D-LAEN AAR 1975-76

National Swedish Road Administration; Fack S-10220; Stockholm 12; Sweden

Intrm Rpt.; SNR 19; 77; 15 pp; 4 Fig.; 5 Tab.; 1 Phot.; Swedish

Electrical fences were tested as game preserves on roads in Sweden for 1.5 years. The purpose was: (1) to study different types of uprights and number of wires and their position, (2) to obtain a value of management safety, (3) to determine construction and management costs, and (4) to study the effect on animal accidents. Of the types tested a 180 cm high fence with 5 wires on pressure impregnated uprights of wood (space 6 M) has proved the best. The construction costs have been low. Mechanical wear and soiling from the road have created some problems. In particular the wire (a laminated band) has been damaged. There were no animal accidents after the erection of the fence. At present a new wire with an expected endurance of 5 to 7 years is being tested.
/TRRL/

National Swedish Road & Traffic Research Institute
Transport and Road Research Laboratory; IRRD-226304

30/03/83 HRIS RUN NO. HALK616 SELECTIONS

51 153873

HIGHWAY FENCES AS VEHICLE-DEER COLLISION DETERRENTS

Bellis, ED
Graves, HB, III

Pennsylvania State University, University Park; Institute for Research on Land and Water Resources; University Park, Pennsylvania; 16802; 432-41 (3502)

Final Rpt.; #FHWA-PA-74-9; Jun 76; 26 pp

FT-Contract; CN-53029

A survey of highway fencing along Interstate 80 in Centre County showed that 7 1/2 foot, type 3-modified fence has little value as a vehicle-deer collision deterrent; many deer crawl under the fence to the planted right-of-way and abundance of gaps underneath provides for easy penetration. From December 1974 through March 1976 numbers and position of deer were observed from a vehicle driven along 6 miles of I-80 at night. Bimodal patterns of abundance were found, deer were most numerous in spring and fall; of 2577 deer sightings, 74.5% were on the highway side and 25.5% on the far side of the fence. Comparisons between a control area (north side of highway) where the fence was unmodified and test areas (south side) where gaps underneath were plugged and/or top five wires removed or repaired showed that the critical weakness in the fence is the underside but also that large numbers of deer cross a fully repaired fence. Only 6 deer were reported killed during the 16 months of study and no live deer were seen on the highway; these results, relative to previous findings beginning in 1967, strongly suggest that high traffic volume prevents deer from venturing onto the highway, thus reducing collisions.

ORDER FROM:
National Technical Information Service; 5285 Port Royal Road; Springfield, Virginia; 22161; PB264875/AS

Federal Highway Administration
National Technical Information Service

Rep Cato

Alaska State Legislature

IN SESSION:
POUCH V
JUNEAU ALASKA 99811
(907) 465-4949

BOX 142
EAGLE RIVER, ALASKA
99577
(907) 694-4949

Representative Randy Phillips
HOUSE DISTRICT 15

MEMORANDUM

TO: House Transportation Committee Members

FROM: Representative Randy Phillips R.E.P.

DATE: January 24, 1984

RE: House Bill 493, "An Act making a special appropriation to the Department of Transportation and Public Facilities for preventive measures related to collisions between motor vehicles and moose on the Glenn Highway; and providing for an effective date."

While this bill will be before the House Transportation Committee tomorrow morning for hearing, I thought I would take this opportunity to provide each of you with some background information on the bill.

The area described in the bill (the Glenn Highway between Eagle River and Muldoon Road) is a high traffic area. With the exception of lights at major intersections (Eagle River Interchange, Highland Drive Interchange, the weigh station, Fort Richardson Interchange, Ship Creek, and Muldoon Road), this approximately ten mile stretch of road is dark during the winter months. The area is also the location of a rather large moose herd (some estimates of the herd go as high as 600 moose) and these animals cross the Glenn Highway with varying degrees of success. In an attempt to provide vehicle drivers with better safety, Representative Liska and I introduced House Bill 493 in order that funds might be appropriated for "preventive measures."

For your information, I am enclosing the following items:

a. House Bill 493

b. January 20, 1984 letter from Marge Founds to Rep. Cato

c. January 18, 1984 article, The Anchorage Times, "Funds sought to cut moose-car crashes"

d. January 19, 1984 memorandum to Rep. Cato

e. December 20, 1983 article, The Anchorage Times, "Train targets commuter 'dance of death'"

f. November 5, 1983 article, The Anchorage Times, "Moose bowhunt to open"

g. November 4, 1983 article, The Anchorage Times, "Bowhunters may solve urban moose problem"

h. November 3, 1983 article, Chugiak-Eagle River Star, "Highway lights said best way to cut moose-vehicle collisions"

i. October 27, 1983 article, Chugiak-Eagle River Star, "Liska views highway lighting project"

j. November 18, 1983 article, Anchorage Daily News, "Lights along Glenn Highway sought"

k. October 13, 1983 letter and report from DOT/PF

l. June 29, 1983 letter from Mrs. Marge Founds

m. May 16, 1983 letter from DOT/PF

n. May 4, 1983 letter from DOT/PF

o. December 28, 1982 letter to Riley Snell of DOT/PF

p. December 9, 1982 letter from Mrs. Marge Founds

Mrs. Founds will be testifying during the teleconference tomorrow. Mr. Snell or his representative will also be testifying.

If you have any questions, please do not hesitate to contact me.

Enclosures
cc: Rep. John Liska (w/out enclosures)

Alaska State Legislature

IN SESSION:
POUCH V
JUNEAU, ALASKA 99911
(907) 465-4949

BOX 142
EAGLE RIVER, ALASKA
99577

Representative Randy Phillips

HOUSE DISTRICT 15

MEMORANDUM

TO: REPRESENTATIVE BETTE CATO
CHAIRMAN, HOUSE TRANSPORTATION COMMITTEE

FROM: REPRESENTATIVE RANDY PHILLIPS R.E.P.

DATE: JANUARY 19, 1984

RE: HOUSE BILL 493

Thank you for your prompt response to my request that the captioned matter be brought before your committee for hearing.

I am enclosing the following items for the committee's review:

a. Letter from Mrs. Marge Founds, dated 9 December 1982

b. Copy of letter dated December 28, 1982, to Riley Snell of DOT/PF

c. Letter from DOT/PF, dated May 4, 1983

d. Letter from DOT/PF, dated May 16, 1983

e. Letter from Mrs. Marge Founds, dated 29 June 1983

f. Letter and report from DOT/PF, dated October 13, 1983

g. Copy of Anchorage Daily News article, November 18, 1983

h. Copy of Chugiak-Eagle River Star article, October 27, 1983, "Liska view highway lighting project"

i. Copy of Chugiak-Eagle River Star article, November 3, 1983, "Highway lights said best way to cut moose-vehicle collisions"

j. Copy of Anchorage Times article, November 4, 1983, "Bowhunters may solve urban moose problem"

k. Copy of Anchorage Times article, November 5, 1983, "Moose bowhunt to open"

l. Copy of Anchorage Times article, December 20, 1983, "Train targets commuter 'dance of death'"

If you have any questions, please do not hesitate to contact me. Thank you for your cooperation.

Enclosures

PS: Also attached is a copy of the Anchorage Times article appearing in the January 18, 1984 issue, entitled "Funds sought to cut moose-car crashes."

Star Route 2, Box 9302
Eagle River, AK 99577

20 January 1984

Rep. Bette Cato
Alaska State Legislature
Pouch V
Juneau, Alaska 99811

Dear Rep. Cato:

I would like to express my support for House Bill No. 493. As a daily commuter on the Glenn Highway between Anchorage and Eagle River, I am concerned about traffic safety. As a wildlife biologist, I am also concerned about moose in the Anchorage area. I think the three million dollar appropriation to Department of Transportation for highway lighting is long overdue. Not only should it alleviate some moose/vehicle interactions, I believe it will significantly improve general traffic safety on the highway. Winter conditions make that highway very dangerous to drive at times, and lighting woudl certainly improve it.

I hope your committee fully supports this and any other measures that will benefit the thousands of daily commuters on that highway.

Sincerely,

Nancy Tankersley

Nancy Tankersley

cc: Randy Phillips

121 Foothill Drive
Eagle River, Alaska
694-2985

9 December 1982

Representative Randy Phillips
Box 142
Eagle River, Alaska 99577

Dear Sir:

I have written to you before and you seem to take a real interest in letters you receive. I thought maybe you could help on this one. I also wrote to Mayor Knowles, Editor of the Times, and the Commanding General of Fort Richardson.

I have been reading about all the car-moose accidents along Glenn Highway. Most of them have involved bodily injury. I have been hoping our family would not be involved in one of these accidents; however, we were involved in one. My husband could not see the moose until it was right in front of him. Then it was too late.

My question is....with all the statistics of accidents on the Glenn Highway, why can't lights be installed at the moose crossings? The lighting is available nearby, so why can't they extend the lights to cover these darkened areas. It is very evident there are three major crossings. One is between Ship Creek and the Powerplant, one between Ship Creek and Fort Richardson overpass, and the other is after the Fort Richardson overpass, from the curve where all the trees are in the median to just about the Weigh Station. The solution is not by hunting the animals. There will always be moose crossing there. Besides that, I really feel sorry for them. They are great animals and I hate to see them hurt or killed. It is the fact that since Glenn Highway is a 4-lane, people will always be driving too fast. It is just too dark to see anything jumping in your path. This is a very hazardous situation. I do not want to see people and animals continually getting wiped out on the highway. We <u>can</u> do something about it, but it takes someone to get the ball rolling.

I think it's about time to start saving lives with our tax money instead of building more bike paths and swimming pools. Build the other two later on, but get to saving lives first.

Thank you for your time. Also, when are you going to be writing more articles in the Star? I really enjoyed reading them.

Sincerely,

Marge Founds

Mrs. Marge Founds

December 28, 1982

Riley Snell
Regional Planner
Department of Transportation and Public Facilities
Pouch 6900
Anchorage, AK 99502

Dear Mr. Snell:

As you know, I have been contacted by some constituents concerning the moose-automobile accidents occuring along the Glenn Highway between Eagle River and Anchorage. These constituents have indicated that they feel that lighting along the Glenn Highway might help reduce these accidents.

Last year, John Bates' office (Juneau DOT/PF) supplied me with some figures on the cost of such proposed lighting. The information that Mr. Bates supplied is in my legislative files, which are packed and in the process of being shipped to Juneau for the legislative session. You may wish to contact Mr. Bates' office and request that he provide you with a copy of this information.

When I spoke with you, we discussed the possibility of including such a project in some future federal program. I would request that you submit this project for inclusion in future federal aid funding programs and the AMATS plan. Please keep me advised of any progress in this area.

If you have any questions, please do not hesitate to contact me.

Sincerely,

Randy Phillips
State Representative

bcc: Mrs. Marge Founds
121 Foothill Drive
Eagle River, AK 99577

. Allan Bailey
115 Whirlaway
Eagle River, AK 99577

Mr. Bailey: I am requesting a member of my staff to have a copy of the information forwarded to you as soon as possible.

STATE OF ALASKA / Bill Sheffield, Governor

DEPARTMENT OF TRANSPORTATION
and PUBLIC FACILITIES
CENTRAL REGION PLANNING & PROGRAMMING
Director's Office

4111 AVIATION AVENUE, POUCH 6900
ANCHORAGE 99502 (TELEX 25-185)
PHONE: 266-1462

May 16, 1983

The Honorable Randy Phillips
Representative
Alaska State Legislature
Pouch V
Juneau, AK 99811

Dear Representative Phillips:

Per your conversation with Michelle Michaud regarding moose-automobile accident prevention measures along the Glenn Highway, Alan Bennett, a biologist with the U.S. Army has indicated that illumination may reduce moose-auto accidents by 20% whereas fencing and underpasses could reduce these accidents by up to 70%. Since a higher reduction in accidents would occur with fencing and underpasses, this method will be considered first.

I have requested the Central Region's Design & Construction Division to investigate the possibility of using federal safety funds for the design portion of the project. They have indicated that the report should be completed in about two weeks. I will forward a copy of that report to you at that time.

In the meantime if I can be of further assistance please call.

Sincerely,

William R. Snell
Director

WRS:MM/ey

cc: Emil Notti, Legislative Assistant
Office of the Governor

Alan Bennett, U.S. Army

Bill Sheffield, Governor

DEPARTMENT OF TRANSPORTATION
and PUBLIC FACILITIES
CENTRAL REGION PLANNING & PROGRAMMING
Director's Office

4111 AVIATION AVENUE, POUCH 6900
ANCHORAGE 99502 (TELEX 25-185)
PHONE: 266-1462

May 4, 1983

The Honorable Randy Phillips
Representative
Alaska State Legislature
Pouch V
Juneau, AK 99811

Dear Representative Phillips:

Sorry for the delay in responding to your request regarding protective/preventive measures along the Glenn Highway (Fort Richardson to Eagle River) to reduce the number of moose-auto accidents.

I requested the Department's Research Section in Fairbanks to do a literature search (attached) to determine various types of methods used in other states and countries to reduce moose-auto accidents. As you can see from the attached list of studies, many thousands of dollars have been spent researching the problem with some success.

A reflector device has been utilized along the Glenn Highway with little success. This has been mainly due to the fact that excess dust and winter snow covers the devices and maintenance of the reflectors has been insufficient as well as costly. Also note that studies directly related to roadway illumination did not tend to show a decrease in vehicle/wildlife accidents.

Herman Griese, a game biologist for the Department of Fish and Game (DF&G) in Anchorage, and Alan Bennett, a biologist for the U.S. Army indicated that the following would probably be the best solution for reducing the occurrence of moose related auto accidents along this section (Mile 132-140) of the highway.

1. Clear at least 35 feet on each side of the road bed. This allows both the driver to see the moose and the moose also does not walk directly onto the road from the trees.

   Mr. Griese mentioned that if 35 feet is cleared on each side of the road that this should occur after the buds have begun to open up around the middle or end of June. Also the brush would need to be cut back periodically (approximately every 3 years) to prevent prime "moose habitat" vegetation from growing back.

2. Install fencing and underpasses for the moose to travel from one side of the road to the other (the attached map shows where the fencing and underpasses should be placed).

3. Install lighting on the both sides of the highway to provide continuous illumination from Muldoon Road to Hiland Road.

Mr. Bennett indicated that 80% of the moose-auto accidents occur within two main areas. He also indicated that approximately 53 mooses were killed on this stretch of the highway last year. Mr. Griese said that ADF&G and the U.S. Army only have accident records in which the accident caused the death of the moose. Mr. Griese also pointed out that moose behave differently than deer, hence those measures used to reduce deer related auto accidents may not work where moose are involved.

Mr. Griese and Mr. Bennett have indicated that the moose herd in this area has remained relatively stable; however, travel along this section of the highway will continue to increase and without some type of prevention measures moose related auto accidents will most likely increase.

A cost estimate has been prepared to determine the costs for: 1) lighting (continuous illumination), 2) fencing and underpasses, and 3) clearing of road side. This cost estimate should give you some indication of the costs involved. The Department has not had time to fully analyze the possibilities of installing any of the above mentioned prevention measures.

In the interim, the Department's Central Region Maintenance & Operations Division will clear certain areas along the roadway pending availability of funds; however, a long-term solution will need to be funded, fully or partially by the Legislature.

Mr. Bennett has indicated that the U.S. Army would be willing to fund part of any project that the Department may construct. The Department is looking into possibly securing federal "safety" funds.

If I can be of further assistance to you regarding this matter please call.

Sincerely,

William R. Snell

William R. Snell
Director

WRS:MM/ey

Attachments

cc: Alan Bennett, U.S. Army

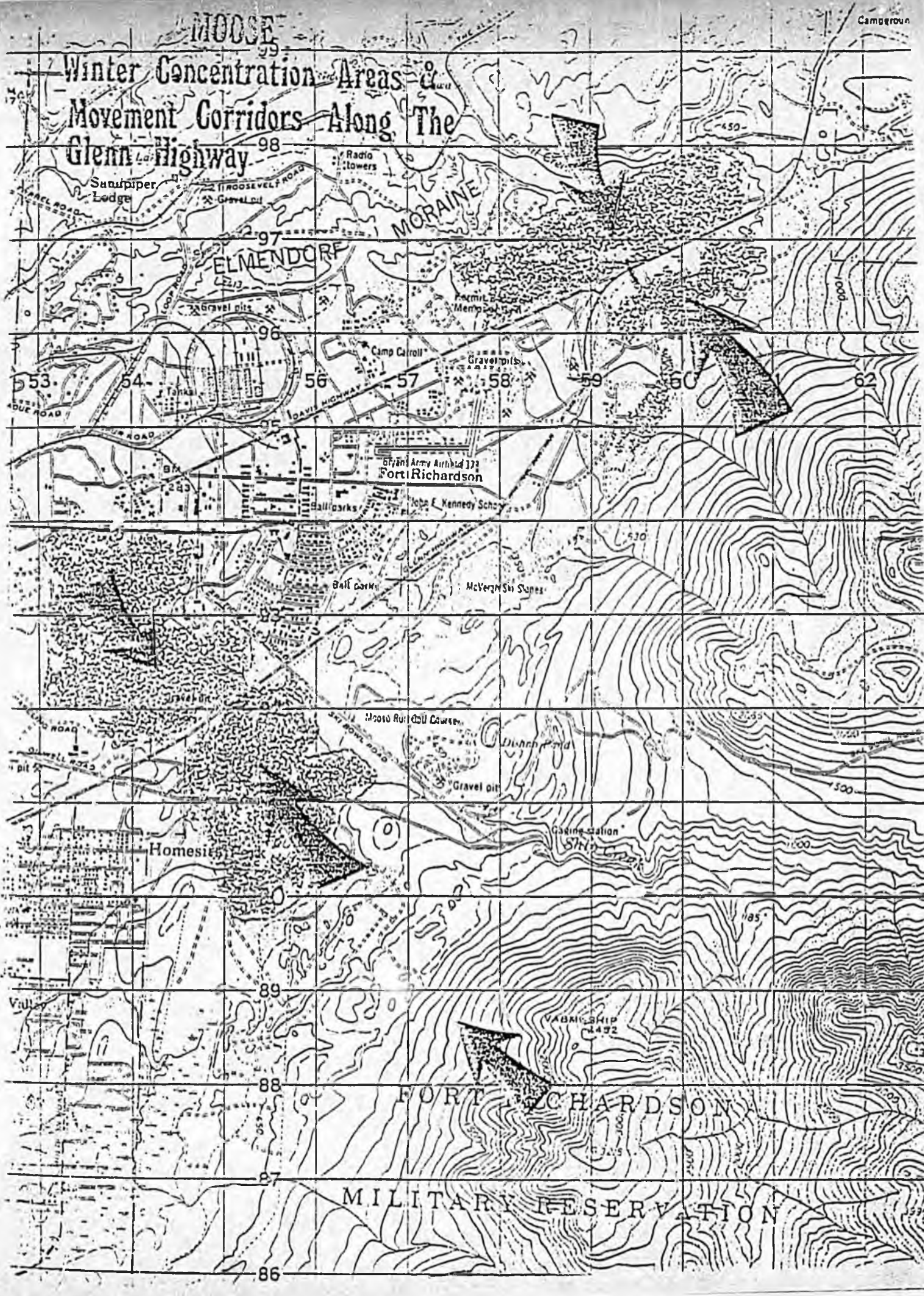
Herman Griese, ADF&G

Emil Notti, Legislative Assistant
Office of the Governor

GLENN HIGHWAY

Muldoon Road to Hiland Road (8 miles)

Fencing along both sides of highway with 5-moose underpasses		$2,596,250.00
Continous Illumination		2,784,000.00
Clearing and Grubbing 35 feet on each side of road		288,000.00
	TOTAL	$5,668,250.00


MOOSE
Winter Concentration Areas &
Movement Corridors Along The
Glenn Highway
Campgroun
Radio Towers
Sandpiper Lodge
ROOSEVELT ROAD
Gravel pit
MORAINE
ELMENDORF
Gravel pits
Camp Carroll
Gravel pits
Fort Richardson
John F. Kennedy Schoo
Ball parks
McKenzie Ski Slopes
Moose Run Golf Course
Gravel pit
Homesite
Gasline station
VABM SHIP
FORT RICHARDSON
MILITARY RESERVATION
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89
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STATE OF ALASKA

Bill Sheffield, Governor

DEPARTMENT OF TRANSPORTATION
and PUBLIC FACILITIES
CENTRAL REGION PLANNING & PROGRAMMING
Director's Office

4111 AVIATION AVENUE, POUCH 6900
ANCHORAGE 99502 (TELEX 25-185)
PHONE: 266-1462

October 13, 1983

Re: Glenn Highway Illumination

The Honorable Randy E. Phillips
Representative
~~S.R. Box 421~~ Box 142
Eagle River, Alaska 99577

Dear Representative Phillips:

Attached is the report you requested concerning moose/vehicle collision deterrents along the Glenn Highway. The report concludes that the most feasible method of decreasing these accidents is to provide continuous illumination on both sides of the Glenn Highway from Muldoon to the Artillery Road Interchange. The cost estimate for illumination is $2,784,000 which would provide one luminaire approximately every 275 feet along the outside lanes. We anticipate the annual operating and maintenance cost to be approximately $50,000.

The Department is required by law to design and construct this type of project according to the standards established by the American Association of State Highway and Traffic Officials (AASHTO). These standards have been developed to insure that highway improvements are uniform, safe, and effective. The 275 foot spacing has been determined to be the maximum spacing that will still provide adequate levels of light. If these standards are not followed, the State could be found liable in case of an accident.

The Department has determined that this project would be eligible for Federal Safety Program Funds. However, DOT&PF's Central Region, which includes most of Alaska south of Cantwell and west of Valdez, receives a maximum of $67,500 per year for this program. To use this money to fund this illumination project would require 42 years worth of Federal Safety Program allocations. No other source of funding has been identified.

We have evaluated this project against other projects considered in our FY'85 CIP. Because of our budget ceiling and the low rating of this project as compared to other identified transportation needs, this project is not included in our FY'85 CIP request.

This summer the Department cleared additional brush near the scale house. Last summer there was extensive brush cutting along the Anchorage outbound

lane and a recent inspection by our maintenance and operations personnel found that there was not enough new growth to justify additional clearing. There has been only limited clearing on the in-bound lane to Anchorage at the request of the Municipality of Anchorage because of the desire to maintain a buffer along the bike path.

Please contact me if I can answer any questions.

Sincerely,

William R. Snell
Director

bjf

Enclosure

cc: Richard S. Armstrong, Director, D&C, Central Region
Ed Cronick, Special Assistant, Standards & Statewide Programs
Mike Gavin, Acting Director, M&O, Central Region
David W. Haugen, Deputy Commissioner, Central Region
Emil Notti, Legislative Assistant, Office of the Governor

MOOSE/VEHICLE COLLISION DETERRENTS: ANALYSIS AND RECOMMENDATIONS

PURPOSE

This report is a summary of the Department's efforts to identify and analyze alternative means of reducing moose/vehicle accidents on the Glenn Highway between Anchorage and Eagle River. The following paragraphs describe the nature of the problem, how the alternatives were identified and evaluated, and a recommended course of action.

INTRODUCTION

The corridor selected for construction of the Glenn Highway was chosen to take advantage of a relatively flat strip of land running between Anchorage and Eagle River. Unfortunately, this same strip of land is the traditional wintering area for up to 250 moose from Fort Richardson, the Ship Creek Valley, and nearby slopes of the Chugach Mountains. The result is a chronic problem of moose/vehicle accidents which has resulted in the death of 50-60 moose each year and annual vehicle damage of $40,000 along this 8 mile length of highway.

Each fall, as snow accumulates on the nearby slopes of the Chugach Mountains and in the Ship Creek Valley, moose begin an orderly and predictable migration down to the lowlands. Young stands of birch and willow adjacent to the highway provide optimum wintering habitat for moose. Seasonal movements of moose are not random, they correspond to the topography and location of prime wintering habitat. As a result, several "accident zones" exist where the highway bisects moose travel corridors. During the 10 year period between 1971 and 1981, 45% of the moose/vehicle accidents occurring between Anchorage and Eagle River happened between Miles 138.5 and 135.5. Between Miles 134 and 132, 35% occurred. These two areas directly correspond to the primary moose travel corridors and winter concentration areas.

Previous attempts to alleviate this problem have included the installation of reflectors designed to repel deer, the removal of brush from within the highway right-of-way, and the installation of moose crossing signs to warn motorists. None of these measures have proven to be significant in reducing the moose/vehicle accident problem. The volume of traffic on the Glenn Highway between Miles 132 and 140 in 1982 was 2.5 times greater than it was in 1972. Between 1981 and 1982, the traffic volume grew by 23%. Unless additional measures are taken, the moose/vehicle accident rate can be expected to increase.

METHODOLOGY

Material presented in this report was gathered from several sources. The Department of Transportation and Public Facilities' (DOT&PF) Highway Research Section conducted a literature search of the Highway Research Information Service (HRIS) in Washington, D.C. The resulcant compilation of studies represents hundreds of thousands of dollars spent researching the problem of collisions between animals and vehicles in the continental United States and foreign countries (see HRIS report attached). Additional material and assistance was contributed by the Alaska Department of Fish and Game, the United States Army, and DOT&PF's Maintenance and Operations Division.

FINDINGS

The following measures have been implemented in the field and were found to have little or no effect upon the rate of collisions between game animals and vehicles:

- Illuminated game crossing signs (motorists disregard sig unless game is physically present)
- Highway underpasses (game unwilling to enter underpasses)
- Conventional fencing (game penetrated fence at open gates, crawled under, or walked over on snow drifts; game that penetrated the fence became trapped in the highway right-of-way)
- Reflecting mirrors (no apparent effect on game; difficult to maintain)
- Brush removal adjacent to highway (besides being ineffective, it is expected that both the State Division of Parks and the Municipal Parks and Recreation Department would object to this treatment since it would decrease the attractiveness of the bike trail adjacent to the highway)

The following measures have been implemented in the field and were found to be effective in reducing the rate of collisions between vehicles and game animals:

- Electrified fences (high construction and maintenance costs, potential safety hazard to humans, any animal that succeeds in penetrating the fence becomes trapped within the highway right-of-way)
- Highway illumination (high construction and operation costs)
- Deliberately placed animal carcass on shoulder of road (offensive to the public)

RECOMMENDATION

From an examination of the findings above, it appears that the only feasible method of decreasing moose/vehicle collisions is to construct continuous illumination on both sides of the Glenn Highway from Muldoon to Eagle River. The estimated cost of this project is $2,784,000.

The Department has determined that this project would be eligible for Federal Safety Program Funds. However, DOT&PF's Central Region, which includes most of Alaska south of Cantwell and west of Valdez, receives a maximum of $67,500 per year for this program. To use this money to fund this illumination project would require 42 years worth of Federal Safety Program allocations. No other source of funding has been identified.

We have evaluated this project against other projects considered in our FY85 CIP. Because of our budget ceiling and the low rating of this project as compared to other identified transportation needs, this project is not included in our FY85 CIP request.

Attachment

MDM/lbk

RUN NO. HALR515

ILLUMINATION, SIGNS, REFLECTORS FOR DEER OR WILDLIFE

HRIS FILE SEARCH

PREPARED FOR

MR. DAVID C. ESCH
CHIEF OF HIGHWAY RESEARCH
ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES
FAIRBANKS, ALASKA

03/30/83

Highway Research Information Service

National Research Council

National Academy of Sciences * National Academy of Engineering

Washington, D.C.

AVAILABILITY OF DOCUMENTS

When it is known by HRIS that full-text copies of documents are available from an organization other than the publishing agency, the name and address of the document distribution center are given in an availability statement below the abstract of the HRIS document record. When a document is ordered, the document title, author, and publisher should always be given.

Only publications of the Transportation Research Board are available from the Transportation Research Board. Articles and reports issued by other agencies are NOT available from TRB. They may be obtained from the publication source shown immediately following the name of the author on the document record or from the document distribution center identified by the availability statement that follows the abstract on the document record.

Reports emanating from research projects sponsored by the Federal Highway Administration and the Urban Mass Transportation Administration are normally available from the National Technical Information Service. If the abstract carries a document order number (PB or AD followed by six digits), the report is available from NTIS.

When no availability is specified, the user should consult an established transportation library.

A loan service for publications and a photocopy service for articles and papers are available at document delivery centers as explained on page vii.

A large number of documents are available from a few sources. The names, addresses, and telephone numbers of those sources are listed below under the abbreviation used for each.

ASCE
American Society of Civil Engineers
345 East 47th Street
New York, NY 10017
Telephone 212-644-7671

ASME
American Society of Mechanical Engineers
345 East 47th Street
New York, NY 10017
Telephone 212-644-7703

DOTL
U.S. Department of Transportation Library
400 Seventh Street, S.W.
Washington, DC 20590
Telephone 202-426-2565

ECMT
(All documents available through OECD)
European Conference of Ministers of Transport
2 rue André Pascal
Paris 75775, France
Telephone 524-97-22

ESL
Engineering Societies Library
United Engineering Center
345 East 47th Street
New York, NY 10017
Telephone 212-644-7611

GPO
U.S. Government Printing Office
Superintendent of Documents
Washington, DC 20402
Telephone 202-783-3238

IEEE
Institute of Electrical and Electronics Engineers
345 East 47th Street
New York, NY 10017
Telephone 201-981-0060

IPC
IPC (America), Inc.
205 East 42nd Street
New York, NY 10017
Telephone 212-869-0700

IRRD
International Road Research Documentation
19 rue de Franqueville
75 Paris, France
Telephone 1-524-92-42

ITS
Institute of Transportation Studies
University of California
412 McLaughlin
Berkeley, CA 94720
Telephone 415-642-3604

NAE/NAS/NRC
National Academy of Sciences
Publication Sales
2101 Constitution Avenue, N.W.
Washington, DC 20418
Telephone 202-334-3313

NTIS
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Telephone 703-487-4650

NTCL
Transportation Center Library
Northwestern University
Evanston, IL 60201
Telephone 312-492-5273

OECD
Organization for Economic Cooperation and Development
Publications Center, Room 1207
1750 Pennsylvania Avenue, N.W.
Washington, DC 20006
Telephone 202-298-8755

PPI
Pergamon Press, Inc.
Maxwell House, Fairview Park
Elmsford, NY 10523
Telephone 914-592-7[illegible]

RTAC
Roads and Transportation Association of Canada
875 Carling Avenue
Ottawa, Ontario K1S5A4, Canada
Telephone 613-521-4052

SAE
Society of Automotive Engineers
400 Commonwealth Drive
Warrendale, PA 15096
Telephone 412-776-4841

TRB
Transportation Research Board
Publications Office
2101 Constitution Avenue, N.W.
Washington, DC 20418
Telephone 202-334-3218

TRRL
Transport and Road Research Laboratory
Crowthorne, Berkshire RG11 6AU
England
Telephone Crowthorne 3131

TSCL
Technical Information Center
Transportation Systems Center
U.S. Department of Transportation
55 Broadway
Cambridge, MA 08619
Telephone 617-494-2306/2193/2783

UITP
International Union of Public Transport
19 avenue de l'Uruguay
B-1050, Brussels, Belgium
Telephone 73-33-25

XUM
Xerox University Microfilms
300 North Zeeb Road
Ann Arbor, MI 48106
Telephone 313-761-4700

LOAN AND PHOTOCOPY SERVICES

Loans of books and reports and photocopies of articles and conference papers referenced by the Highway Research Information Service can be obtained from three transportation libraries designated as TRISNET Centers. Two of them are Regional Centers:

Transportation Center Library
Northwestern University
Evanston, IL 60201
312-492-5273
TWX 910-231-0872

Institute of Transportation Studies Library
University of California
412 McLaughlin Hall
Berkeley, CA 94720
415-642-3604

and one is a Federal Center:

Headquarters Library
U.S. Department of Transportation
Washington, DC 20590
202-426-1792

The three centers are not HRIS depositories in that copies of all HRIS-referenced publications are not added to their collections automatically. Rather, each has a collection of transportation publications and all research reports, in microfiche or paper copy, that have been issued by the U.S. Department of Transportation and distributed through the National Technical Information Service.

The centers cannot supply reports of or information on research that is in progress. Information on research in progress can usually be obtained from the principal investigator at the contracting agency or the project monitor at the sponsoring agency.

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Northwestern University will accept requests for loans and photocopies by telephone, letter, or interlibrary loan form. The University of California will accept requests for photocopies by telephone or letter, but requires an interlibrary loan form for loan of books and reports.

Requests for publications by loan or photocopy should include either a copy of the entry in the HRIS publication or the following information:

1. TRIS accession number (six-digit number at top of printout);
2. Title;
3. Author, including individuals and organizations responsible for the publication (for example, James, John J., West Virginia Department of Highways); and
4. Publication data, including publisher, periodical title, conference, date, paging, series numbers (for example, Public Roads, Dec. 1976, pp. 116-120; or National Technical Information Service, PB 259 688).

The library responding to the request will lend books and reports for 2 weeks plus the estimated mailing time. Services are free if books or reports are mailed at the book rate. If the user requires priority mailing, the center will send an invoice for mailing costs. Charges for photocopies of articles and conference papers are 10 cents per page plus $1.00 per item for handling.

An invoice is sent with the requested document; the Regional Centers request that payment *not* be made in advance.

The Regional Centers attempt to respond to all requests within one week of receipt.

Federal Centers

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Other Libraries

Many of the publications referenced by HRIS are available in local transportation libraries or through a public or state library. Each of these libraries will also prepare and process an interlibrary loan form on request.

FOREIGN LANGUAGE DOCUMENTS

Foreign language documents referenced by HRIS are generally recognizable through the foreign language title listing (after the translated title) in the document record. In *HRIS Abstracts* text language is indicated at the end of the abstract: in the current awareness service it appears with publication data information. It does not appear in the TRIS-on-line short-form printouts.

Documents published outside of the United States are usually written in the language of the country of origin and can be obtained from the publisher in that country. Documents published by the Organization for Economic Cooperation and Development (OECD) can be obtained at the following address:

OECD Publications Center
1750 Pennsylvania Avenue
Washington, DC 20006
Telephone 202-298-8755

Translations may be obtained through agencies listed in the yellow pages of the telephone book in metropolitan areas, through embassies in Washington, D.C., from language departments of universities, or from one of the translations centers listed below. Some of these, such as the National Translations Center, do not translate but maintain a registry of translations. Fees for translation services vary but in the Washington, D.C., area average about $10 per page for technical material.

International Translations Centre
Doelenstraat 101
Delft, Netherlands
World Index of Scientific Translations (quarterly)

National Translations Center
John Crerar Library
35 West 33rd Street
Chicago, IL 60616
Telephone 312-225-2526
Translations Register-Index (irregular annual)

Pan American Highway Congress
Pan American Union
Organization of American States
Room 1009
1725 I Street, N.W.
Washington, DC 20006
Telephone 202-381-8567

Division of Language Service
Room 2214
U.S. Department of State
320 21st Street, N.W.
Washington, DC 20520
Telephone 202-632-1523

International Road Federation
1023 Washington Building
Fifteenth Street and New York Avenue
Washington, DC 20005
Telephone 202-783-5722

Transport and Road Research Laboratory
U.K. Ministry of the Environment
Crowthorne, Berkshire RG11 6AU
England
Telex 848272

All Languages Translation Center
545 Fifth Avenue
New York, NY 10017
Telephone 212-986-1688

British Library Lending Division
Boston Spa
Wetherby, Yorkshire LS23 7BQ
England

IDENTIFICATION GUIDE FOR AN HRIS RECORD OF A PUBLISHED WORK

JOURNAL ARTICLE

Document Record Number
TRIS Accession Number
HRIS Subject Area Number — 32 385786

Title — EVALUATION FOR DURABILITY AND STRENGTH DEVELOPMENT OF A GROUND GRANULATED BLAST FURNACE SLAG

Authors — Regan, FJ; Atlantic Cement Company, Incorporated
Meusel, JW; Atlantic Cement Company, Incorporated

Publication Data — ASTM Cement, Concrete, and Aggregates; American Society for Testing and Materials; 1916 Race Street; Philadelphia, Pennsylvania; 19103

Document Data — VJ NI; 81; pp 40-52; 23 Fig.; 12 Tab.; 25 Ref.

Abstract — This paper covers the evaluation of a ground granulated blast furnace slag as a partial replacement for portland cement in mortars and concrete. The ground slag was evaluated for strength-producing properties as well as durability performance when used to replace 40 to 65% portland cement. This study shows that the ground slag when used to replace 40 to 65% portland cement did significantly improve strengths, sulfate resistance, and alkali aggregate reactivity. (Author)

Availability — ORDER FROM:
Engineering Societies Library; 345 East 47th Street; New York, New York; 10017

RESEARCH REPORT

Document Record Number
TRIS Accession Number
HRIS Subject Area Number — 12 343723

Title — PARK-AND-POOL FACILITIES SURVEY RESULTS AND PLANNING DATA

Authors — Bullard, D
Christiansen, DL
Fitzgerald, AV

Publication Data — Texas Transportation Institute; Texas A&M University; College Station, Texas; 77843
Federal Highway Administration; Texas Division; Austin, Texas;
Texas State Department of Highways & Public Transp; 11th and Brazos Streets; Austin, Texas; 78701

Document Data — Res Rpt.; RTI-2-10-74-205-13; Fel. 81; 56p
#FHWA/TX-81/21

Abstract — The report presents the results of a Park-and-Pool survey undertaken at selected locations around the San Antonio and Houston, Texas, metropolitan areas. This information should prove useful in a number of different ways including: the identification of various improvements which could be made in order to better meet the needs of area commuters; and the planning and design of future Park-and-Pool facilities.

Availability — ORDER FROM:
National Technical Information Service; 5285 Port Royal Road; Springfield, Virginia; 22161; PB81-211191

Document Order Data

SUPPLEMENTAL NOTE:
Sponsored in part by Texas State Dept. of Highways and Public Transportation, Austin.

HRIS Information Source — National Technical Information Service; 05123

TECHNICAL PAPER IN A CONFERENCE PROCEEDINGS

Document Record Number
TRIS Accession Number
HRIS Subject Area Number — 20 368188

Title — EVALUATION OF PAVEMENT SERVICEABILITY ON THE INTERSTATE SYSTEM IN OREGON

Authors — Miller, TC; Portland Cement Association

Publication Data — New Mexico University, Albuquerque; 810 Stanford Drive, NE; Albuquerque, New Mexico; 87131; PPC81

Document Data — 81; pp 208-211

Abstract — Measurements of present serviceability index (PSI) using a PCA Road Meter have been made on the 398-mile Interstate System in Oregon annually since 1972. The system has been broken down into sections based on the pavement structure and construction contract. Structural strip maps were prepared and the PSI ratings plotted on this map show the pavement performance trend for each section. The superior performance of some pavements has been documented and sections that will be in need of early rehabilitation identified. Analysis of PSI vs Age and PSI vs Heavy Truck Traffic has been made and compared with the M. R. Brown model equations for the concrete sections. The goal is to develop PSI trend curves and to predict when rehabilitation of the pavement will be required.

Availability — ORDER FROM:
Engineering Societies Library; 345 East 47th Street; New York, New York; 10017

SUPPLEMENTAL NOTE:
Proceedings of the 18th Paving Conference, held at the University of New Mexico, Albuquerque, January 7-9, 1981.

Engineering Index; EI8206106139

IDENTIFICATION GUIDE FOR AN HRIS RECORD OF AN ON-GOING RESEARCH PROJECT

Document Record Number
TRIS Accession Number
HRIS Subject Area Number — 13 [3338781]

Title of Project — FORECASTING REVENUES FOR THE VIRGINIA DIVISION OF MOTOR VEHICLES UNDER ENERGY AND TRANSPORTATION SUPPLY CONSTRAINTS

PERFORMING AGENCY:
Virginia Polytechnic Institute & State University; Department of Civil Engineering; Department of Aerospace and Ocean Engineering; Blacksburg, Virginia; 24061; 0568

INVESTIGATOR:
Mohelka, AG; Associate Professor; (703) 961-7407

FUNDING AGENCY:
Virginia Department of Highways and Transportation; Division of Motor Vehicles; 2220 West Broad Street; Richmond, Virginia; 23220

AS = project status
RD = reporting date
AD = funding approval date
CD = contract date
SD = project start date
DC = estimated project completion date
TF = total funds
FT = type of funding
CN = contract/grant number
CT = contract type
FY = funds by fiscal years

AS-Active; RD-Feb 81; SD-01 Sep 80; DC-Aug 81 EST; TF-$79000; FT-Contract; CN-8481101

Summary Statement of Research Project Includes Objectives, Scope and Methods —

The objective is to estimate the needed revenues to meet the Highway expenditures in the coming decade under different socio-economic conditions and technological developments in the Commonwealth of Virginia.

CITATIONS:

Tra, TK
Forecasting Highway Revenues Under Different Taxation Policies, Transportation Supplies and Gasoline Shortages
Virginia Division of Motor Vehicles
Exec Summary 8008

Gordon, P
Alternative Transportation Taxation Policies Volume I
Virginia Division of Motor Vehicles
8008

Tran, TK; Young, SB; Paulkner, T; Seeman, DA
Impacts of Transportation Supply and Gasoline Shortages on Virginia Gas Tax Revenues, Volume II
Virginia Division of Motor Vehicles
8008

HRIS Information Sources — Virginia Polytechnic Institute & State University

FORM 500 CARDS RUN NUMB. HALK616

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NAMR. DAVID C. ESCH
NBCHIEF OF HIGHWAY RESEARCH
NCALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES
NDFAIRBANKS, ALASKA
NE
NF
NGILLUMINATION, SIGNS, REFLECTORS FOR DEER OR WILDLIFE
NH
NI
PA 701 I

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T02 675S 31   A DEER                                       04 05 03
T03 675S 31   O WILDLIFE                                   08 05 04
T04 675S 31   O ANIMALS                                    07 05 XX
T05 575S 24   A 51                                         02 VV 06
T06 575S 24   O 54                                         02 VV XX
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54 097030

EFFECTIVENESS OF A LIGHTED, ANIMATED DEER CROSSING SIGN

Pojar, TM

Journal of Wildlife Management; Wildlife Society; Suite S-176, 3900 Wisconsin Avenue, NW; Washington, D.C.; 20016

V39 N1; Jan 75; pp 87-91

Two lighted, animated deer crossing signs were installed adjacent to State Highway 82 south of Glenwood Springs, Colorado, delineating a 1.61km (1-mile) segment of highway where deer-vehicle accidents frequently occurred. Crossings per kill ratios were nearly identical with the signs off (56.5:1) and with the signs on (56.9:1). When the motorist was presented with evidence that a danger existed (i.e., deer carcasses in emergency lane), the response was much greater than when they were merely warned (via the deer crossing sign) of a potential danger. With evidence of danger, the response was the same regardless of whether or not the warning signs were on. Motorists' response in the form of speed reduction and/or increased awareness was not sufficient to affect the crossings per kill ratio. Since these lighted, animated signs were not effective in reducing the number of deer-vehicle accidents, it seems reasonable to assume that conventional deer crossing signs are not effective either. However, in areas where deer-vehicle accidents are especially numerous, warning signs may be useful for public relations and liability reasons.

25 098607

BEHAVIORAL RESPONSE OF MULE DEER TO A HIGHWAY UNDERPASS

Reed, DF
Woodward, TN
Pojar, TM

Journal of Wildlife Management; Wildlife Society; Suite S-176, 3900 Wisconsin Avenue, NW; Washington, D.C.; 20016

V39 N2; Apr 75; 00 361-367

A concrete box underpass 3.05 x 3.05 m (10 feet) and 30.48 m (100 feet) long under Interstate 70 in west central Colorado was monitored for deer use during four years following its completion in early 1970. A seasonal mean of 345.1 plus or minus 133.0 (50) mule deer (Odocoileus hemionus) passed through the structure when moving to or from their summer range. A video time-lapse surveillance system recorded behavioral responses during four migration periods, spring-summer and fall in 1972 and 1973. On the basis of video tape playback of 4.450 approaches and 1,739 entrances, deer displayed three basic overt responses: look-up, tail-up, and muzzle-to-ground. The frequency of the look-up response was indicative of the reluctance of the animals to go through a structure of this size and character. The underpass was successful in permitting about 61 percent of the local deer population to migrate safely under the highway. /Author/

51 125287

ANALYSIS OF ROAD ACCIDENTS
UN ANALISIS DE LOS ACCIDENTES DE TRANSITO

Bandel, E
Yanez, J

Decimo Concurso de Trabajossobre Temas Viales; Ministerio de Obras Publicas; C/7 Numero 1175, La Plato; Buenos Aires; Argentina

N84; Conf Paper; Oct 68; pp 47-73; 16 Fig.; 12 Tab.; Spanish

400 accidents which occurred in buenos aires during 1967 and which represent 40% of the total number of accidents are analyzed in detail. The analysis is divided as follows: monthly, daily and hourly distribution of accidents and casualties, classification of accidents per types, main factors recurring in these accidents, and economic evaluation of the latter. It was found that the main causes of accidents were: the human factor (driver or pedestrian) which accounted for 84% of accidents; the road for 9% and the vehicle 7%. A more detailed study showed the following results: driver/pedestrian factor: excess speed (2%), carelessness (53%), drunkenness (3%), other causes 24%; road factor: wet road (43%), bad weather conditions (27%), bad road conditions (11%), bad visibility caused by vegetation or obstruction (8%), animals roaming on the road (7%), defective shoulders (3%), other causes (7%); vehicle factor: lighting defects (33%), defective brakes (19%), punctures (5%), other mechanical faults (9%). The number of the covering abstract is IRRD Abstract No. 100834.
/TRRL/

Transport and Road Research Laboratory; IRRD 100835

51 138435

EFFECTS OF MULTIPLE LAND USE PRACTICES ON BIG GAME HABITAT & BEHAVIOR IN THE CENTRAL ROCKY MOUNTAINS

PERFORMING AGENCY:
Wyoming University; Laramie, Wyoming; 82071; FS RM

INVESTIGATOR:
Ward, AL

FUNDING AGENCY:
Department of Agriculture; Independence Avenue, Between 12th and 14th Streets, SW; Washington, D.C.; 20250; RM-1804

AS-Active; RD-Jun 80; SO-Nov 68; DC-Nov 81 EST

Determine the environmental impacts and the interrelationships of major land use practices on the spectrum of habitats essential for optimum elk and other big game populations. Determine patterns of elk behavior and movements following harvest and activities related to increased human ingress, studies will be made of plant succession on harvested areas of various ages, silvicultural systems, and site conditions. The effects of increased numbers of people on the game populations will be evaluated. Also the behavioral characteristics of big game in the vicinity of road systems of various standards will be monitored through he use of radio telemetry and time lapse photography. Pre- and post-construction situations will be evaluated in conjunction with various practices to mitigate unfavorable effects of the road developments. Elk behavior in relation to timber harvest operations in South-central Wyoming was studied using telemetry, time-lapse photography and fecal and track counts. Elk preferred to be at least one-half mile from harvest and clean-up operations. Elk can be expected to move back to a harvest site within three weeks after humans leave. Traffic on Forest Systems roads has little effect on elk activity, especially beyond 300 yards. Resident populations of mule deer are living adjacent to the heavy traffic on I-80 near Laramie, Wyoming. In other areas deer migrate across I-80 to move from summer to winter ranges. Available underpasses are not being utilized and highway accidents are common. Pronghorn antelope are kept off I-80 where right-of-way fences are in good shape and snow has not drifted, creating a bridge for the antelope. Antelope are not using underpasses. I-80 acts as a barrier for elk although they are seen regularly within 300 yards.

CITATIONS:
Ward, AL

Effects of Timber Harvest on Mule Deer and Elk
Proc. 18th Rocky Mountain Industries Conf, Wyoming
75

Ward, AL; Diem, KL; Weeks, RW
The Impact of Snow on Elk
Final Report of the Medicine Bow Ecology Project, U of Wyo.
380 pp, Figs. 75

Cupal, JJ; Ward, AL; Weeks, RW
A Repeater Type Biotelemetry System for Use on Wild
Big Game Animals
11th Ann Rocky Mtn Bioeng Symp-Intl ISA Biomed Sci Symp
8 pp, Vpl. 10 7404

Hiller, PK; Cupal, JJ; Weeks, RW; Ward, AL
An Automatic Wildlife Tracking System
11th Ann Rocky Mtn Biorng Symp-Intl ISA Biomed Sci Symp
4 pp, Vol. 10 7404

Current Research Information Service; CRIS 0018563

51 145098

DEER-CAR ACCIDENTS IN SOUTHERN MICHIGAN

Allen, RE; Michigan University, Ann Arbor
McCullough, DR; Michigan University, Ann Arbor

Journal of Wildlife Management; Wildlife Society; Suite S-176, 3900 Wisconsin Avenue, NW; Washington, D.C.; 20016

V40 N2; Apr 76; pp 317-325; Figs.; Tabs.; 20 Ref.

Collisions of cars with white-tailed deer (Odocoileus virginianus) were studied in southern Michigan in 1966 and 1967. Most of the 2,566 accidents studied occurred at dawn, dusk, or after dark with peaks at sunrise and 2 hours after sunset. Accidents were highest on weekends when evening traffic was greatest. A low seasonal peak in collisions occured in May and a high one in November. Sex ratio of the annual kill was predominately female, but it shifted in favor of males during seasonal peaks. Causes of the peaks seemed to be primarily rutting activities, with hunter disturbance and food of lesser importance. Accidents were related to habitat type approximately according to the prevalence of the type. Accidents were most common at speeds of 80-95 km/h (50-59 mph), and the deer was killed in 92 percent of the accidents. Human injuries occurred in less than 4 percent, and most resulted from secondary collisions.

Highway Safety Research Institute; HSRI-35511
National Safety Council, Safety Research Info Serv; 770653J

51 153873

HIGHWAY FENCES AS VEHICLE-DEER COLLISION DETERRENTS

Bellis, ED
Graves, HB, III

Pennsylvania State University, University Park; Institute for Research on Land and Water Resources; University Park, Pennsylvania; 16802; 432-41 (3502)

Final Rpt.; #FHWA-PA-74-9; Jun 76; 26 pp

FT-Contract; CN-53[illegible]9

A survey of highway fencing along Interstate 80 in Centre County showed that 7 1/2 foot, type 3-modified fence has little value as a vehicle-deer collision deterrent; many deer crawl under the fence to the planted right-of-way and abundance of gaps underneath provides for easy penetration. From December 1974 through March 1976 numbers and position of deer were observed from a vehicle driven along 6 miles of I-80 at night. Bimodal patterns of abundance were found, deer were most numerous in spring and fall; of 2577 deer sightings, 74.5% were on the highway side and 25.5% on the far side of the fence. Comparisons between a control area (north side of highway) where the fence was unmodified and test areas (south side) where gaps underneath were plugged and/or top five wires removed or repaired showed that the critical weakness in the fence is the underside but also that large numbers of deer cross a fully repaired fence. Only 6 deer were reported killed during the 16 months of study and no live deer were seen on the highway; these results, relative to previous findings beginning in 1967, strongly suggest that high traffic volume prevents deer from venturing onto the highway, thus reducing collisions.

ORDER FROM:
National Technical Information Service; 5285 Port Royal Road; Springfield, Virginia; 22161; PB264875/AS

Federal Highway Administration
National Technical Information Service

21 153962

EFFECTS OF HIGHWAY CONSTRUCTION AND USE ON BIG GAME POPULATIONS

Ward, AL
Cupal, JJ
Goodwin, GA
Morris, HD

Rocky Mountain Forest & Range Experiment Station; Colorado State University, 240 West Prospect Street; Fort Collins, Colorado; 80521; FHA-3-1-1517
Federal Highway Administration; 400 7th Street, SW; Washington, D.C.; 20590

Final Rpt.; #FHWA/RD-76-174; Mar 76; 101 pp

FUNDING AGENCY:
FHWA Code E-0231

FT-Contract; CN-P.O. 3-1-1517

Pronghorn antelope, mule deer, and elk are affected by right-of-way fences and highway traffic. At least 153 antelope, 561 mule deer, and 10 elk have been killed through vehicle accidents along a 55-mile section of I-80 west of Laramie, Wyoming, during a 5.5-year period. Since antelope are reluctant to jump fences and use underpasses, I-80 is a barrier and the herds are managed accordingly. Antelope can be kept off the highway by maintaining good woven wire fences and preventing snow from drifting over the right-of-way fence. Mule deer jump right-of-way fences, but can be forced to use underpasses by using deer-proof fencing. Both resident and migratory mule deer are affected by roads and traffic. Proper management should provide safe deer crossings thus increasing the safety of the highway user. Since elk are large, they present a greater hazard to motorists, and should be discouraged from crossing highways by proper fencing and road location. New techniques using heart-rate telemetry shows great potential for use in further studies of animal behavior in relation to the ever increasing activities of man.

ORDER FROM:
National Technical Information Service; 5285 Port Royal Road; Springfield, Virginia; 22161; PB-264633/9ST

National Technical Information Service; u7712

51 159750

THE ANIMAL ACCIDENT PROJECT
VILTOLYCKSPROJEKTET

Peterson, BE
Imre, E

National Swedish Road Administration; Fack S-10220; Stockholm 12; Sweden

Monograph; #Report No 16; 76; 10 pp; 1 Fig.; Swedish

This report is included as number 12 in a series of working reports within the animal accident project. The publication is a situation report briefly dealing with the background, the results and the future. The results contain statistical accident analysis, study of existing measures and new measures. -/TRRL/

National Swedish Road & Traffic Research Institute
Transport and Road Research Laboratory; IRRD 225875

51 163949

TESTS WITH ELECTRICAL GAME PRESERVES DURING 1975-76
FOERSOEK MED VILT STAENGSEL TYP NITRO-NOBEL ELSTAENGSEL I D-LAEN AAR 1975-76

National Swedish Road Administration; Fack S-10220; Stockholm 12; Sweden

Intrm Rpt.; #NR 19; 77; 15 pp; 4 Fig.; 5 Tab.; 1 Phot.; Swedish

Electrical fences were tested as game preserves on roads in Sweden for 1.5 years. The purpose was: (1) to study different types of uprights and number of wires and their position, (2) to obtain a value of management safety, (3) to determine construction and management costs, and (4) to study the effect on animal accidents. Of the types tested a 130 cm high fence with 5 wires on pressure impregnated uprights of wood (space 6 M) has proved the best. The construction costs have been low. Mechanical wear and soiling from the road have created some problems. In particular the wire (a laminated band) has been damaged. There were no animal accidents after the erection of the fence. At present a new wire with an expected endurance of 5 to 7 years is being tested.
/TRRL/

National Swedish Road & Traffic Research Institute
Transport and Road Research Laboratory; IRRD-226304

51 174180

WIRE NET FENCES
NAETSTAENGSEL

Almkvist, B

Stockholm University, Sweden; Zoologiska Institutionen, Raadmansgatan 70A; S-11385 Stockholm; Sweden

Monograph; Report No. 11; 30 Apr 76; 13 pp; 3 Fig.; 2 Tab.; 1 Phot.; 4 Ref.; Swedish

This report reviews the ability of cloven-footed animals to pass various types of wire net fences. Furthermore accident statistics of fenced roads are presented. Taking this as a basis, recommendations for fence design are given. /TRRL/

Transport and Road Research Laboratory; IRRD 231013
National Swedish Road & Traffic Research Institute

51 179855

THE EFFECTIVENESS OF DEER FLAGGING MODELS AS DETERRENTS TO DEER ENTERING HIGHWAY RIGHTS-OF-WAY

Graves, HB
Bell's, ED

Pennsylvania State University, University Park; Institute for Research on Land and Water Resources; University Park, Pennsylvania; 16802; 432-41 (8772)

Final Rpt.; #FHWA-PA-78-12; Jun 78; 21 pp

FUNDING AGENCY:
FHWA Code E-0328

FT-Contract; CN-55108

To determine whether rear-view silhouette models of deer with raised tails would be effective in keeping deer off planted interstate highway rights-of-way, such models were tested in four experiments along Interstate 80 in Centre County, PA. Results of counts of deer in experimental and control areas obtained from a moving vehicle or examination of tracks through gaps under the fence revealed that the models were ineffective as deterrents to deer gaining access to the right-of-way. It is not recommended that they be used to reduce vehicle-deer collisions. /FHWA/

ORDER FROM:
National Technical Information Service; 5285 Port Royal Road; Springfield, Virginia; 22161; PB-284422/AS

SUPPLEMENTAL NOTE:
Sponsored by Pennsylvnaia DOT.

Federal Highway Administration
National Technical Information Service

51 179860

HIGHWAY LIGHTING TO PREVENT DEER-AUTO ACCIDENTS

Reed, DF
Woodard, TN
Beck, TDI

Colorado Division of Wildlife; 6060 Broadway; Glenwood Springs, Colorado; 81601; CDOH-PSR-R-77-5

Final Rpt.; #FHWA-CO-77-5; Sep 77; 26 pp

FUNDING AGENCY:
FHWA Code E-0331

FT-Contract; CN-1478

Deer vehicle accidents have been the cause of considerable property damage and the loss of biotic resources. This is especially the case in rural areas in mountainous terrain where nighttime driver visibility is poor. The purpose of this research was to determine if deer-vehicle accidents were affected by fixed highway illumination. This was done by comparing responses of motorists to deer on the highway and deer responses to the motorists, with and without fixed illumination. Estimated deer crossings per kill was 9.7 percent higher with the lights on compared to lights off. When a deer simulation was present under lighted conditions mean vehicle speeds decreased by 13.9 km (8.6 miles) per hour with brake lights observed on 50.6 percent of the approaching vehicles. The Roadway Lighting Committee (1972) recommends lighting standards based on mean horizontal illumination and illumination uniformity ratios for different roadway and area classifications. /FHWA/

ORDER FROM:
National Technical Information Service; 5285 Port Royal Road; Springfield, Virginia; 22161; PB-284312/6ST

SUPPLEMENTAL NOTE:
Sponsored by Colorado Division of Highways.

Federal Highway Administration
National Technical Information Service

21 193646

WIRE-NETTING FENCES FOR GAME ACCIDENT PREVENTION
NAETSTAENGSEL FOER VILT

Ljungqvist, S

National Swedish Road Administration; Fack S-10220; Stockholm 12; Sweden

Monograph; #VTU Internrpt 23; Apr 78; 8 p.; 8 Fig.; 2 Tab.; Swedish

This report deals with the technical and geometric design of wire-netting fences for the prevention of accidents involving wild animals. Details of fences, nettings, posts, stays and assembly are presented. Finally, the installation procedure is described.

Transport and Road Research Laboratory; IRRD-234402
National Swedish Road & Traffic Research Institute

51 193924

THE ANIMAL ACCIDENT PROJECT. PART 2. SITUATION REPORT SEPTEMBER 1978
VILTOLYCKSPROJEKTET 2. LAEGESRAPPORT SEPT 1978

Almkvist, B
Andre, T
Ekblom, S
Aaberg, L
Rempler, S-A

National Swedish Road Administration; Pack S-10220; Stockholm 12; Sweden

Monograph; #Interarapport Nr 33; Sep 78; 16 p.; 3 Fig.; Swedish

An analysis of accidents involving moose and deer shows that 70% of all accidents occur in the summer, with peaks in June, and end of September and end of January. Almost 40% occur at dawn. On newly constructed roads, the number of accidents during the first year is about 2.5 times the normal; even after three years, the number of accidents is twice that normally expected. 50% of accidents occur where distance between road and forest is 5 M, and over 90% where distance is up to 20 M. On roads in open country less than 20% of accidents occur. Peaks involving moose are influenced by behaviour of the calves. Measures to counteract such accidents are (1) game fences; deer usually crawl underneath while moose jump over. Where fence consists of a mesh with single strands above, animals are often injured, and fences should therefore consist of mesh over full height. (2) game mirrors; these are used extensively, and an investigation of their efficacy is in progress. (3) clearance along roads; it appears that this is effective in reducing accidents. New measures are the use of visual or smell signals, and speed restrictions. Driver attitude is also significant. Further studies are planned. /TRRL/

Transport and Road Research Laboratory; IRRD 237666
National Swedish Road & Traffic Research Institute

51 221301

COLLISION OF VEHICLES WITH DEER STUDIED ON PENNSYLVANIA INTERSTATE ROAD SECTION

Bellis, ED
Graves, HB

Highway Research News, Hwy Res Board

71; No 43, pp 13-17, 8 REF

IN 1968 AND 1969 THE NUMBERS OF WHITE-TAILED DEER REPORTED KILLED ON PENNSYLVANIA HIGHWAYS WERE 21,607 AND 21,246, RESPECTIVELY. DEER-VEHICLE COLLISIONS ALSO OFTEN ENTAIL EXTENSIVE VEHICLE DAMAGE AND INJURY OR DEATH TO THE HUMAN OCCUPANTS. A LONG-TERM STUDY HAS BEEN UNDERTAKEN, EMPLOYING AN EIGHT-MILE STRETCH OF I-80, TO DETERMINE THE ACTIVITY, BEHAVIOR, AND MORTALITY OF DEER. PARAMETERS IN THE STUDY ARE DESCRIBED, DATA ARE CITED, AND TENTATIVE CONCLUSIONS ARE DRAWN.

51 221684

"DEER CROSSING" SIGNS MAY PROVE VALUABLE IN REDUCING ACCIDENTS AND ANIMAL DEATHS

Pojar, TM
Reseigh, TC
Reed, DF

Highway Research News, Hwy Res Board

N46; Jan 72; pp 20-3; 1 Fig; 2 Phot; 1 Ref

A SECTION OF COLOADO HIGHWAY WITH THE HIGHEST FREQUENCY OF DEER ACCIDENTS PER MILE IN THE STATE WAS CHOSEN FOR THE STUDY. A REFLECTORIZED DIAMOND SIGN WITH "DEER XING" IN NEON LIGHTS WAS COMPARED WITH A REFLECTORIZED DIAMOND WITH 4 ANIMATED SILHOUETTES IN NEON TUBING, LIT IN SEQUENCE. BOTH SIGNS RESULTED IN A SMALL, BUT STATISTICALLY SIGNIFICANT REDUCTION IN TRAFFIC SPEEDS PAST THE SIGN. THE SECOND SIGN APPEARED TO INITIATE A GREATER RESPONSE ON THE PART OF THE MOTORIST.

51 221688

DEER MIRRORS IN MISSOURI

American Highways

V51 N1; Jan 72; p 17

THE EFFECTIVENESS AND USE OF DEER MIRRORS BY THE MISSOURI HIGHWAY DEPARTMENT ARE REPORTEDLY FAVORABLE. THE NUMBER OF DEER-VEHICLE ACCIDENTS WERE CUT DOWN ENORMOUSLY WHILE IN USE. THE DEVICE CONSISTS OF TWO ROUND THREE INCH MIRRORS MOUNTED AT 45 DEGREE ANGLES ABOUT FOUR FEET ABOVE THE GROUND. THESE ARE INSTALLED ON A STAGGERED SYSTEM AT ABOUT 75 FT INTERVALS ON BOTH SIDES OF THE HIGHWAY DEPENDING ON THE TERRAIN BORDERING THE HIGHWAY AND THE NUMBER OF DEER CROSSING. HEADLIGHTS FROM PASSING CARS REFLECT AGAINST THE MIRRORS CAUSING LIGHT TO FLICKER SHARP, PENCIL-LIKE BEAMS STARTLING THE DEER AND CAUSING THEM TO STOP. ONCE THE LIGHT BEAMS STOP FLICKERING, THE DEER SAFELY CROSS.

51 221927

LIGHTED DEER CROSSING SIGNS AND VEHICULAR SPEED

Pojar, TM
Reed, DF
Resigh, TC

Colorado Dept Natural Resources; /Div Games, Fish, & Parks

Inter Rept; Aug 71; 12 pp

A COOPERATIVE STUDY BY THE COLORADO DIVISION OF HIGHWAYS AND THE COLORADO DIVISION OF GAME, FISH AND PARKS CONCERNING DEER-VEHICLE ACCIDENTS WAS INITIATED IN 1968. THESE AGENCIES ARE IN THE PROCESS OF EVALUATING PROCEDURES AND DEVICES THAT MAY HELP REDUCE THE NUMBER OF DEER-VEHICLE ACCIDENTS. SOME OF THE DEVICES BEING EVALUATED ARE TWO TYPES OF LIGHTED DEER CROSSING SIGNS. /AUTHOR/

National Technical Information Service

51 222425

USE OF ONE-WAY GATES BY MULE DEER

Reed, DF
Pojar, TM
Woodard, TN

Journal of Wildlife Management

V38 N1; Jan 74; pp 9-15

GATES DESIGNED TO ALLOW PASSAGE OF MULE DEER (ODOCOILEUS HEMIONUS) IN ONLY ONE DIRECTION WERE TESTED UNDER CONTROLLED AND FIELD CONDITIONS. TWO GATE TYPES HAD SIGNIFICANTLY DIFFERENT FREQUENCIES OF USE UNDER CONTROLLED CONDITIONS. EIGHT GATES OF THE TYPE DEEMED MOST EFFECTIVE WERE INSTALLED IN EIGHT-FOOT (2.44-M) FENCES ADJACENT TO INTERSTATE HIGHWAY 70 NEAR VAIL, COLORADO. A TOTAL OF 558 PASSAGES WERE RECORDED THROUGH THESE GATES DURING 1970-72 AND 96 PERCENT OF THESE WERE IN THE ONE-WAY DIRECTION FOR WHICH THE GATE WAS DESIGNED. BASED ON TRACK COUNTS, IT WAS ESTIMATED THESE GATES PERMITTED ABOUT 223 DEER TO ESCAPE THE IMMEDIATE HIGHWAY RIGHT-OF-WAY. /AUTHOR/

54 226320

MIRRORS QUELL DEER KILL

Better Roads

Dec 71; p 6

THE MISSOURI HIGHWAY DEPARTMENT IS INSTALLING MIRRORS ALONG CERTAIN SECTIONS OF THEIR HIGHWAYS IN AN ATTEMPT TO CUT DEER-VEHICLE ACCIDENTS. TWO ROUND, THREE-INCH MIRRORS MOUNTED AT 45-DEGREE ANGLES ABOUT FOUR FEET ABOVE THE GROUND ARE INSTALLED AT 75-FOOT INTERVALS ON BOTH SIDES OF THE HIGHWAY. HEADLIGHTS FROM PASSING CARS REFLECT AGAINST THE MIRRORS CAUSING LIGHT BEAMS TO FLICKER INTO THE CUTS, DRAWS, AND TIMBER ALONGSIDE ROADWAYS. THESE SHARP PENCIL-LIKE LIGHT BEAMS STARTLE THE DEER AND CAUSE THEM TO STOP. ONCE THE LIGHT BEAMS STOP FLICKERING, THE DEER THEN CROS, IN SAFETY. /AUTHOR/ -

51 262462

DEER MORTALITY ON A MICHIGAN INTERSTATE HIGHWAY

Reilly, RE
Green, HE

Journal of Wildlife Management; Wildlife Society, Suite S-176; 3900 Wisconsin Avenue, NW; Washington, D.C.; 20016

V38 N1; Jan 74; pp 16-19

Yearly totals of white-tailed deer (Odocoileus virginianus) killed by automobiles in a northern white cedar (Thuja accidentalis) deer wintering area in Upper Michigan's Mackinac County were compiled for a 13-year period from 1960 through 1972. Mackinac Trail, a two-lane highway (formerly US 2), intersects approximately a five-mile stretch of this wintering area. In 1963, Interstate 75 was constructed roughly parallel to US 2 and about 0.25 mile east of it and thus also intersected the wintering area. In 1964, car-deer kills in the study area increased by approximately 500 percent over the average of the previous four years. This car-deer kill declined slightly through 1967, and has recently fluctuated about an average which is approximately twice that of the pre-Interstate yearly mortality figure. /Author/

21 300989

GAME FENCES. LOCATION, COSTS AND MANAGEMENT
VILTSTAENGSEL. PLACERING, KOSTNADER OCH DRIFT

National Swedish Road Administration; Pack S-10220; Stockholm 12; Sweden

Monograph; #TU 1979:1; 79; 26 p.; 4 Fig.; Swedish

This report is a summary of present knowledge concerning game fencing for traffic accident prevention. Costs of construction, operation and maintenance are studied together with how the fence can be adapted to prevailing terrain conditions and adjacent roads. Results from tests of special take-off mounds for elks that have wandered into fenced areas are also included in the report. Different types of fences are studied. Some results from the report: net fence is more costly to erect than electrified fence, but it has lower maintenance costs. A combination fence also has a maintenance cost lower than that for the electrified fence. The accident prevention effect of the net fence was studied with aid of accident statistics from the Stockholm region. It was found that a reduction of accidents by 70-80 percent is well within the reach of what can be obtained by game fencing. /TRRL/

Transport and Road Research Laboratory; IRRD 241314
National Swedish Road & Traffic Research Institute

51 305661

WHITE-TAILED DEER (ODOCOILEUS VIRGINIANUS) ON THE DEPARTMENT OF ENERGY'S OAK RIDGE RESERVATION: DATA ON ROAD-KILLED ANIMALS, 1969--1977

Story, JD
Kitchings, JT

Oak Ridge National Laboratory; Post Office Box X; Oak Ridge, Tennessee; 37830
Department of Energy; 1000 Independence Avenue, SW; Washington, D.C.; 20585

Jul 79; 36 p.

FT-Contract; CN-W-7405-ENG-26

During nine years (1969--1977), 126 white-tailed deer (Odocoileus virginianus) were killed by highway vehicles on the Department of Energy's Oak Ridge, Tennessee Reservation. Mortality was highest in the fall, and more males than females were killed among both fawns and adults. While traffic volume increased 8.2% annually, deer road-kills increased 43.8% annually. Increased road-kills were attributed primarily to an increase in the resident population.

ORDER FROM:
National Technical Information Service; 5285 Port Royal Road; Springfield, Virginia; 22161; ORNL/TM-6803

National Technical Information Service; u8003

51 315659

THE EFFECT OF DEER REFLECTORS ON DEER-VEHICLE ACCIDENTS

PERFORMING AGENCY:
Iowa Department of Transportation; 826 Lincoln Way; Ames, Iowa; 50010; HR-210

INVESTIGATOR:
Gladfelter, L; #(515) 432-2823

FUNDING AGENCY:
Iowa Department of Transportation; 826 Lincoln Way; Ames, Iowa; 50010
Iowa Conservation Commission; Wild Life Research Station; R.R. #1; Boone, Iowa; 50036

AS-Active; RD-Dec 81; SD-Jun 79; DC-Sep 83 EST; TF-530072; FT-Contract; CN-HR-210

The objective is to evaluate the "Swareflex" reflector system in reducing deer-vehicle accidents, to determine a cost benefit ratio for the system and to identify deer crossing areas throughout the state for possible implementation of the system.

CITATIONS:
Gladfelter, L
The Effect of Deer Reflectors on Deer-Vehicle Accidents
Iowa DOT, Office of Materials
Progress Report 8106

Iowa Department of Transportation

23 315778

SURVEY OF 1977 DEER KILL IN MINNESOTA

PERFORMING AGENCY:
Minnesota Department of Transportation; Environmental Affairs, 807 Transportation Building; St Paul, Minnesota; 55155

INVESTIGATOR:
Peterson, R; #(612) 296-1640
Sullivan, R

FUNDING AGENCY:
Minnesota Department of Transportation; Environmental Affairs, 807 Transportation Building; St Paul, Minnesota; 55155

AS-Completed; RD-Dec 81; SD-Oct 78; TF-$10000; FF-0

The purpose of this study is to identify the location of deer roadkill throughout the state. Once chronic kill areas have been located they will be field checked to identify possible treatment measures to reduce the kill problem. Data source are the confiscation reports on road-killed deer filed by the Conservation Officers.

Minnesota Department of Transportation

23 315784

DEER-PROOF FENCE AND ONE-WAY GATES

PERFORMING AGENCY:
Minnesota Department of Natural Resources; Farmland Wildlife Research Center; Madelia, Minnesota; 56062

INVESTIGATOR:
Ludwig, J; #(507) 642-8478

FUNDING AGENCY:
Minnesota Department of Natural Resources; Farmland Wildlife Research Center; Madelia, Minnesota; 56062
Minnesota Department of Transportation; Office of Environmental Affairs; 408 Transportation Building, John Ireland Boulevard; St Paul, Minnesota; 55155
Minnesota Department of Transportation; 408 Transportation Building, John Ireland Boulevard; St Paul, Minnesota; 55155;

AS-Active; RD-Mar 81; SD-Aug 77; TF-$15000

To determine effectiveness of 8' fencing in preventing deer access to highway and effectiveness of one-way gates in facilitating the safe exist of deer gaining access for fenced highway corridors on I 90 at Walnut Lk and I 94 at St. Joseph. Fence and gates monitored by use of counters and track beds. Also monitored location of road-killed deer. Obtained pre-fence data with track counts of crossing over road bed. Aerial counts used to evaluate deer density.

CITATIONS:
Bellis, E; Graves, H
Deer Mortality on a Pennsylvania Interstate Highway
J. Wildl Manage
35(2):232-237

Roper, KL; Olson, P; Evans, R
Using Wildlife Values in Benefit/Cost Analysis and Mitigation of Wildlife Losses
Colarado Division Wildl.
17p

Pils, C
The Cost and Chronology of Wisconsin Deer-Vehicle Collisions
Wisconsin Dept. Nat. Res.
Res. Rpt. 103, 5p

Puglisi, M; Lindsay, J; Bellis, E
Factors Associated with Highway mortality of White-Tailed Deer

J. Wildl. Manage
38(4):799-807 74

Reed, D
Deer Vehicle Accidents Statewide and Methods and Devices to Reduce Them
Colorado Div. Wildl fed Aid
pp 1-22, Part 1 7907

Reed, D; Pojar, T; Woodard, T
Use of One-Way Gates by Mule Deer
J.Wild l. Manage
38(1): 9-15 74

Reilly, R; Gren, H
Deer Mortality on a Michigan Interstate Highway
J. Wildl. Manage
38(1):16-19 74

Minnesota Department of Transportation

51 322118

INVESTIGATION OF ELK ACCIDENTS IN THE COUNTY OF NORRBOTTEN, SWEDEN 1978
UNDERSOEKNING AV AELGOLYCKOR I NORRBOTTENS LAEN 1978

Pettersson, S
Svedberg, AA

Trafiksaekerhetsverket; Oevre Norra Distriktet; Luleaa; Sweden

Monograph; 79; 29p; 15 Fig.; 20 Tab.; Swedish

The study aims at obtaining answers to questions such as, when, where and how do elk accidents occur and who meets with them. It draws upon 294 police reports of elk accidents during 1978 in the province of Norrbotten. The drivers involved were asked to answer a questionnaire comprising the following variables: vehicle, light conditions, traffic conditions, lighting, when was the elk discerned, speed, road standard, surrounding terrain, knowledge, damage/injury, previous experience. The answers received were compiled in frequency and cross tables. The results show that the drivers, irrespective of speed, speed limit or knowledge of elk danger often did not see the elk before the collision, or saw it so late that he was unable to react. There was no over-representation of any age group or sex of driver. Accidents mainly occurred in darkness and at dawn. Surprisingly enough one fourth of the accidents occurred at places described by drivers as open field with good visibility. The author concludes that measures aimed at drivers to reduce the number of accidents have limited effect. Instead long-term measures must be taken to prevent elks from coming into conflict with road traffic. In the meantime the number of elks must be kept at a suitable level by shooting. (TRRL)

Transport and Road Research Laboratory; IRRD 247888
National Swedish Road & Traffic Research Institute

51 322719

EFFECTS OF HIGHWAY OPERATIONS PRACTICES AND FACILITIES ON ELK, MULE DEER, AND PRONGHORN ANTELOPE

Ward, AL
Fornwalt, NE
Henry, SE
Hodorff, RA

Rocky Mountain Forest and Range Experiment Station; 240 West Prospect Street; Fort Collins, Colorado; 80526
Federal Highway Administration; 400 7th Street, SW; Washington, D.C.; 20590

Final Rpt.; #FHWA-RD-79-143; Mar 80; 52p

FUNDING AGENCY:
FHWA Code -E-0469

Vegetative ground cover under snowdrifts formed behind snowfences used along Interstate 80 to control blowing and drifting snow has not changed appreciably over a five-year period. Sagebrush (Artemisia tridentata) has decreased significantly under snowdrifts where deep drifts occurred every year and is being replaced by grasses and forbs. Mule deer (Odocoileus heminous) use machinery and box-type underpasses to cross under Interstate 80 when big game fencing 8 feet (2.44 m) high is constructed in place of the regular right-of-way fence. Deer-vehicle accidents were reduced over 90 percent, which is a large savings of deer life and vehicle damage. Only one pronghorn antelope (Antilocarpa americana), out of several hundred in the area, has been known to use the same underpasses. Elk (Cervus canadensis) have not had occasion to use the underpasses. Hunted mule deer and elk cross Forest roads most in areas where their feeding sites are adjacent to the road. Elk show a perference to stay over 0.1 mile (160 m) from streams when crossing roads, while deer are not so sensitive. Elk show a preference to stay a minimum of 0.25 mile (400 m) from traffic while deer prefer a minimum of 100 yards (91.m), and antelope use the habitat up to the right-of-way fence. All three species are more responsive to people walkering; elk prefer a distance of 0.5 mile (800 m), deer 200 yards (182 m) and antelope somewhere between the two distances, depending on habitat and experiences. The displacement reaction is definitely the most serious response. Camera systems using microwave sensors and lights are useful in recording animal activities at underpasses. (FHWA)

ORDER FROM:
National Technical Information Service; 5285 Port Royal Road;

Springfield, Virginia; 22161; PB81-107898

Federal Highway Administration

51 323385

REGIONAL DEER-VEHICLE ACCIDENT RESEARCH

Reed, D
Woodard, TN
Beck, TDI

Colorado Division of Wildlife; 526 Pine Street; Glenwood Springs, Colorado; 81601
Federal Highway Administration; Region 8, 555 Zang Street; Lakewood, Colorado; 80225

Final Rpt.; #FHWA-CO-79-11; Nov 79; 61p

FUNDING AGENCY:
FHWA Code E-0485

FT-RPOR; CN-3(3)

The purpose of this study was to evaluate and test the effectiveness of methods, devices, or structures related to reducing the number of deer-vehicle accidents. Consistent with this purpose was the need to locate and examine potentially critical deer-vehicle accident areas and recommend methods or structures which could have reduced these accidents. In addition, the effects of the methods recommended and investigation of deer responses to various experimental structures was conducted.

ORDER FROM:
National Technical Information Service; 5285 Port Royal Road; Springfield, Virginia; 22161

Federal Highway Administration

51 330483

THE GAME ACCIDENT PROJECT (VIOL). FINAL REPORT, MAY 1980
VILTOLYCKSPROJEKTET (VIOL). SLUTRAPPORT MAJ 1980

National Swedish Road Administration; Fack S-10220; Stockholm 12; Sweden

Monograph; #TU 146; May 80; 117p; Figs.; Tabs.; Refs.; Apps.; Swedish

The number of police reported accidents with game and motor vehicles increased heavily in the 1960's. As a result the government assigned to the National Road Administration the task to carry out research and experimental work for the purpose of reducing the number of such accidents. The work has been going on between 1970 and 1979. Basic facts about game, traffic and accidents have been collected and analysed. The analyses have led to an estimation of game accident hazards under different conditions. Accident preventive measures have been thoroughly studied through practical experiments, statistical accident analyses and economic assessments. The investigation comprises elk, roe deer, fallow deer and red deer with the accent on elk. Game accidents have increased no less heavily in the 1970's and they are likely to constitute about 15% of the total number of road accidents. A number of measures are discussed, ie game fences, mirrors, improved visibility through clearing, big game signs, repellents, information to road users, reduction of the stock of game. Fences have an accident reducing effect of approx 80% whereas mirrors show no significant effect. Clearing is an expensive measure. Further research is necessary to establish the effect of signs. Repellents in the form of evil-smelling preparations seem to have some effect. (TRRL)

Transport and Road Research Laboratory; IRRD 251162
National Swedish Road & Traffic Research Institute

51 330484

GAME AND TRAFFIC: REPORT OF HUNTING AND WILDLIFE MANAGEMENT COMMISSION
VILT OCH TRAFIK: BETAENKANDE AV JAKT- OCH VILTVAARDSBEREDNINGEN

Jordbruksdepartementet; Fack; Stockholm; Sweden; 0375-250X; 91-38-05660-7

Monograph; *SOU 1980:29; 80; 120p; Figs.; Tabs.; Swedish

There are no simple ways of solving the problem of accidents involving game. These proposals are only limited efforts which might contribute to reducing the risks. A somewhat increased hunting ought not to cause any greater risks for the fauna. In contrast to traffic safety demands, the aim should be to create one balanced elk stock in larger regions. Lower speed on the roads, especially where and when the accident risk is high, leads to fewer and less serious accidents. It can be done with speed limits and use of warning signs. Education (driving-school) and information (ej forwarding the police knowledge about temporary elk accumulations) can also help to decrease the number of accidents. To reduce the accident risk several actions in connection with the carriageway have been tried, for instance fences, land clearance and game mirrors. The game mirrors, however, have not proved to have any considerable efficiency. Biotope actions are seldom justified, at least not concerning elk. Light, sound and odour signals have not yet been used in any great degree. Tests have showed that odour signals have a high effect. (TRRL)

Transport and Road Research Laboratory; IRRD 251201
National Swedish Road & Traffic Research Institute

51 331459

ACCIDENTS BETWEEN WILD ANIMALS AND VEHICLES. THE BEHAVIOUR OF ROAD USERS, AND POSSIBILITIES OF CHANGING IT
VILTOLYCKOR. TRAFIKANTERS BETEENDE OCH MOEJLIGHETER ATT PAAVERKA DETTA

Swedish Transport Research Delegation; Wenner-Gren Center, Sveavaegen 166; S-11346 Stockholm: Sweden; 91-85562-27-0

Monograph; No. TFD 1980:3; 80; 47p; 9 Fig.; 10 Tab.; Phots.; Ref.; Swedish

This is the final report of a three year research project. The general purpose of the project has been to investigate the possibility of changing driver behaviour in order to reduce the risks of accidents between wild animals and vehicles. Only accidents involving moose and car drivers have been considered. Four different investigations have been carried out. The first two studies consist of analyses of survey data from drivers sampled from three Swedish counties. In the first study relations between the probability of a collision with moose and drivers' experiences with knowledge and attitudes about moose were explored. In the second study the problem was to investigate and compare circumstances in accidents and near-accidents and to relate the results to differences in driver behaviour. In the third study the relation between the attention distribution of drivers and their detection of moose dummies was studied experimentally. The effect of the wild animal crossing warning sign is investigated in the fourth and final study as manifested in drivers' detection of moose dummies. (TRRL)

Transport and Road Research Laboratory; IRRD 252765
National Swedish Road & Traffic Research Institute

51 333600

AN EVALUATION OF THE EFFECTIVENESS OF SWAREFLEX WILDLIFE WARNING REFLECTORS IN REDUCING DEER-VEHICLE COLLISIONS

PERFORMING AGENCY:
Minnesota Department of Natural Resources; Farmland Wildlife Research Group; Madelia, Minnesota; 56062

INVESTIGATOR:
Ludwig, J; Wildlife Research Biologist; #(507) 642-3478
Alter, R
Mauver, M

FUNDING AGENCY:
Minnesota Department of Transportation; P.O. Box H, 301 Laurel Street; Brainerd, Minnesota; 56401

AS-Active; RD-03 Mar 81; SD-Oct 80; DC-Oct 83 EST; TF-$17301; FT-Contract; CN-364

The objective is to evaluate the effectiveness of the SWAREFLEX "Wildlife Warning Reflectors" in reducing the number of deer-vehicle collisions. Historical number of deer-vehicle collisions, as tabulated from Conservation Officer reports, will be compared to number of collisions after installation of reflectors.

Minnesota Department of Natural Resources

51 333603

EVALUATION OF THE EFFECTIVENESS OF "BOSCH" WILD ANIMAL WARNING MIRRORS IN REDUCING DEER-VEHICLE COLLISIONS

PERFORMING AGENCY:
Minnesota Department of Transportation; Office of Environmental Services; 807 Transportation Building; St Paul, Minnesota; 55155

INVESTIGATOR:
Peterson, R; #(612) 296-1640

FUNDING AGENCY:
Minnesota Department of Transportation; 408 Transportation Building, John Ireland Boulevard; St Paul, Minnesota; 55155;
Minnesota Department of Natural Resources; Centennial Office Building, 658 Cedar Street; St Paul, Minnesota; 55155
Valley Archery Club

AS-Active; RD-Oct 81; SD-Oct 81; DC-Dec 84 EST; TF-33000

The study objective is to evaluate "Bosch" Wildlife Warning Mirrors in reducing deer-vehicle collisions on a stretch of TH 169 north of St. Peter, Minnesota which has a chronic deer-kill problem. Reflectors will be purchased by Valley Archery Club and installed in October 1981. Deer-Kills will be monitored for 3 years by Mn/DNR.

Minnesota Department of Transportation

21 334660

TRAFFIC SAFETY EFFECT OF GUIDE POSTS
TRAFIKSAEKERHETSEFFEKTEN AV KANTSTOLPAR

National Swedish Road Administration; Pack S-10220; Stockholm 12; Sweden

Monograph; #Meddelande Tu 1980:7; 80; 26p; 3 Tab.; Swedish

The number of accidents on twenty road sections with guide posts provided with reflectors, was compared to the number on twenty control sections. The test started in January 1977 and has been in progress for somewhat more than two years. During this time 584 police reported accidents occurred on the stretches with guide posts and 615 on the control sections. After a correction of the numbers with regard to differences in vehicle kilometers, the increase of safety with guide posts, was calculated to three percent.a closer analysis of the accidents shows that the guide posts have little effect on accidents involving wild animals, while the effect on accidents involving one or several vehicles can be as high as 5-10 percent. Earlier, tests were done with reflectors on snow guide posts on almost the same road sections, but with a considerably higher effect. The causes of the different results are discussed in the report. (TRRL)

Transport and Road Research Laboratory; IRRD 252937
National Swedish Road & Traffic Research Institute

51 336523

WILDLIFE RESEARCH REPORT. PART ONE

Colorado Division of Wildlife; Fort Collins, Colorado

Jul 80; 178p

Methods, devices, or structures related to reducing the number of deer-vehicle accidents were evaluated or experimentally tested after obtaining preliminary data on study areas and methodology. These methods, devices, or structures were highway lighting, underpasses, overpasses, 2.44-m fences and one-way deer gates, and deer guards. During the highway lighting study, 84 deer-vehicle accidents occurred, 45 and 39 with lights off and on, respectively. Behavioral responses of deer to the Vail deer underpass did not change substantially over the 10 years (1970-1979) of study. Five deer guard prototypes were evaluated. Highway lighting, as tested in this study, did not result in significantly fewer accidents.

ORDER FROM:
National Technical Information Service; 5285 Port Royal Road; Springfield, Virginia; 22161; PB81-124638

National Technical Information Service; u8107

21 341499

EVALUATION OF HIGHWAY DEER KILL MITIGATION ON SIE/LAS-395 (1976-1979)

Ford, SG

California Department of Transportation; Division of Transportation Planning; Sacramento, California; 95814; 13140-604103
Federal Highway Administration; 400 7th Street, SW; Washington, D.C.; 20590

Final Rpt.; #FHWA/CA/80/01; May 80; 45p

FUNDING AGENCY:
FHWA Code E-0458

FT-Contract; CN-A-9-34

The project was developed to determine the effectiveness of deer-crossing structures, deer-proof fence, and one-way deer gates in preventing deer-vehicle collisions on a section of highway which crosses a deer migration route. All information on this study was gathered by direct and indirect observation. It has been determined that the wide open type of deer crossing system is effective in providing deer a safe passage across the highway. It took three years before the major portion of the herd approached the crossings directly rather than moving to them along the fence. Until that time, every weak spot in the fence was challenged by the deer moving to the structures. Man was the major cause for openings in the crossing system during this study. The opening that accounted for the major portion of the deer killed during the study was a drive through gate, frequently left open by a local rancher. (FHWA)

ORDER FROM:
National Technical Information Service; 5285 Port Royal Road; Springfield, Virginia; 22161; PB81-246795

51 348055

FENCES FOR PROTECTION OF TRAFFIC AND DEER. SUMMARY

Lehtimaki, R

Central Organization for Traffic Safety, Finland; PL 239; 00120 Helsinki 12; Finland; 0355-6670; 951-9431-32-2

Monograph; No. 37/1981; Feb 81; 14p; 1 Fig.; 2 Tab.; 8 Ref.

The effect of 12 short wire-net fences built along the road network on deer accidents and on the movement of deer were studied by accident analysis and observation at the test fences. It was found the number of deer accidents decreases if fences are built, but only where the fences are located there was a corresponding increase in the number of accidents at both ends of the short wire-net fences studied. Thus the short wire net fences have no effect on the total number of deer accidents.
(TRRL)

Transport and Road Research Laboratory; IRRD 258697

51 360126

EVALUATION OF DEER MIRRORS FOR REDUCING DEER VEHICLE ACCIDENTS

PERFORMING AGENCY:
Maine University; Hampden Highlands, Maine; 04445

INVESTIGATOR:
Gilbert

FUNDING AGENCY:
Federal Highway Administration; Environmental Design and Control; 400 7th Street, SW; Washington, D.C.; 20590

AS-Active; RD-Dec 81; SD-09 Sep 77; TF-$8000; FT-Contract; CM-PO-7-3-0152

The study will evaluate the effectiveness of metal mirrors placed along the highway row in reducing deer-vehicle accidents. The operating theory is that car lights reflecting of the mirrors will cause deer to stop as the vehicle passes.

Federal Highway Administration; 298017352; 33F? 82 54; A

52 348119

THE HUMAN FACTOR IN GAME-VEHICLE ACCIDENTS. A STUDY OF DRIVERS' INFORMATION ACQUISITION

Aaberg, L

Uppsala University, Sweden; P.O. Box 227; S-751 05 Uppsala; Sweden; 0586-8858; 91-554-1135-1

Monograph; #No. 6; 91; 130p; 17 Fig.; 15 Tab.; 2 Phot.; Refs.;

The problem of game-vehicle accidents is discussed in terms of driver's strategies for visual search in driving. To find possible measures for reducing the number of wildlife accidents, four studies were undertaken. Initially, two exploratory investigations were made: a survey of drivers' expectancies concerning moose in traffic and a study involving reports of accidents and near-accidents with moose. The results of these investigations give no evidence that drivers' experience, knowledge, or attitude concerning moose are related to wildlife accidents. Instead they suggest that the visual search patterns of drivers might explain some of the effects obtained. In a series of field experiments, drivers' ability to detect moose dummies was explored and in a final study the effectiveness of the game crossing sign was investigated experimentally. The results were interpreted as evidence that in rural driving, drivers normally scan the view ahead in a systematic and almost automatic way which is not effective for the task of detecting moose. Drivers can easily change their automatic scanning into a controlled search for animals but this search is demanding and can probably not be sustained for any length of time without feedback. (TRRL)

Transport and Road Research Laboratory; IRRD 250809
National Swedish Road & Traffic Research Institute