

Report and Summary

Pinelands Science-Policy Forum: Ecological Impact of Roads

November 17, 2010

Purpose: The Forum was devoted to discussion of policy options to address the ecological impacts from roads. The goal was to reach consensus among the participants on a policy agenda that would alter the road design and application process to review and address impacts to plant and animal communities and to require alternative road building designs or strategies as necessary. The Forum focused on actions that can be taken within the Pinelands, but many of the tools discussed could be applied elsewhere.

The scientific basis for seeking effective, comprehensive reform to road construction and management stemmed from Pinelands Preservation Alliance's consultant report on Pine Barrens Roadside Plant Communities and research from the New Jersey Endangered and Non-Game Species Program. This research shows that road construction and roadside management directly alter native plant and wildlife communities, and New Jersey lags far behind other states that have taken significant strides in offering technical aids to road designers and requiring a more comprehensive approach in creating roads that work to reduce or eliminate negative impacts on plant and animal communities. A summary document on the scientific findings to support a new agenda for road construction and approval is in Appendix A.

After the Forum, participants will work on completing a consensus agenda, which they can then take to the public and to state, regional, county and local government leaders in an effort to move the agenda to fruition.

The results summarized here reflect the group's overall direction, but do not show that any given participant agrees with or has committed to the policy and implementation options we discussed. Once a policy agenda has been refined and completed, participants and others will have the opportunity to sign on to the agenda.

Organizers: The Forum was organized by a steering committee of representatives of the Pinelands Preservation Alliance, the Pinelands Commission, Wharton State Forest, New Jersey's Endangered and Non Game Species Program, Michael Van Clef of Ecological Solutions, New Jersey Conserve Wildlife Foundation, New Jersey Conservation Foundation, and the Delaware Valley Regional Planning Commission. The members are listed in Appendix B.

Attendees: The Forum attendees were individuals from a variety of public agencies who review applications for road development and private organizations and institutions who work to protect the plant and wildlife communities in the Pinelands and throughout New Jersey. A list of attendees, and others who were invited but could not attend, is attached as Appendix C. We noted at the start of the Forum that participants had a variety of jobs and affiliations, and specifically that some were employees of government agencies which have not taken formal positions on the policies we were debating. We therefore recognized that a person's statements did not necessarily reflect the position of his or her employer.

Structure: The Forum was structured to maximize discussion and measure consensus. The morning was devoted to roads and plant communities and was facilitated by Michael Van Clef, Ecological Solutions, LLC. The afternoon was devoted to roads and wildlife communities and was led by Dave Golden, NJ Endangered and Non-Game Species Program. We used anonymous key-pad polling to measure and display the group's views of specific policy and implementation options. Facilitators summarized a range of policy options and polled participants on each option; we then broke into smaller groups for further discussion and brainstorming; and finally reconvened for facilitated plenary discussions and re-polling of the group's views of policy and implementation options.

Polling Methodology: The key pad polling was anonymous, and it appears that a few participants did not participate in the polling by their own choice. The possible responses for all polling questions were:

- 1 – Agree and High Priority
- 2 – Agree and Low Priority
- 3 – Agree but not possible/practical
- 4 – Disagree – not effective and/or not worth pursuing

Polling results were immediately displayed for the group as the percentages choosing each answer. The full text of the polling options is attached as Appendix D, and the polling results are attached as Appendix E.

Results: The Forum discussions and polling resulted in a strong consensus on many key points and set clear direction for further work to flesh out details and resolve remaining areas of uncertainty. The points of consensus and uncertainty are summarized below.

For purposes of measuring consensus, we are treating as a point of consensus those options for which 90% or more of participants selected responses of 1, 2 or 3 – meaning they thought it was a good idea. In some cases, however, a large percentage of participants felt the option was not possible or practical (response 3), and those cases are noted in this summary. The points of consensus and uncertainty are summarized below.

Some policy options encompassed the impacts to both plant and animal communities and are highlighted separately below.

A. Roads and Plant and Wildlife Communities:

There was strong support for a number of policy options, including most prominently:

- Various agencies work together in making standards among the agencies consistent.
- Require applicants seeking DEP or Pinelands Commission (PC) permits for road improvement projects (or new road construction) to:
 - submit projects in early phases of design;
 - determine how their projects will impact plant and wildlife communities;

- require construction of roads permeable to wildlife, and
- require use of BMPs and technical aids for designing projects

(There was still debate and uncertainty as to the best way to accomplish the above. Some suggestions considered included using existing authority, changing regulations and creating MOAs among the agencies.)

- Hold a workshop on road impacts and solutions to show how maintenance and construction can be done to conserve natural resources.

There was support for, but also greater concern with practicality regarding:

- Pinelands Commission follows up after permitted development with monitoring and enforcement.

B. State Lands

There was strong support for a number of policy options, including most prominently:

- DEP and/or PC modify policy on permitting Enduro events and similar ORV events on state lands to ensure that rare species and sensitive habitats are not being put at risk during these events.
- DEP and/or PC increase application fees to cover true costs for Enduro and similar ORV events.

There was support for, but also greater concern with practicality regarding:

- Comprehensive measures are adopted to control illegal and irresponsible ORV activities.
- DEP require bonds to cover any costs for repairing damage caused by Enduro events.
- State land managers develop a transportation plan for lands under their jurisdiction that address fire safety, public access, education, and wildlife.
- State land managers provide access plans and related mapping.

C. Roads and Wildlife Communities:

There was strong support for a number of policy options, including most prominently:

- Expand membership in the Roads and Wildlife Working Group to include the Turnpike Authority, County engineers and others.
- DEP and Pinelands Commission work together in developing BMPs and technical aids which would include:

- a model for transportation planners to identify road impacts on wildlife prior to construction;
- searchable database on roads/wildlife conflict areas, road-kill information, and crossing structures, and
- a habitat connectivity map.

D. *Roads and Plant Communities*

There was strong support for a number of policy options, including most prominently:

- PC requires that standard maintenance of road shoulders by all agencies follows PPA's BMP summary.
- Authorities direct that all post-construction re-vegetation practices follow the recommendations outlined in the PPA BMP, i.e., disallow soil amendments and the planting of non-native plant species.
- PC creates a regular system to update/revise comprehensive data and field surveys to identify road segments important to the preservation of rare flora.
- PC establishes MOAs with pertinent agencies (NJDOT, county and municipal road agencies, South Jersey Transit Authority, NJ Turnpike Authority, Soil Conservation Districts) on the standard maintenance regimes as outlined in PPA's BMP.
- DOT and State Soil Conservation committee revise soil conservation standards.
- Promote county and municipal resolutions for road-related issues to include Road BMPs and roadside mowing.
- NJDEP and PC create a plant data sharing agreement to help identify road segments important to the preservation of rare flora.
- Educate the public regarding lawns versus native plants along roads.
- Establish source of native fill for use when grading is needed.

There was support for, but also greater concern with practicality regarding:

- PC develops in-house expertise and capacity to scientifically assess presence or absence of rare plant populations at proposed development sites.
- PC follows up after permitted development with monitoring and enforcement.

Next Steps: The organizing committee has agreed to facilitate next steps towards bringing this consensus-building process to a conclusion and taking the resulting policy agenda into discussions with the public and government agency leaders:

1. The organizing committee will distribute a report of the Forum to participants for their review and comments, which the committee will use to finalize the report.
2. The organizing committee will invite participants to attend meetings and weigh in with government agency leaders regarding implementation of the above policy options.
3. It is understood that some issues, like technical aids, are being actively worked on. We will not organize new efforts to work on these issues, but rather will follow these existing efforts and weigh in as needed.
3. The organizing committee will seek to brief the Pinelands Commission, county officials and municipal governments on the progress of our discussions. The committee will invite other Forum participants to join in these briefings if they wish.
4. The organizing committee will invite participants to join in another gathering to review progress and work on carrying the consensus agenda forward.

Background Data and Statement of Problem:

- According to the Federal Highway Administration, New Jersey has 38,753 miles of paved roads and ranks #1 in having the worst roads in the country, with 48.6 % in poor or mediocre condition. Major road improvement projects are therefore likely in the near future and could provide opportunities for wildlife considerations to be included in road improvement designs.
- Roads create barriers to animal movement and can lead to isolation of animal populations (Forman et al. 2003). Small and slow-moving animals are particularly susceptible to the “barrier effect” of roads, and roads with > 15,000 vehicle trips per day likely serve as complete barriers to the movement of many species of snakes (Andrews & Gibbons 2005); many roads in the Pinelands approach or exceed this traffic volume (Golden et al. 2009).
- Wildlife mortality along roadways can lead to significant reductions in wildlife populations (Row 2007).
- Other impacts of roads and traffic, e.g., visual and audible effects, reduce the suitability of habitat for many species in the proximity of roads. (Parris and Schneider 2008; Eigenbrod, et al. 2009.)
- If placed correctly, culverts and under-road passageways can reduce roadside mortality of wildlife and restore connectivity between habitats (Dodd et al. 2004). Culverts are most effective when used in combination with a barrier system that directs animal movements towards culverts (Beier 2008).
- Correct placement of “ecopassage structures” (e.g. culverts and barrier systems) is best achieved by first identifying mortality, or wildlife crossing, hotspots along roadways (Beier 2008).
- On existing roadways, regular growing season mowing of road shoulders degrades native flora.
- Paved roadway and roadside improvements/expansions include activities that destroy native plants through physical disturbance. The application of enriched soils/fertilizers and lime (e.g., making Pine Barren soils more like non-Pine Barrens soils, resulting in conditions that are more favorable for non-Pine Barrens plants) and non-native plant seeding create long-term adverse conditions for native plants.
- Road shoulders can provide early successional habitat for a variety of rare species as well as many characteristic Pine Barrens plants, but this fact should not be used as a justification for an expanded roadway system.
- Shoulders of existing paved and unpaved roads with associated rare plants are threatened by off road vehicles.
- Invasive species such as Chinese Bushclover and African Lovegrass are listed as recommended for planting on roadsides by the Soil Conservation Districts.
- Expansion of Roadway System:
 - Paving of unpaved roads is not being evaluated for long-term damage to flora and fauna.
 - ORVs are creating new roads (e.g., Enduro events) and/or expanding roads. Other disturbances that were intended to be temporary (e.g., access roads for fire suppression), have become permanent.
- Characteristic Pinelands soils are highly acidic and nutrient poor, providing unique habitats for the native plants and animals in the region. Fertilizer and lime disrupt the conditions native plants and animals need to thrive. Adding such chemicals can invite non-native and often invasive species to move in. <http://www.state.nj.us/pinelands/infor/yard/>
- In 2009, the Pinelands Preservation Alliance sponsored the preparation of a report entitled “Best Management Practices of Pine Barrens Roadside Plant Communities”, which summarizes existing conditions/policies and provides recommendations to improve roadside native plant communities. The report and other related information can be found at: (<http://www.pinelandsalliance.org/protection/work/currentissues/roadsidevegetation/>). The BMP summary is provided below.

Appendix A: Background Data and Statement of Problem

- Existing roadsides in the Pine Barrens account for nearly 10,000 acres of early successional habitat. Many thousands of acres are not yet being managed to maximize early successional habitat for Pine Barrens flora.
- Numerous rare and characteristic Pine Barrens plants and plant communities have been destroyed or degraded by current roadside management regimes. Although an exact figure has not been documented, local botanists are aware of many such instances (See BMP Report pages 14-15)
- The Pinelands Commission has met with state and private botanists to review existing data on rare plant occurrences along roadsides. The Commission has acknowledged the importance of roadside plant communities through a press release in May 2010, which includes a summary of its roadside management standards. See:
http://www.state.nj.us/pinelands/images/pdf%20files/press/PR_RoadsidePlantsPractices.pdf
- The Pinelands Commission has entered into memoranda of agreement (MOAs) with Pine Barrens counties that are intended to guide certain roadside management/expansion activities.

Summary Best Management Practices for Pine Barrens Roadside Plant Communities

Road Construction, Maintenance, and Drainage Materials

- Avoid or minimize disturbance to existing native roadside vegetation
- Do not apply paving, underlayment or roadside fill materials that may raise soil pH or increase soil nutrients

Mowing and Maintenance Regimes

1. Areas within 8 Feet of Traveled Lane Edge (Operational Zone)

- Regular, repeated mowing during growing season (mow as necessary to maintain vegetation height between 6-10 inches)
- Do not apply fertilizer or soil amendments
- Do not mow bare or sparsely vegetated areas at all. This will enhance natural plant growth and reduce soil erosion caused by mower wheels.
- SPECIAL EXCEPTION TO REGULAR MOWING: Rare plant populations within 8 feet of traveled lane edge warrant special mowing regimes. Ideally, mowing should occur annually in March at no lower than 6 inches. These isolated areas require permanent markings to avoid inadvertant mowing during the growing season.

2. Areas greater than 8 Feet from Traveled Lane Edge (Clear and Transitional Zones)

- Annual dormant season mowing to edge of Undistrubed Zone (i.e., forest edge)
- Mowing from November 30th to March 30th at 6" height to eliminate woody plants and maintain herbaceous plant cover by allowing full plant life cycle (i.e., growth, flowering, seed production/dispersal, seedling establishment)

Post-Disturbance Restoration Regimes

1. In all cases ...

- Create necessary grade to minimize potential soil erosion
- Address soil compaction, if necessary
- Do not apply non-Pine Barrens fill material, fertilizer or soil amendments

2. If standard calculation indicates low soil erosion potential, then ...

- Allow natural colonization by local native species
- Follow above mowing and maintenance guidelines

3. If standard calculation indicates moderate or high soil erosion potential, then ...

- Utilize biodegradable erosion control products/techniques that hold soil during natural colonization by local native plant community
- Allow natural colonization by local native species
- Re-apply temporary erosion control measures until native vegetation is sufficiently established.
- Follow above mowing and maintenance guidelines

References

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- Row, J. R., G. Blouin-Demers, and P. J. Weatherhead. 2007. Demographic effects of road mortality in black ratsnakes (*Elaphe obsoleta*). *Biological Conservation* 137:117–124.
- The National Academy of Sciences (NAS) Strategic Highway Research Partnership (SHRP) C06, *The Case for MPO Implementation of an Ecosystem Approach to Transportation Planning*.

Appendix B: Steering Committee Members

November 17, 2010

Rob Auermuller	Wharton State Forest
John Bunnell	Pinelands Commission
Emile DeVito	New Jersey Conservation Foundation
Dave Golden	New Jersey's Endangered and Non-Game Species Program
Chris Linn	Delaware Valley Regional Planning Commission
Margaret O'Gorman	New Jersey Conserve Wildlife Foundation
Michael Van Clef	Ecological Solutions, LLC
Russell Juelg	Pinelands Preservation Alliance
Jaclyn Rhoads	Pinelands Preservation Alliance

Appendix C: Forum Invites and Attendees
November 17, 2010

Affiliation	Attended	LastName	FirstName
Pinelands Commissioner	X	Ashmun	Candace
Wharton State Forest	X	Auermuller	Robert
Drexel University	X	Bien, Ph.D.	Walt
NJ Department of Transportation	X	Bird	Robert
Pinelands Preservation Alliance	X	Bizub	Richard
Pinelands Commission Science Office	X	Bunnell	John
New Jersey Department of Transportation	X	Caruso	George
NJ Department of Transportation	X	Ciaruffoli	Nancy
NJ Audubon	X	Conrad	Suzanne
Pinelands Commission	X	Deman	Ernie
NJ Department of Transportation	X	Desai	Alkesh
New Jersey Conservation Foundation	X	DeVito	Emile
Maser Consulting	X	Ferren	Wayne
PB	X	Folli	Michael
DEP Endangered and Nongame Species P	X	Golden	Dave
Pine Barrens Inventories	X	Gordon	Ted
New Jersey Department of Transportation	X	Hawkinson	Bruce
New Jersey Department of Transportation	X	House	Connie
New Jersey Department of Transportation	X	Hunger	Brett
Pinelands Preservation Alliance	X	Hunninghake	Michael
	X	Jackson	Robert
NJ Conservation Foundation	X	Juelg	Russell
Pinelands Commission Science Office	X	Laidig	Kim
Rutgers University	X	Lathrop	Dr Richard
Pinelands Preservation Alliance	X	Lettman	Theresa
Delaware Valley Regional Planning Commission	X	Linn	Chris
New Jersey Audubon Society	X	Lynch	Jean
US Fish and Wildlife Service	X	Mars	Steven
Pinelands Preservation Alliance	X	Montgomery	Carleton
Brooklyn Botanic Gardens	X	Moore	Gerry
Ocean County Engineering Department	X	Murphy	Rebecca
NJ Department of Transportation	X	Nowak	Jason
Conserve Wildlife Foundation of New Jersey	X	O'Gorman	Margaret
Ocean County	X	Pirozek	Joe
College of New Jersey	X	Reinert	Howard
Pinelands Preservation Alliance	X	Rhoads	Jaclyn
	X	Rosenson	Leon

Appendix C: Forum Invites and Attendees
November 17, 2010

Affiliation	Attended	LastName	FirstName
New Jersey Department of Transportation	X	Saylor	Thomas
New Jersey Department of Transportation	X	Scelsi	Paula
US Fish and Wildlife Service	X	Scherer	Annette
New Jersey Department of Transportation	X	Shaw	Richard
	X	Smith	Kevin
	X	Smith	Ron
PB	X	Stanker	Darren
NJ Audubon Society	X	Tsipoura	Nellie
Ecological Solutions	X	VanClef	Michael
Drexel University	X	Ward	Dane
NJDEP	X	Zarate	Brian
Great Egg Harbor Watershed Association		Akers	Fred
The Nature Conservancy		Allen	Bob
New Jersey State Park Police		Arroyo	Rick
		Arsenault	Joe
Federal Highway Administration		Brillhart	Sandra
The Nature Conservancy		Brummer	Barbara
Rutgers University		Burger	Joanna
New Jersey Conservation Foundation		Byers	Michele
DEP Natural Areas and Heritage Programs		Cartica	Bob
New Jersey Department of Transportation		Cebrick	Robert
NJDEP		Chanda	Dave
Bass River State Forest		Coritz	Cynthia
Department of Environmental Protection		Cradic	Amy
Richard Stockton College		Cromartie	Jamie
Federal Highway Administration		Cullari	Lawrence
Pinelands Field Station		Dighton	John
American Littoral Society		Dillingham	Tim
South Jersey Transportation Authority		Donelson	Sam
New Jersey Department of Transportation		Earl	David
Rutgers University		Ehrenfeld	Dr. Joan
New Jersey Audubon Society		Ettel	Troy
		Ficcaglia	Leslie
New Jersey Department of Transportation		Fittipaldi	Janet
NJDEP		Fleming	Lynn
Harvard University		Forman	Richard
NJDEP		Fowles	Gretchen

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Affiliation	Attended	LastName	FirstName
Ocean County Soil Conservation District		Friedman	David
New Jersey Forest Fire Service		Gablks	Maris
New Jersey Department of Transportation		Garrett	Pamela
Richard Stockton College		Geller, Ph.D.	Michael
Trust for Public Land		Gilbert	Tom
South Jersey Transportation Authority		Gordon	Sharon
Pinelands Field Station		Gray	Dennis
New Jersey Department of Transportation		Green	Elkins
Pinelands Commission		Grogan	Susan
Georgian Court University		Gross	Michael
Rowan University		Hasse	John
		Heasley	Anne
NJDEP		Heilferty	John
Pinelands Commission		Horner	Chuck
New Jersey Department of Transportation		James	Bernard
NJ Division of Fish and Wildlife		Jenkins	David
NJDEP		Kaplan	Marjorie
Ramapo College of New Jersey		Karlin	Eric
NJDEP		Keck	Tom
Raritan Valley Community College		Kelly	Jay
		Kennedy	Daniel
New Jersey Department of Transportation		Kingsland	William
Pinelands Commission		Liggett	Larry
Columbia Law School Environmental Law Clinic		Lloyd	Ed
New Jersey Department of Transportation		Marshall	Robert
Belleplain State Forest		McCay	Lorraine
New Jersey Department of Transportation		Mikhael	Salim
NJ State Soil Conservation Committee		Minch	Frank
New Jersey Conservation Foundation		Mitchell	Alison
NJ Audubon		Mooij	Kelly
		Moore	Dave
		Niles	Larry
The Nature Conservancy		Noe	Damon
Burlington County		Nooney	Erin
		Olson	Bill
Columbia University		Palmer	Matt
Rowan University		Patterson	Gary
NJDEP		Petrongolo	Tony

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Affiliation	Attended	LastName	FirstName
Island Beach State Park		Pitchell	Mark
Cape-Atlantic Soil Conservation District		Reilly	David
University of Pennsylvania		Rhoads	Dr. Ann
New Jersey Department of Transportation		Rich	Lynn
		Rittler Sanchez	Jessica
Federal Highway Administration		Sabidussi	Tony
NJDEP		Schell	Christine
Academy of Natural Sciences		Schuyler	Ernie
Herpetological Associates		Schweitzer	Dale
NJ State Soil Conservation Committee		Showler	John
New Jersey Department of Transportation		Smith	Wendy
Department of Environmental Protection		Snyder	David
New Jersey Audubon Society		Stiles	Eric
Pinelands Commission		Stokes	John
Atlantic County Department of Public Works		Tillett	Harry
New Jersey State Parks		Trontis	John
		Tucker	Robert
Department of Environmental Protection		Walz	Kathy
NJDEP		Welch	Charlie
The Nature Conservancy		Wells	Tom
New Jersey Department of Environmental Protection		Williams	Elena
DEP Natural Areas and Heritage Programs		Windisch	Andy
Montclair University		Wu	Mei Yin
Pinelands Commission Science Office		Young	Karen
Herpetological Associates		Zappalorti	Bob
Richard Stockton College		Zimmerman	George

This Forum seeks to develop policy measures to protect Pine Barrens flora from the impacts of roadways and off-road motorized vehicle (ORV) traffic. This discussion paper was developed by Michael Van Clef, Ph.D. from Ecological Solutions.

The Challenge

- Existing Roadways:
 - Regular growing season mowing of road shoulders degrades native flora
 - Paved roadway and roadside improvements/expansions include activities that destroy native plants through physical disturbance. The application of enriched soils/fertilizers and lime (e.g., making Pine Barren soils more like non-Pine Barrens soils, resulting in conditions that are more favorable for non-Pine Barrens plants) and non-native plant seeding create long-term adverse conditions for native plants.
 - Road shoulders can provide early successional habitat for a variety of rare species as well as many characteristic Pine Barrens plants, but this fact should not be used as a justification for an expanded roadway system.
 - Shoulders of existing paved and unpaved roads with associated rare plants are threatened by ORVs.
 - Invasive species such as Chinese Bushclover and African Lovegrass are listed as recommended for planting on roadsides by the Soil Conservation Districts.
- Expansion of Roadway System:
 - Paving of unpaved roads is not being evaluated for long-term damage to flora and fauna.
 - ORVs are creating new roads (e.g., Enduro events) and/or expanding roads. Other disturbances that were intended to be temporary (e.g., access roads for fire suppression), have become permanent.

Background Data

- Characteristic Pinelands soils are highly acidic and nutrient poor, providing unique habitats for the native plants and animals in the region. Fertilizer and lime disrupt the conditions native plants and animals need to thrive. Adding such chemicals can invite non-native and often invasive species to move in. <http://www.state.nj.us/pinelands/infor/yard/>
- In 2009, the Pinelands Preservation Alliance sponsored the preparation of a report entitled “Best Management Practices of Pine Barrens Roadside Plant Communities”, which summarizes existing conditions/policies and provides recommendations to improve roadside native plant communities. The report and other related information can be found at: [\(http://www.pinelandsalliance.org/protection/work/currentissues/roadsidevegetation/\)](http://www.pinelandsalliance.org/protection/work/currentissues/roadsidevegetation/).
 - Existing roadsides in the Pine Barrens account for nearly 10,000 acres of early successional habitat. Many thousands of acres are not yet being managed to maximize early successional habitat for Pine Barrens flora.
 - Numerous rare and characteristic Pine Barrens plants and plant communities have been destroyed or degraded by current roadside management regimes. Although an exact figure has not been documented, local botanists are aware of many such instances (See BMP Report pages 14-15)
- The Pinelands Commission has met with state and private botanists to review existing data on rare plant occurrences along roadsides. The Commission has acknowledged the importance of roadside plant communities through a press release in May 2010, which includes a summary of its roadside management standards. See: http://www.state.nj.us/pinelands/images/pdf%20files/press/PR_RoadsidePlantsPractices.pdf

Appendix D: Discussion Paper and Polling Options for Plants

- The Pinelands Commission has entered into memoranda of agreement (MOAs) with Pine Barrens counties that are intended to guide certain roadside management/expansion activities.
- The Pinelands Preservation Alliance website contains extensive information regarding off road vehicles at: <http://www.pinelandsalliance.org/protection/work/currentissues/offroadvehicles/>

Policy Options

1. Pinelands Commission increases scrutiny of development applications on behalf of protected plant populations.
2. Pinelands Commission requires that standard maintenance of road shoulders by all agencies follows the BMP summary as published at http://www.state.nj.us/pinelands/images/pdf%20files/press/PR_RoadsidePlantsPractices.pdf
3. Authorities direct that all post-construction re-vegetation practices follow the recommendations outlined in the PPA BMP, i.e., disallow soil amendments and the planting of non-native plant species. The PPA BMP Report (see below) contains a one-page summary of best management practices regarding road construction, maintenance, and drainage materials, mowing and maintenance regimes, and post-disturbance restoration regimes.
4. Comprehensive measures are adopted to control illegal and irresponsible ORV activities. The Pinelands Preservation Alliance has developed a set of 13 recommendations (Downloadable at: http://www.pinelandsalliance.org/downloads/pinelandsalliance_466.pdf). These documents provide proactive and reactive options.
5. NJDEP develops and implements restoration plans for degraded areas. Areas that have been degraded by soil amendments and cultivation of non-native plants and especially areas containing non-native fill could be mapped, and restoration potential examined to provide a prioritized project list. A pilot project has recently been conducted by NJDOT, the goal of which was to remove non-Pine Barrens fill material from a degraded roadside, back-fill with Pine Barrens soil, and re-landscape with characteristic Pine Barrens plants. This project should be carefully evaluated so that lessons may be applied to future projects.
6. Create a regular system to update/revise comprehensive data and field surveys to identify road segments important to the preservation of rare flora: Rare plant occurrences are tracked by the NJ Natural Heritage Program. Additional data was provided by local botanists to the Pinelands Commission in 2009. This information has been mapped by the Pinelands Commission using GIS, and the Commission has indicated that the polygons are to be marked with road-side signage.

Implementation Options

1. Pinelands Commission
 - a. uses existing authority to protect roadside vegetation (see 7:50-6.21 et. seq.).
 - b. requires a scientific assessment by the developer to determine presence or absence of rare plant populations at proposed development sites.
 - c. develops in-house expertise and capacity to scientifically assess presence or absence of rare plant populations at proposed development sites.

Appendix D: Discussion Paper and Polling Options for Plants

- d. establishes MOAs with pertinent agencies (NJDOT, county and municipal road agencies, South Jersey Transit Authority, NJ Turnpike Authority, Soil Conservation Districts) on the standard maintenance regimes as outlined in PPA's BMP.
2. Re-vegetation practices:
 - a. Pinelands Commission uses existing authority to redirect soil conservation measures
 - b. Pinelands Commission establishes MOAs to accomplish this
 - c. State Soil Conservation Committee revises standards
 - d. DOT revises standards
3. Promote county and municipal resolutions for road-related issues to include:
 - a. Road BMPs, and
 - b. Roadside mowing
 - i. Expand existing county and municipal agreements that are currently pilots or limited in scope
 - ii. Develop agreements with other private landowners that independently mow roadsides when they are not mowed by government entities
4. Control illegal ORV activity:
 - a. NJDEP cracks down:
 - i. Issues a policy directive similar to Commissioner Campbell's directive in 2002 that off-road vehicle traffic (i.e., people driving where they are not permitted) will not be tolerated on state land.
 - ii. Directs all law enforcement agencies to strictly enforce state lands regulations regarding motor vehicles, so that costs for damages to state-owned land can be recuperated from these offenders.
 - b. Judges regularly issue penalties stiff enough to function as deterrents.
 - c. The New Jersey Forest Fire Service establish a policy of blocking access to roads that were created in the course of fighting fires and that are not necessary routes of access for fighting fires in the future. Any roads that were created for fighting fire and that are maintained strictly for that purpose should be gated.
 - d. State lands authorities:
 - i. maintain "No Motorized Vehicles" signs at points where people are liable to gain access to areas off limits.
 - ii. provide access plans and related mapping.
 - iii. shut off access to damaged areas.
 - iv. develop volunteer programs to help accomplish i-iii.
5. NJDEP
 - a. allocates existing resources to produce and execute restoration plans
 - b. develops partnerships with NGO's to fund development and execution of restoration plans
6. NJ DEP and Pinelands Commission create a plant data share agreement to help identify road segments important to the preservation of rare flora.

References

See text above.

Summary Best Management Practices for Pine Barrens Roadside Plant Communities

Road Construction, Maintenance, and Drainage Materials

- Avoid or minimize disturbance to existing native roadside vegetation
- Do not apply paving, underlayment or roadside fill materials that may raise soil pH or increase soil nutrients

Mowing and Maintenance Regimes

1. Areas within 8 Feet of Traveled Lane Edge (Operational Zone)

- Regular, repeated mowing during growing season (mow as necessary to maintain vegetation height between 6-10 inches)
- Do not apply fertilizer or soil amendments
- Do not mow bare or sparsely vegetated areas at all. This will enhance natural plant growth and reduce soil erosion caused by mower wheels.
- SPECIAL EXCEPTION TO REGULAR MOWING: Rare plant populations within 8 feet of traveled lane edge warrant special mowing regimes. Ideally, mowing should occur annually in March at no lower than 6 inches. These isolated areas require permanent markings to avoid inadvertant mowing during the growing season.

2. Areas greater than 8 Feet from Traveled Lane Edge (Clear and Transitional Zones)

- Annual dormant season mowing to edge of Undistrubed Zone (i.e., forest edge)
- Mowing from November 30th to March 30th at 6" height to eliminate woody plants and maintain herbaceous plant cover by allowing full plant life cycle (i.e., growth, flowering, seed production/dispersal, seedling establishment)

Post-Disturbance Restoration Regimes

1. In all cases ...

- Create necessary grade to minimize potential soil erosion
- Address soil compaction, if necessary
- Do not apply non-Pine Barrens fill material, fertilizer or soil amendments

2. If standard calculation indicates low soil erosion potential, then ...

- Allow natural colonization by local native species
- Follow above mowing and maintenance guidelines

3. If standard calculation indicates moderate or high soil erosion potential, then ...

- Utilize biodegradable erosion control products/techniques that hold soil during natural colonization by local native plant community
- Allow natural colonization by local native species
- Re-apply temporary erosion control measures until native vegetation is sufficiently established.
- Follow above mowing and maintenance guidelines

Roads and Wildlife

This discussion will be led by Dave Golden from NJ DEP's Endangered and Non-Game Species Program, who has prepared the following material:

Background:

- According to the Federal Highway Administration, New Jersey has 38,753 miles of paved roads and ranks #1 in having the worst roads in the country, with 48.6 % in poor or mediocre condition. Major road improvement projects are therefore likely in the near future and could provide opportunities for wildlife considerations to be included in road improvement designs.
- Roads create barriers to animal movement and can lead to isolation of animal populations (Forman et al. 2003). Small and slow-moving animals are particularly susceptible to the “barrier effect” of roads, and roads with > 15,000 vehicle trips per day likely serve as complete barriers to the movement of many species of snakes (Andrews & Gibbons 2005); many roads in the Pinelands approach or exceed this traffic volume (Golden et al. 2009).
- Wildlife mortality along roadways can lead to significant reductions in wildlife populations (Row 2007).
- Other impacts of roads and traffic, e.g., visual and audible effects, reduce the suitability of habitat for many species in the proximity of roads. (Parris and Schneider 2008; Eigenbrod, et al. 2009.)
- If placed correctly, culverts and under-road passageways can reduce roadside mortality of wildlife and restore connectivity between habitats (Dodd et al. 2004). Culverts are most effective when used in combination with a barrier system that directs animal movements towards culverts (Beier 2008).
- Correct placement of “ecopassage structures” (e.g. culverts and barrier systems) is best achieved by first identifying mortality, or wildlife crossing, hotspots along roadways (Beier 2008).

Policy:

1. DEP and/or Pinelands Commission require applicants seeking permits for road improvements or new road construction:
 - a. to submit projects in early phases of design, so that projects can be comprehensively reviewed for ecological impacts and suggestions can be made to decrease any negative impacts identified.
 - b. to formally and thoroughly address how their proposed project will adversely impact wildlife (mortality, discontinuity of movement, noise, visual impacts, etc.).
 - c. to require applicants to construct roads that are permeable to wildlife and require infrastructure improvements that will reduce wildlife mortality along roadways. <http://www.maine.gov/mdot/environmental-office-homepage/fishpassage/3rd%20edition%20-%20merged%20final%20version%207-01-08a1.pdf>

- d. to use BMPs and/or technical manuals to aid the design of roads/structures to reduce adverse impacts to wildlife.
http://corridordesign.org/dl/docs/corridordesign.org_BMPs_for_Corridors.pdf
2. DEP and/or the Pinelands Commission develop technical aids to assist road applicants:
 - a. Searchable database of road-killed wildlife locations that will aid planners and resource agencies in identifying wildlife mortality hotspots along roadways. Consideration should be given to using volunteers to collect these data (e.g. <http://linkinglandscapes.info/roads/home.html>) or asking DOT maintenance crews to collect these data during their regular maintenance activities.
 - b. Searchable database to store information on existing “crossing structures” for wildlife as well as other projects where accommodations for wildlife were made along roads during or after construction.
 - c. Screening tool for transportation planners and regulators to identify potential road/wildlife conflict areas so that wildlife considerations can be either: 1) incorporated into road projects during the planning state; or 2) required during the permitting process.
 - d. Statewide habitat connectivity map for wildlife in New Jersey. Similar maps have been developed by many other states and help to identify key habitat linkages that have either: 1) been broken by roads and are in need of restoration; or 2) remain intact and should be maintained for long-term habitat connectivity.
http://www.azdot.gov/Highways/OES/AZ_WildLife_Linkages/assessment.asp
3. State land managers develop a transportation plan (or multiple plans) for lands under their jurisdiction that address fire safety, public access, and wildlife. (e.g. <http://www.nps.gov/dena/parkmgmt/roadvehmgteis.htm>)
 - a. All other roads/areas would be de facto ‘off limits.’
 - b. “No motorized vehicles” signage for off-limits areas should be maintained cooperatively with the state park personnel, state park police, and volunteers.
4. DEP and/or Pinelands Commission modify policy on permitting enduro events and similar ORV events on state lands to ensure that rare species and sensitive habitats are not being put at risk during these events.

Implementation:

Policy 1

1. The State empowers the Pinelands Commission with the authority to review transportation plans well in advance of execution in order to conduct a full range environmental assessment and require applicants to implement measures as identified in the policy options above. This helps in altering transportation projects to minimize impact on or avoid environmentally sensitive areas.

- For example, DVRPC, Florida Metropolitan Planning Organizations (MPOs), and others are part of a new way of doing business in transportation and environmental planning. These agencies conduct environmental screening before proposals have been shortlisted. By going beyond regulated resources, the environmental screening that MPOs are inclined to perform encompasses all areas identified as important for natural resource conservation and preservation. . (*The Case for MPO Implementation of an Ecosystem Approach to Transportation Planning.*)
- 2. The Pinelands Commission creates an MOA with transportation agencies, counties and municipalities to implement early review of transportation plans and other requirements as identified in policy options #1 above.

Policy 2

- 3. DEP and Pinelands Commission work together in sharing data to create technical aids for transportation planners and road applicants.

Policy 3

- 4. State lands managers work with NGOs and other agencies to find funding to develop transportation plans.
- 5. The State allocates money to land managers for transportation plans on state lands.

Policy 4

- 6. DEP and Pinelands Commission require the following changes to applications for enduro/ORV events:
 - a. Increase application fees to cover the true costs of reviewing the plans before and after approval.
 - b. Require bonds to cover any costs for repairing damage caused by the events.
 - c. Require an agency review of the course following the event.

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Eigenbrod, F., S. J. Hecnar, and L. Fahrig. 2009. Quantifying the road-effect zone: threshold effects of a motorway on anuran populations in Ontario, Canada. *Ecology and Society* **14**(1): 24. [online] URL: <http://www.ecologyandsociety.org/vol14/iss1/art24/>

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The National Academy of Sciences (NAS) Strategic Highway Research Partnership (SHRP) C06, *The Case for MPO Implementation of an Ecosystem Approach to Transportation Planning*.

Appendix E: Vegetation Policy and Implementation Options
Polling Results

Pinelands Science-Policy Forum: Ecological Impact of Roads
November 17, 2010

Vegetation Policy Options	1 - Agree and High Priority	2 - Agree and Low Priority	3 - Agree, but not practical	4 - Disagree
1. Pinelands Commission increases scrutiny of development applications on behalf of protected plant populations.	51%	14%	11%	23%
2. Pinelands Commission requires that standard maintenance of road shoulders by all agencies follows PPA's BMP summary	73%	14%	8%	5%
3. Authorities direct that all post-construction re-vegetation practices follow the recommendations outlined in the PPA BMP, i.e., disallow soil amendments and the planting of non-native plant species.	84%	11%	3%	3%
4. Comprehensive measures are adopted to control illegal and irresponsible ORV activities.	64%	6%	22%	8%
5. NJDEP develops and implements restoration plans for degraded areas.	29%	35%	24%	12%
6. Create a regular system to update/revise comprehensive data and field surveys to identify road segments important to the preservation of rare flora	78%	11%	8%	3%
7. Commission follows up after permitted development with monitoring and enforcement.	57%	11%	26%	6%
8. BMPs include plans for salting and chipping on roads	60%	17%	6%	17%
Vegetation Implementation Options				
1. Pinelands Commission				
a. Uses existing authority to protect roadside vegetation.	71%	14%	6%	9%
b. Requires a scientific assessment by the developer to determine presence or absence of rare plant populations at proposed development sites.	61%	6%	14%	19%
c. Develops in-house expertise and capacity to scientifically assess presence or absence of rare plant populations at proposed development sites.	54%	9%	29%	9%
d. Establishes MOAs with pertinent agencies (NJDOT, county and municipal road agencies, South Jersey Transit Authority, NJ Turnpike Authority, Soil Conservation Districts) on the standard maintenance regimes as outlined in PPA's BMP.	79%	15%	0%	6%
2. Re-vegetation Practices:				
a. PC uses existing authority to redirect soil conservation measures.	78%	9%	6%	6%
b. PC establishes MOAs to accomplish this.	74%	9%	6%	11%

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Polling Results

Pinelands Science-Policy Forum: Ecological Impact of Roads
November 17, 2010

Vegetation Policy Options	1 - Agree and High Priority	2 - Agree and Low Priority	3 - Agree, but not practical	4 - Disagree
c. State Soil Conservation Committee revises standards.	86%	6%	6%	3%
d. DOT revises standards.	74%	11%	6%	9%
3. a. Promote county and municipal resolutions for road-related issues to include Road BMPs and roadside mowing.	81%	11%	5%	3%
b. Develop agreements with other private landowners that independently mow roadside when they are not mowed by government entities.	23%	31%	34%	11%
4. a. NJ DEP issues a policy directive that ORV traffic will not be tolerated on state land and direct all law enforcement to strictly enforce regulations.	56%	8%	25%	11%
b. Judges regularly issue penalties stiff enough to function as deterrents.	61%	11%	18%	11%
c. NJ Forest Fire Service establish a policy of blocking access to roads that are not necessary routes of access for fighting fires in the future.	35%	16%	27%	22%
d. State land authorities maintain no motorized vehicles signs	42%	13%	29%	16%
e. State land authorities provide access plans and related mapping	50%	32%	12%	6%
f. State land authorities shut off access to damaged areas	56%	8%	17%	19%
g. State land authorities develop volunteer programs to help accomplish this.	55%	16%	16%	13%
5. a. NJDEP allocates existing resources to produce and execute restoration plans.	18%	32%	34%	16%
b. NJDEP develops partnerships with NGOs to fund development and execution of restoration plans.	53%	26%	8%	13%
6. NJDEP and PC create a plant data share agreement to help identify road segments important to the preservation of rare flora.	92%	6%	3%	0%
7. Campaign of intense ticketing to bear down on ORV abuse.	63%	3%	18%	16%
8. Various agencies work together in making standards among the agencies consistent.	84%	3%	11%	3%
9. Educate the public regarding lawns versus native plants along roads.	66%	17%	9%	9%
10. Establish source of native fill for use when grading is needed.	83%	6%	8%	3%

Appendix E: Vegetation Policy and Implementation Options
 Polling Results

Pinelands Science-Policy Forum: Ecological Impact of Roads
 November 17, 2010

Vegetation Policy Options	1 - Agree and High Priority	2 - Agree and Low Priority	3 - Agree, but not practical	4 - Disagree
11. Revise existing MOA between DOT and Pinelands Commission to incorporate practices that protect and support native plants along the roads.	80%	14%	0%	6%

Appendix E: Wildlife Policy and Implementation Options
Polling Results

Pinelands Science-Policy Forum: Ecological Impact of Roads
November 17, 2010

Wildlife Policy Options	1 - Agree and High Priority	2 - Agree and Low Priority	3 - Agree, but not practical	4 - Disagree
1. a. Require applicants seeking DEP or Pinelands Commission permits for road improvement projects (or new road construction) to submit projects in early phases of design.	72%	9%	9%	9%
b. Require applicant seeking DEP or Pinelands Commission permits for road improvement projects to determine how their project will adversely impact wildlife.	77%	13%	0%	10%
c. Require applicants to construct roads that are permeable to wildlife and reduce wildlife mortality	84%	3%	6%	6%
d. Require use of BMPs or technical manuals to aid the design of roads and structures.	83%	10%	7%	0%
2. a. DEP and Pinelands Commission develop technical aids to assist road applicants by creating a searchable database of road-killed wildlife locations.	84%	9%	6%	0%
b. DEP and PC create a searchable database to store information on existing "crossing structures" for wildlife as well as other projects where accommodations for wildlife were made along roads during or after construction.	75%	25%	0%	0%
c. DEP and PC create a screening tool for transportation planners and regulators to identify potential road/wildlife conflict areas.	83%	17%	0%	0%
d. DEP and PC develop technical aids to assist road applicants by creating a statewide habitat connectivity map for wildlife.	77%	19%	3%	0%
e. NJ DEP create a model for transportation planners to identify road impacts on wildlife prior to construction.	64%	21%	11%	4%
3. State land managers develop a transportation plan for lands under their jurisdiction that address fire safety, public access, education, and wildlife.	53%	23%	23%	0%

Appendix E: Wildlife Policy and Implementation Options
Polling Results

Pinelands Science-Policy Forum: Ecological Impact of Roads
November 17, 2010

Wildlife Policy Options	1 - Agree and High Priority	2 - Agree and Low Priority	3 - Agree, but not practical	4 - Disagree
4. DEP and/or PC modify policy on permitting enduro events and similar ORV events on state lands to ensure that rare species and sensitive habitats are not being put at risk during these events.	79%	6%	6%	9%
5. State transportation agencies, PC, planners and MPOs create a transportation vision for the Pinelands that outlines and evaluates future transportation plans and these plans impacts on natural resources.	47%	20%	20%	13%
Wildlife Implementation Options				
1. a. State empowers the PC with the authority to review transportation plans well in advance of execution.	53%	13%	13%	20%
b. PC enforces pre-application requirements for road applicants to consult with Commission during scoping phase of projects.	60%	17%	7%	17%
c. DEP changes regs to require applicants to submit pre-apps for road projects.	63%	10%	10%	17%
2. PC creates an MOA with transportation agencies, counties and municipalities to implement early review of transportation plans and other requirements as identified in policy option 1.	61%	13%	13%	13%
3. DEP and PC work together and share data to create technical aids for transportation planners and road applicants.	88%	9%	3%	0%
4. a. State land managers with with NGOs and other agencies to find funding to develop transportation plans for state lands.	45%	32%	3%	19%
b. State allocates money to land managers for transportation plans on state land.	38%	13%	28%	22%
5. DEP and PC require applications for ORV/enduro Events to:				
a. Increase application fees to cover true costs	78%	19%	0%	3%
b. Require bonds to cover any costs for repairing damage caused by events.	73%	7%	7%	13%

Appendix E: Wildlife Policy and Implementation Options
Polling Results

Pinelands Science-Policy Forum: Ecological Impact of Roads
November 17, 2010

Wildlife Policy Options	1 - Agree and High Priority	2 - Agree and Low Priority	3 - Agree, but not practical	4 - Disagree
6. PC and NJDEP develop protocols specific to Pinelands for creating habitat connectivity map	70%	27%	3%	0%
7. Require user fee for anybody to drive on unpaved roads on state lands (this fee could fund enforcement of illegal ORV activity)	45%	13%	10%	32%
8. Hold a workshop on roads impacts and solutions to show how maintenance and construction can be done to conserve natural resources	73%	10%	7%	10%
9. Expand membership in the Roads and Wildlife Working Group to include the Turnpike Authority, County engineers and others.	83%	10%	3%	3%