

**From:** [Scott Pitta](#)  
**To:** [DNR Kohler Proposal](#)  
**Subject:** public input on Kohler project  
**Date:** Saturday, July 09, 2016 6:11:44 AM

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*In other words - - the DNR is reviewing a project for which no permit to build has been applied. And is asking for public comment on the draft EIS for a project not yet formally submitted for permitting.*

*Such is part of a post that showed p in my newsfeed.*

*I ask that a formal application is made before the department proceeds on this project.*

*I also ask that a complete archaeological survey be made by the department with a tribal historic preservation officer and not by one hired by Kohler.*

*No land owned by the DNR should be sold to Kohler and no wetlands should be destroyed in this project.*

*Scott Pitta  
2919 14th Ct.  
Wisconsin Dells, WI  
53965*

**From:** [Lisa](#)  
**To:** [DNR Kohler Proposal](#)  
**Subject:** public input  
**Date:** Monday, August 22, 2016 10:27:32 AM  
**Attachments:** [Kohler-Letter-Aug2016.pdf](#)

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To the Wisconsin DNR

I am seriously concerned about this proposed golf course for the following reasons:

- If it is like Whistling Straits, there will be long fairways built out into the lake held up by big manmade walls. This causes danger to adjacent shorelines if and when lake levels rise, causing more erosion to Town of Wilson property owners and to the state park dunes.
- A Maritime Task Force member proposing a NOAA maritime sanctuary in the waters here have said that this proposed golf course would be detrimental to the health of Lake Michigan, when he spoke to a group in Sheboygan this summer.
- When wetlands are filled in water will flow elsewhere. I live two blocks from the Black River and Kohler property. The lower part of my yard is wet every few years. Where would the water go in the case of an excessive rainfall like recently experienced up north, or during an extended rainy period?
- I believe that it is morally wrong to allow a private company to create access to an exclusive for-profit golf course through our state park and to destroy or use any state land. What kind of precedent would this set?
- It is terrible to even consider that land adjacent to a state park with signs that tell people to stay off the sensitive dunes would be trampled by hundreds of thousands of people during a tournament.
- This is an important bird migration pathway. Personal example: I have seen large flocks of tundra swans. When I walk the beach, they stay far, far away so that I can barely see them. Just one person scares them off.
- There are eagles sitting in the trees along the Kohler property, nesting and feeding from the lake.
- Golf is a declining industry. The number of U.S. golfers dropped to 24.1 million in 2015 from a peak of 30.6 million in 2003. Why destroy this ecosystem for something that may be abandoned after men the age of Mr. Kohler and Pete Dye are gone. Sheboygan County is already one of the top seven golf destinations IN THE WORLD, according to Golf magazine.
- There is an abandoned golf course (The Squires) just to the south which has been converted to a sanctuary.
- To think of the vast number of pileated woodpeckers, hawk and owls; coyotes, deer, badgers, skunks; plants and tiny critters like bees, butterflies and other insects that would die makes me feel sick to my stomach.
- I do not want pesticides drifting into my air and leaking into my well water and local waters.
- Kohler will likely block access to the public waterway like they did at Whistling Straits.
- Many more trees will be damaged than the 50% they would cut due to compaction, damage and blow down.
- People in the Town of Wilson chose to live here because of the quiet and woods. The Black River Advancement Association was founded decades ago to keep the area natural. That's why it is so unique.
- NO! to idling buses and golf carts and more airplanes, blimps, boats, jet skis, autos & trucks in this quiet area.

This would be a perfect spot for a Native American museum and fishing village re-creation with trails. It could make money for Kohler and provide a natural attraction for the state park and Town of Wilson. Truly a win-win.

Sincerely,  
Lisa Lehmann

Town of Wilson homeowner

To: Wisconsin DNR

Re: Proposed golf course

Aug. 16, 2016

I am seriously concerned about this proposed golf course for the following reasons:

- If this proposed golf course is like Whistling Straits, there will be long fairways built out into the lake held up by big manmade walls. This causes danger to adjacent shorelines if and when lake levels rise, causing more erosion to Town of Wilson property owners and to the state park dunes.
- A Maritime Task Force member proposing a NOAA maritime sanctuary in the waters here have said that this proposed golf course would be detrimental to the health of Lake Michigan, when he spoke to a group in Sheboygan this summer.
- When wetlands are filled in water will flow elsewhere. I live two blocks from the Black River and Kohler property. The lower part of my yard is wet every few years. Where would the water go in the case of an excessive rainfall like recently experienced up north, or during an extended rainy period?
- I believe that it is morally wrong to allow a private company to create access to an exclusive for-profit golf course through our state park and to destroy or use any state land. What kind of precedent would this set?
- It is terrible to even consider that land adjacent to a state park with signs that tell people to stay off the sensitive dunes would be trampled by hundreds of thousands of people during a tournament.
- This is an important bird migration pathway. Personal example: I have seen large flocks of tundra swans. When I walk the beach, they stay far, far away so that I can barely see them. Just one person scares them off.
- There are eagles sitting in the trees along the Kohler property, nesting and feeding from the lake.
- Golf is a declining industry. The number of U.S. golfers dropped to 24.1 million in 2015 from a peak of 30.6 million in 2003. Why destroy this ecosystem for something that may be abandoned after men the age of Mr. Kohler and Pete Dye are gone. Sheboygan County is already one of the top seven golf destinations IN THE WORLD, according to Golf magazine.
- There is an abandoned golf course (The Squires) just to the south which has been converted to a sanctuary.
- To think of the vast number of pileated woodpeckers, hawk and owls; coyotes, deer, badgers, skunks; plants and tiny critters like bees, butterflies and other insects that would die makes me feel sick to my stomach.
- I do not want pesticides drifting into my air and leaking into my well water and local waters.
- Kohler will likely block access to the public waterway like they did at Whistling Straits.
- Many more trees will be damaged than the 50% they would cut due to compaction, damage and blow down.
- People in the Town of Wilson chose to live here because of the quiet and woods. The Black River Advancement Association was founded decades ago to keep the area natural. That's why it is so unique.
- NO! to idling buses and golf carts and more airplanes, blimps, boats, jet skis, autos & trucks in this quiet area.

This would be a perfect spot for a Native American museum and fishing village re-creation with trails. It could make money for Kohler and provide a natural attraction for the state park and Town of Wilson. Truly a win-win.

Sincerely,  
Lisa Lehmann  
Town of Wilson homeowner

**From:** [Samuel Leannah](#)  
**To:** [DNR Kohler Proposal](#)  
**Subject:** Public land  
**Date:** Thursday, July 21, 2016 7:32:04 PM

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I am a 21 year old male who was born in Sheboygan. I love this city but I do not support the proposal. If it goes through my view of my hometown will be disenchanted. I want to be involved in the community and be the future of this county, but if things like this go through here, I will leave.

**From:** [Steve B](#)  
**To:** [DNR Kohler Proposal](#)  
**Subject:** Public Trust  
**Date:** Tuesday, August 16, 2016 10:27:33 PM

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. To entertain the idea of destroying the State property for a golf course is absurd and goes against "The Public Trust". If you allow the loss of 20 acres for a roundabout then I will assume that the dunes directly to the south of said property could be opened to mountain bikes, ATVs, dirt bikes and dune buggies too. Maybe an amusement park or a casino with a hotel overlooking the beautiful Lake Michigan. That would bring a whole new set of rules that YOU are responsible for. If you break The Public Trust on this issue you will be held accountable.

There are so many environmental reasons to deny the destruction of the area that if you OK the project we can only assume there is a financial gain for you. If that's the case build the casino and hotel on the dunes. Digging up Indian artifacts would be appropriate. Let them profit by the greed involved in this project.

Below is an excerpt from one of your publications. You might want to read it before making a decision.

"The court has ruled that DNR staff, when they review projects that could impact Wisconsin lakes and rivers, must consider the cumulative impacts of individual projects in their decisions. "A little fill here and there may seem to be nothing to become excited about. But one fill, though comparatively inconsequential, may lead to another, and another, and before long a great body may be eaten away until it may no longer exist. *Our navigable waters are a precious natural heritage, once gone, they disappear forever,*" wrote the Wisconsin State Supreme Court justices in their opinion resolving *Hixon v. PSC.(2)*"

*You can do your job or you can lose any integrity you might have.*

**From:** [Edward B. Mueller](#)  
**To:** [DNR Kohler Proposal](#)  
**Subject:** RE: Draft EIS for Kohler golf course - affect on 610 Beach Park Lane  
**Date:** Thursday, August 18, 2016 6:08:35 PM

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There was a type in the address, corrected in this email. I may send a hard copy, perhaps with expanded reasoning, in a letter. Thus, please discard the prior email as this one corrects our address.

Ed Mueller

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**From:** Edward B. Mueller  
**Sent:** Thursday, August 18, 2016 2:24 PM  
**To:** 'DNRKohlerProposal@wisconsin.gov'  
**Subject:** Draft EIS for Kohler golf course

Dear DNR representatives:

In addition to re-stating our concerns previously expressed about the poor location for the entrance to the proposed Kohler golf course and the admitted impairment of the water table (see my email below, and prior confirming letter), my family and I would like to comment on the location of the proposed 22,000 square foot maintenance facility on State Park property.

The maintenance facility is very near our property at 610 Beach Park Lane (shown as private ownership on your maps). Starting their machinery at 5 a.m. as the draft EIS says, and handling "herbicides, pesticides, and fertilizers" in that location would create a public nuisance and render our bucolic vacation cottage a noisy work zone where people will not be able to sleep. Add to this the fact that our shallow water table will probably be interrupted if we read the report right, and it would be a disaster.

Thanks.

Ed Mueller

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**From:** Edward B. Mueller  
**Sent:** Monday, July 20, 2015 6:59 AM  
**To:** 'DNRKohlerProposal@wisconsin.gov'  
**Subject:** Kohler golf course

Dear DNR representatives:

Our family's cottage at 610 Beach Park Lane is about 700 feet south of the proposed 16<sup>th</sup> fairway and our access to the cottage is through the entrance to Kohler-Andrae State Park. We are the "private parcel" on the materials provided before the UW-Sheboygan forum on July 14. I would like to address just two of the shortcomings of the most recent plan, the impact on water availability and the location of the entrance to the proposed course.

An insurance fund would not compensate people if the water runs out as it did for some property

owners near Whistling Straights. My family often entertains at our cottage – if the water runs out when we or any of our neighbors to the north of the proposed course have a house full of guests, what good is an insurance policy? How will campers or day visitors to Kohler-Andrae State Park be compensated if there is no running water? As you know, “showers, flush toilet and laundry facilities are available in the family campground” (per the Kohler-Andrae/DNR web-site).

Insurance claims periods are often long and insurance funds themselves can run dry. Would it take a month to process a claim and then dig a new well? Will the insurance fund or Kohler pay for us and our guests to stay at the American Club, for each day or part of a day when we have no water? If the course is going to use wells, rather than water straight from the lake which was a plan mentioned by Kohler representatives at a meeting last year, the hydrology must be investigated thoroughly and relief provided to people with shallow wells before Kohler builds his course. The public needs an unconditional opinion from a licensed hydrologist that residents’ water source will not be interrupted – and there must be recourse against Kohler himself if the wells nevertheless run dry.

Here is another quote from your web-site:

Water resources are the foundation for Wisconsin’s economy, environment and quality of life. Managing, conserving and restoring them for the benefit of Wisconsin citizens now and in the future is a big job, and one that DNR staff share with local governments, citizens and businesses.

As to the entrance, entering off County V/12<sup>th</sup> Street at a spot where there are no driveways and no public hiking trails that would be disrupted is far better than coming through the park. The busy times for golfers are the exact times when the park is most busy. The park was at full capacity over the week-end of July 4<sup>th</sup>. Imagine what it will be like if and when Kohler lands a Major, his stated goal. The U.S. Open is in June, and the PGA in August. How are hundreds of thousands of spectators going to get into the course, and what will that do to traffic on roads used by campers at Kohler-Andrae and used by my family and guests to get to our cottage?

We were guaranteed access to our property by the DNR when it moved the entrance to the park from the south and closed and then destroyed the old V Road east of the “new” entrance to the park, which had been our public access. We cannot be made to wait in lines created by golf professionals or tournament spectators – that is not what we agreed. The entrance should be moved to a spot along the V Road (12<sup>th</sup> Street) that will have as little impact on any hiking trails as possible. If there is nowhere to put the entrance that does not dissect hiking trails, which seems unlikely, let Kohler build an underpass or overpass for any hikers to get past his driveway, or use stop signs and caution signs where the trail crosses his driveway. It appears that the entrance off 12<sup>th</sup> Street could easily be south of the current parking lot and trail head(s). Or, north of the parking lot for that matter. A quick visual drive-by will confirm that this is plausible and is better than tying up the park entrance that my family and our guests use for the access to our cottage, and obviously better for the public using Kohler-Andrae State Park – who as you know pay a fee to do so.

Focusing on these two points does not reflect a lack of concern for the opinions of, as I recall, two

professional ornithologists, a geologist, a hydraulics engineer, various people with environmental credentials, and all the homeowners/taxpayers from Black River that were voiced at UW-Sheboygan on July 14, and in other venues, much less the other deleterious impacts that a golf course would have on the Black River forest and surrounding DNR-owned wilderness areas and wildlife refuges.

**Ed Mueller**

**From:** [Steve Rassel](#)  
**To:** [DNR Kohler Proposal](#)  
**Subject:** re: Draft EIS  
**Date:** Sunday, July 31, 2016 7:28:31 PM

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I wholeheartedly agree with EVERYTHING Jim Buchholz has stated in the letter attached below. I could not have said it better!

Sincerely,  
Steve Rassel  
338 Edgewater Road  
Sheboygan, WI 53081

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July 23, 2016

I am strongly opposed to the development of the proposed 18--hole golf course in the Town of Wilson by the Kohler Company. I also feel the DNR's proposed Environmental Impact Statement (EIS) is flawed and incomplete for the following reasons:

- The Dept. of Natural Resources has no right and nor any responsibility to "give away" 4-plus acres of publicly- owned state park land to anyone, especially to a "for-profit" business or person for the purpose of increasing the revenue of such business or to increase the income of any person or corporation. Kohler-Andrae State Park's land acquisition was supported by Federal LAWCON funding. As such the conversion of these public lands to a private person or corporation is NOT justified to accommodate their financial interests and is not permitted except in very rare circumstances.
- The EIS document map shows a total of over 19 acres that are being considered for Kohler's development with no detail as to the actual footprint of the development. The EIS mentions the size of maintenance building to be constructed on state park lands but does not state the size of the paved parking lot that would need to service the proposed maintenance building. The area listed for conversion is listed as "lightly used"... as if it doesn't matter if the land is given away or not. This is far from the truth. The area may not be used as heavily as the park's beach and picnic areas but this was by design by park management. Hiking trails, boardwalks, restrooms, etc. were left out of this area to keep it in its natural sand dune state to protect this rare ecosystem as mandated by the Kohler-Andrae State Park Master Plan.
- The DNR's EIS states that permitting the transfer of public land for Kohler's own private use and the development of roads, shop buildings and parking areas on these fragile and rare sand dune lands would "not set a precedent" My question and that of anyone else reading this EIS is how could it not?
- If this is approved for Kohler, " I " would like to request and expect approval for my own 4 acres so I could set up my own business, perhaps a hotdog stand. Of course, like Kohler, I would have to ban park visitors from ever setting foot on my part of their public land again

(unless they purchase one of my hotdogs of course).

- This land transfer for private use should not be allowed regardless of the political involvement, DNR appointments and pressure from the Governor's office. The DNR is supposed to represent the preservation and protections of all public lands. Park visitors should not have to be denied access to their public lands just to appease a large corporate donor to a particular party or person. If so, all confidence is lost for this agency now and into the future. The EIS hints at what is already known in that the DNR intends to "alter" the existing property master plan in order to give away this part of the park to a corporation. The Kohler-Andrae Master Plan was developed over several years of local and statewide public input and was approved by the Wis. Natural Resource Board. It cannot be altered without permission and approval of the natural resource board "and" without new local and statewide public debate/hearings.
- The EIS does not include the acreage necessary and loss of sand dune habitat needed to construct the proposed "roundabout" at the park's office area. The design shown in the document would be way too small to accommodate all the heavy traffic and especially the larger delivery semi and panel trucks that would be entering and exiting the state park and the golf course on a regular basis. It would not even accommodate most of the larger RV's and longer camping trailers that would need to maneuver through this small roundabout. A much larger roundabout would be needed which would require at least an acre of land (sand dune habitat) and create even more lost public land and habitat.
- The traffic system LOS (Level of Service) calculations were incomplete and as stated in the DNR EIS report, did not occur during the heaviest use times for traffic on weekends. With more than 400,000 visitors a year the Kohler-Andrae entrance is already burdened by way too many vehicles, RV's and trailers. Backups all the way out to the Co. Hwy V have regularly occurred during busy times and even during the evening hours if special event are held in the park. The addition of even more heavy traffic due to Kohler's golf course and their proposed clubhouse/restaurant by cars, delivery trucks and most likely buses from their own hotels, would certainly cause traffic jams and confusion for all, especially since their highest use period would "also" be on weekends. Visitors to both the state park and the golf course will be frustrated by this unnecessary traffic congestion. It would also hamper all police, fire and rescue emergency calls. According to Kohler's plan for the course it would host some high profile events as well. If so, "where" would all these people park and how would they all access the golf course at the same time of year that the state park has so much incoming and outgoing traffic?
- If Kohler receives a positive DNR EIS report it should only be approved without the loss of publicly-owned state park land for their entrance road, roundabout, shop building and parking lots. There is no convincing need to use state park lands to accomplish their project other than it is the "cheapest" way to go for the Kohler company. This should not be a consideration for the DNR to give away state park lands. The alternative D-3 of the EIS is the correct route to go and should be selected by the DNR's EIS as the only course to take. The D-3 version allows Kohler to make use of their own existing entrance off of Co. Hwy V (12th Street) north of the state park with a direct eastern access to their property. Yes, this would mean the

construction of an expensive bridge over the Black River and additional road building on their property but again, this is the Kohler Company's concern and not the DNR's. There is no logical reason why the golf course shop building and parking lots could not be built on their own property adjacent to the existing state park shop building as was originally planned. There is no reason to take away public state park land and destroy rare sand dune formations and habitat for Kohler's shop building and parking area development when they have 247 acres of their own property to work with.

- The EIS does mention a few negative effects of Kohler's plan to deforest 150 or more acres of mature timber but there are many more. This unique forest, dune and wetland area is an extension of the rare sand dune ecosystem that is currently protected and managed by the DNR on the Kohler-Andrae State Park property. Clear cutting, pulling stumps, and bulldozing these areas for the purpose of installing golf course greens will forever destroy a fragile landscape and ecosystem that has evolved in its present state since the last ice age over 14,000 years ago. Unfortunately the Kohler Company does not see any problem with destroying this very unique and rare Great Lakes sand dune area for the purpose of building a golf course for their wealthy clients. The EIS does mention that there are "several rare species" that will be destroyed by Kohler's development. A few are listed but not all. Some are Federally threatened species such as the [REDACTED] plus state threatened species including most of the [REDACTED] [REDACTED] and many others. Many of these are only found growing on Great Lakes sand dunes and nowhere else in the world.
- Bird, mammal, reptile, amphibian and insect life (some rare/threatened) that have adapted to both the wooded and open dune habitat would also be displaced or destroyed by the Kohler development. The combination of the state park and Kohler forested area has long been known as an "Important Bird Area" (IBA) for migratory birds along Lake Michigan. Throughout the entire history of the DNR and the Conservation Commission before that, staff managers, biologists and scientists have supported and strived to protect these areas at all costs. The EIS should make a strong statement against the destruction and fragmentation of this important IBA and Great Lakes dunes habitat. It should be noted also that an active bald eagle nesting site is located only a short distance to the north of the Kohler property which most likely will be negatively affected by the massive tree removal, development and increase in public use of this area.
- The EIS also mentions several "globally rare" wetlands that will be lost in the construction of the golf course. The DNR's own Bureau of Endangered Species has termed these rare wetlands [REDACTED] as the rarest, most irreplaceable habitat/ecosystems in the state of Wisconsin. If the DNR doesn't protest the irreversible/permanent destruction of this important and threatened ecosystem who will? Wetland replacement mitigation was mentioned as a possible replacement of these lost wetlands but it must be very clear to all reading the EIS or least the DNR staff themselves that these rare [REDACTED] wetlands cannot be reproduced artificially elsewhere. The EIS should make this clear to all readers in addition to explaining why these wetlands and surrounding dune formations should be protected from development.

The effects of groundwater well water drawdown due to the proposed high capacity wells usage is listed in the EIS as “uncertain”. This uncertain designation is not appropriate and should be studied in more detail by someone other than the Kohler Company. Their estimate of using 15-25 million gallons a year (just to water their golf course) plus about 2 million more of potable water usage seems low. These estimates were all based on water usage at Kohler’s other golf courses. This reasoning fails to take into account that none of the other courses were built on 247 acres of nearly pure dry sand with little or no water holding capacity.

- There was mention that the high capacity wells located within Kohler-Andrae State Park have not caused any problems to the surrounding landowners but obviously the park doesn’t use 15-25 million gallons of water for irrigation/watering lawns. In fact, the park doesn’t water any of its lawns and never has. The park only uses well water for flush toilets, water fountains, two small fill towers at the dump station for campers and to provide water at few shower stalls and sinks for campers. Kohler’s only advise for local neighbors who will run out of water when their wells run dry is to contact them for help and “they” will determine if they believe their water drawn down are at fault or not. This information (clearly written directly by Kohler staff) does NOT belong in a DNR EIS document in my opinion and is of no help to local citizens who will be affected by the massive water use for the golf course. In addition, the state park itself may have water issues with its own wells due to the high draw of ground water aquifers which will affect all state park visitors and campers.
- Overall, I feel the DNR’s EIS is incomplete, lacks scientific analysis and study, and depends way too heavily on the Kohler Company’s own very slanted studies and papers. Much of the EIS document seems to be a rehash of Kohler’s EIR report from March of 2015. At that time citizens were asked to submit questions and concerns about that document as did the DNR itself. To date very few answers or responses have been given by the Kohler company to those concerns and are clearly NOT covered in the proposed EIS. It would seem impossible to complete a DNR EIS without that data and lots of other very important “missing” information about the golf course and related facility/roads development plans. Unfortunately as a result of this missing documentation and lack of detailed construction and road/parking lot placement plans it is really not possible for citizens to comment fully on Kohler’s proposal or the DNR’s current EIS.

James Buchholz

(retired superintendent of Kohler---Andrae State Park) Sheboygan County Resident  
Plymouth, WI

**From:** [Mark Leider](#)  
**To:** [Schiefelbein, Jeremiah J - DNR](#)  
**Subject:** Re: Proposed Kohler Golf Course  
**Date:** Thursday, July 21, 2016 10:35:06 AM  
**Attachments:** [DNR EIS Support Statement 2016.docx](#)

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*God Bless You!*

Mark J. Leider

*"Lord, suffer me to catch  
a fish so large that even I  
in talking of it  
shall have no need to lie."*

**LeiderSide**

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**From:** "Schiefelbein, Jeremiah J - DNR" <Jeremiah.Schiefelbein@wisconsin.gov>  
**To:** "markleider@att.net" <markleider@att.net>  
**Sent:** Thursday, July 21, 2016 10:21 AM  
**Subject:** RE: Proposed Kohler Golf Course

Good morning Mark,

I did not receive your testimony electronically. Please send it again and I will incorporate it with the other public comments received. Thank you,

Jay

-----Original Message-----

**From:** Mark Leider [markleider@att.net]  
**Received:** Thursday, 21 Jul 2016, 9:55AM  
**To:** Schiefelbein, Jeremiah J - DNR [Jeremiah.Schiefelbein@wisconsin.gov]  
**Subject:** Proposed Kohler Golf Course

Good Morning Jay:

Please confirm that you received my testimony that I emailed yesterday. (We've had some computer issues)

Thanks.

Mark

*God Bless You!*

Mark J. Leider

***"Lord, suffer me to catch  
a fish so large that even I  
in talking of it  
shall have no need to lie."***

**LeiderSide**

July 20, 2016

Subject: Proposed Kohler Golf Course

To Whom It May Concern:

I appreciate the opportunity to comment on this project and to express my strong support for its approval by your agency as well as its ultimate approval by the applicable federal, state, county, and town regulatory authorities.

My name is Mark Leider. I reside in the Town of Wilson, at 1319 Woodview Avenue, which is a short distance from the subject Kohler property. I have lived at this property for over 40 years, and I am familiar with the subject site.

Let me be clear, I have no affiliation with the Kohler Company or family, and I am not a golfer.

I have expressed--in writing, and in some detail--support for this project during the last two years. Those prior written comments have been provided to the DNR, the Town of Wilson, the "not in my backyard" opponents, and the media. So, I will not restate them here.

I had not intended to comment further at all, until I received this document (SHOW) last weekend from the "not in my backyard" opponents who title themselves "Friends of the Black River Forest".

Frankly, the propaganda comments in this document warrant a response. I had read very closely the DNR's nearly 100-page Draft Environmental Impact Statement. I was pretty impressed with its depth, breadth, and detail.

Yet, the "experts" from the "Friends" group have termed it "incomplete", and they charge the DNR with "showing favoritism" to the Kohler Company. They claim, and I quote, "the true impacts of this project have been overly minimized, glossed over or just plain ignored" by the DNR.

These people speak and represent without portfolio, based strictly on emotion and hypocrisy. Yet they criticize the resource professionals and their science-based facts.

They urge their followers to act, I quote, "...before an entire ecosystem is destroyed". They cite, I quote, "Impacts of spreading huge quantities of Herbicides, Pesticides and Fertilizers affecting Lake Michigan, the Black River, Town wells, plants and wildlife". It goes on.

Who could write such rubbish with a straight face? They know that Kohler will strictly be following Integrated Pest Management practices and Best Management Practices with everything attendant to water. It's just ludicrous!

A nearly 700-page Environmental Impact Report on this project was completed by Stantec International, a most reputable professional services company headquartered in Edmonton, Canada. It is extremely comprehensive, and is consistent with state and federal environmental policy acts. I read it. The NIMBY group has chosen to disregard it because the Kohler Company paid for this report.

An Economic Impact Report on the project was prepared SB Friedman & Company, an equally reputable firm headquartered in Chicago. It projected an annual economic impact of nearly \$21 million

countywide. I read it. Yet again, the NIMBY group has chosen to disregard it because the Kohler Company paid for this report.

So, despite the fact that the Kohler Company is obligated to provide these studies, and that it selected leaders in these disciplines, the “Friends” know better. And, now, despite the efforts and expertise of the DNR in preparing the nearly 100-page Draft Environmental Impact Statement, the “Friends” know better yet again.

The “Friends” propaganda piece sets out 11 bullet points that are so sophomoric as to be meaningless and unworthy of reply. Suffice it to say that the developer has already complied with a range of conditions since the project inception. And, the above environmental reports satisfactorily address all pertinent issues.

It's simply time to move forward. This project is a winner! Any adverse impacts are minimal. The positive benefits are astounding!

Anyone who would characterize this Kohler property as “pristine” is either dishonest or has not actually visited it. The forested areas should have had a managed harvest years ago.

Finally: The Town of Wilson Zoning Ordinance, which implements the Town's Comprehensive Plan, specifically identifies “Golf Courses” as compatible within its Conservancy District. They are simply treated as a “Conditional Use” rather than a straight up “Permitted Use”. The distinctions blur, but as a conditional use, everyone gets a “kick at the cat” through public hearings. The Kohler Company has already agreed to numerous “conditions”.

Folks, there are many land uses that'd be less desirable than a golf course, and particularly one that may have an economic impact of \$21 million per year countywide. Let's support something spectacular for a change!

**From:** [maryloubrotz](#)  
**To:** [DNR Kohler Proposal](#)  
**Subject:** Reckless Use of Our Natural Resources  
**Date:** Friday, August 26, 2016 4:06:50 PM

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**Re: The misuse of OUR STATE PARK LANDS**

This must be stopped before it is gone and cannot be replaced. The Black River watershed is nearly the only one left of it's kind along our shores and is far better used to educate people of it's importance to the wildlife and the water table and for it's rich history of Woodland Native Americans. I have watched what happened to the beaches below the bluffs at Kohler's Whistling Straits golf course in horror as it was covered in rotting algae bloom. The park's gorgeous beaches will become unswimable when the algae bloom from a golf course run off pollutes our waters. And it is OUR WATERS, NOT KOHLER'S

**STOP THE KOHLER GOLF COURSE! SAVE OUR WATER AND WILDLIFE!**

**Marylou Knight Brotz**

Sent from my U.S. Cellular® Smartphone

**From:** [Lincoln Rice](#)  
**To:** [DNR Kohler Proposal](#)  
**Subject:** Reject Kohler Golf Course Project  
**Date:** Friday, July 29, 2016 1:20:55 PM

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Mr. Schiefelbein

I am against the Kohler Golf Course Project. I am a professor of Catholic moral theology and a birder. In addition to the fact that there is already a wonderful high-end golf course in the same area, I am opposed to the proposal for the following reasons:

The forested property is a major migratory stopover site. The DEIS, while noting that the area is recognized as an important stopover site, does not provide any specific evaluation of how the extensive forest clearing for a golf course would degrade the value as a migratory stopover site.

The draft study also is being challenged by the group Friends of the Black River Forest (FBRF) for what it calls unscientific, inaccurate work for a business that has yet to submit a project application to the agency.

The friends of the local state park oppose allowing Kohler to convert public park land purchased with federal funds into private land for the company's profit.

The group has published information for two years on the serious environmental impacts of clear cutting and reconstructing 247 acres adjacent to Kohler-Andrae on the shore of Lake Michigan, arguing:

"Once you level rare dunes and fill rare wetlands, deforest 150 of 247 acres, the ecosystem is destroyed and it can never come back. "We need people to speak out against the Kohler Co.'s lack of environmental concern, and the DNR's favoritism."

Other issues raised by the FBRF:

- Destroying rare wetlands, animal habitats and migratory bird stopover sanctuaries
- Impacts and risks of building a septic system where water table is very high
- Impact of destroying thousands of years of Native American cultural heritage artifacts
- Impacts on residents' wells from pumping millions of gallons of water for irrigation
- Groundwater contamination impacts • Impacts of spreading huge quantities of herbicides, pesticides and fertilizers on Lake Michigan, the Black River and Town of Wilson wells, plants and wildlife
- Impacts of traffic, congestion, safety and noise from a major golf tournament
- Loss of public beach access, impacts of fencing boundaries on state park
- Impact of high-capacity wells on a fractured rock aquifer

Sincerely,

Lincoln Rice, PhD  
1006 N 22nd Street  
Milwaukee, WI 53233

**From:** [stonehouse5440@charter.net](mailto:stonehouse5440@charter.net)  
**To:** [DNR Kohler Proposal](#)  
**Subject:** Response to DRAFT EIS Proposed Kohler Golf Course  
**Date:** Sunday, July 31, 2016 11:19:07 PM  
**Attachments:** [DNR EIS Ltr 073116.docx](#)

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Robert Fuller  
4593 Beaver Dam Road  
West Bend, Wisconsin 53090

July 31, 2016  
VIA Email

[DNRKohlerProposal@wisconsin.gov](mailto:DNRKohlerProposal@wisconsin.gov)

I strongly suggest that DNR stop this EIS, or at least come to a just and quick conclusion that the Proposed Kohler Golf Course (“the Project”) be denied. Others have already made powerful arguments against this Project based on environmental and well-water issues, to name a few, and here are a few more reasons (as if any more are needed):

1. Failure of the Purpose & Need Section All EIS’s require a proposed project to address its Purpose and Need. DNR’s draft EIS utterly failed to discuss the *need*! No where is the *need* for the County’s **fifth** championship class 18 hole golf course addressed ... for obvious reasons: there is **no need**! That huge EIS deficiency should have ended the EIS process!
2. Economic Benefits The various financial assumptions woefully lack backup or verification such as:
  - 227 full-time, permanent employees – for one 18 hole course. How do those numbers compare to similar golf courses in operation? Those numbers seem incredibly generous.
  - This draft report says the Town of Wilson will receive ~\$1.1 million in net new property taxes. I suggest DNR check with the Town of Mosel regarding Kohler’s projected property tax payments versus the amount that Town has actually received in the last 3 years. Regardless, why should DNR care?
  - There is a claim that this Project will produce \$21 million in “economic activity”. What exactly does this mean? And importantly, who benefits from this so-called “economic activity”? The Kohler owners including the American Club, and other high-end restaurants and lodging establishments in SE Wisconsin. But it is flat-out wrong for our State’s DNR to side with the wealthy political donors and their pet projects rather than the 99% of Wisconsin citizens! DNR’s mission is to protect our natural resources which directly allows our tourism industry to thrive ... but, allow our natural resources to be degraded, and tourism, our State’s number 2 industry, will suffer greatly.
3. Public Access When a round of golf costs ~\$500 (including caddie fees & tip), the “public” which has that kind of access, are the wealthiest 1% of the public. DNR should *independently verify* the number of *local citizens* (the real public) that have access to Whistling Straits. And while DNR talks with the citizens of the Town of Mosel, ask them about the public’s access to the beaches of that golf course. I am told that enormous boulders were placed at both ends of that golf

course's Lake Michigan boundaries, so as to prevent public access to Kohler's part of the beach.

Also, in Section 5.2.2 of the draft EIS, the author(s) made a curious statement about the abundance of outdoor activities that are available to the "other public" in the Sheboygan County area. Implication? That "public 99%" already has sufficient outdoor venues and so there really isn't much *need* for them to experience any non-golfing activities on this site!!

And that brings me back to NEEDS: Kohler is saying, in the draft, the "public 99%" doesn't have a need for access to the beach or any other non-golfing or eating activity on this site; however, they can't come up with a need for the Project! It should have been Dead On Arrival!!

Bob Fuller

**From:** [Judy Olson](#)  
**To:** [DNR Kohler Proposal](#)  
**Subject:** Response to Kohler Golf Course Proposal And WDNR Environmental Impact Statement  
**Date:** Monday, August 01, 2016 9:41:00 PM  
**Attachments:** [Response to Kohler Golf Course Proposal.pdf](#)

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Response to Kohler Golf Course Proposal  
And WDNR Environmental Impact Statement  
August 1, 2016

I am writing to urge the Wisconsin DNR to deny Kohler Company's request for:

- <!--[if !supportLists]-->• <!--[endif]-->an easement across public lands of the Kohler-Andrae State Park;
- <!--[if !supportLists]-->• <!--[endif]-->permission to build a maintenance shed on state park land;
- <!--[if !supportLists]-->• <!--[endif]-->permission to destroy wetlands, rare sand dunes, and clear cut 125 acres of trees; and,
- <!--[if !supportLists]-->• <!--[endif]-->permission to install a high capacity well in this sensitive area.

I am a member of the Wisconsin Ornithological Society and aware that the lands along the Lake Michigan shoreline are an Important Bird Area particularly for migratory birds, many of whom are declining in numbers. The Kohler-Andrae State Park was created to protect the rare sand dune ecosystem and wildlife they support. Rather than permitting the destruction of these lands, we should be finding ways to protect and restore them.

Public lands should not be given away to facilitate development by anyone. In this case, in particular, there are clear alternatives that will enable the Kohler's to build their golf course without removing public park lands. This proposal is an extremely bad precedent and should be resisted.

I am a resident of Madison and frequently travel to Lake Michigan, including the Kohler-Andrae State Park, to watch birds and enjoy the beauty of the lake and its shoreline. As a tourist and traveler, I contribute to the economy of the communities along the Lake Michigan shoreline as do many others who use our public lands. They should be preserved for long-term public use, not given away for any reason.

Sincerely,  
Judy Olson  
518 Clemons Ave.  
Madison, WI 53704  
Judyolson518@att.net

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And WDNR Environmental Impact Statement  
August 1, 2016

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Sincerely,

Judy Olson  
518 Clemons Ave.  
Madison, WI 53704  
Judyolson518@att.net

**From:** [Mary Filion-Zuelsdorf](#)  
**To:** [DNR Kohler Proposal](#)  
**Subject:** selling of Kohler Andrea public lands to the Kohler Company  
**Date:** Thursday, July 28, 2016 10:52:19 AM

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I urge you not to allow the Kohler Company to use public lands that are now a part of Kohler Andera State Park to build a parking lot and storage building. This land is part of a rare and fragile ecosystem. It is important that it be preserved as habitat for the plants, birds, animals and insects now inhabiting it. There will never be more land and it is so important that this land remain protected. Kohler Company can build on it's own land. Allowing Kohler to use this land sets a dangerous precedent. Public land should not be given up so corporations can make more money.

Also the impact of the high capacity wells should be carefully considered as should the deforestation of the land. Kohler can build a golf course somewhere else not in this fragile and rare ecosystem.

Our family has visited this park for 30 plus years. We value it not just for the beach but for the ecosystem. The DNR's job is to protect the ecosystem s of WI not destroy them.

Mary Filion-Zuelsdorf  
N4048 Amity Rd  
Brandon WI

**From:** [Stray Cat](#)  
**To:** [DNR Kohler Proposal](#)  
**Subject:** STOP KOHLER GOLF COURSE in Town of Wilson  
**Date:** Thursday, July 28, 2016 5:55:19 PM

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Please don't destroy nature and contaminate our water supply for the sake of a few. Rich people can go hit little white balls around anywhere they want. This is our home, our backyard and our only life, please don't destroy it for the whim of a rich man.

Thank You  
Rosemary Reischl

**From:** [James Schuessler](#)  
**To:** [DNR Kohler Proposal](#)  
**Subject:** Support for golf course  
**Date:** Sunday, July 24, 2016 8:04:03 PM

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To home it may concern: I wish to note my support for the proposed golf course in the Town of Wilson. I live near the whistling Straits golf course and have been very impressed by manner by which the Kohler Company has respected the natural beauty of the area and done so much to support economic progress in the area.

Kindest regards, James Schuessler, 3508 Willow Circle, Sheboygan, WI 53083.

**From:** [Beth Rausch](#)  
**To:** [DNR Kohler Proposal](#)  
**Subject:** Support to stop the Kohler Golf Course development  
**Date:** Wednesday, July 27, 2016 9:41:59 PM

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To the WI DNR committee considering the Kohler Proposal,

This is a simple fact: the damage done to intact critical habitat for a stressed migratory songbird population cannot be mitigated, period.

I urge the DNR to please stop this project; do not allow "modification", offers of "mitigation", or other empty promises that simply cannot replace what will be lost.

The DNR has taken strong steps to protect the neotropical bird population through the Osa Project (link attached). Please demonstrate continued commitment to this struggling population by protecting the Kohler-Andrae habitat.

<http://dnr.wi.gov/wnrmag/2012/02/birds.htm>

Sincerely,  
Beth Rausch

Beth Rausch DVM MPH  
*Assistant Professor*  
*Department of Animal and Food Science*  
*University of Wisconsin-River Falls*  
*(715)425-3704*

**From:** [Arthur Marquardt](#)  
**To:** [DNR Kohler Proposal](#)  
**Subject:** Terry Andrea gulf coarse  
**Date:** Friday, August 26, 2016 2:25:14 PM

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July 31, 2016

Jay Schiefelbein DNR

I am writing in protest of the proposed Kohler golf course. We have been told for decades that the Eco system of the lake, dunes, ponds and marshes were “globally rare” and we could only cross them by way of the cord walk and specific paths. We understood and respected that. Why now, is it OK to bull dose them down for the almighty dollar?

The environmental impact of the destruction of this beautiful area is not lost on even the youngest of my family. My grandchildren are absolutely horrified that this amazing place would be allowed to be ripped apart. We have instilled in them a love of our natural resources and a great respect for the land. One of them put it very simply and truly saying “when its gone, its gone for ever”. Out of the mouth of babes!

As for Kohler getting part of our unbelievably beautiful state park... I say absolutely not!!! Not four acres not twenty! This land was taken away from an individual, a family, by the state to be part of the state park. To give it to another individual for his monetary gain is criminal, and a slap in the face to the family who loved it and who had it take away.

I know you are aware of the impacts on the forest, wetlands, animal habitats, migratory birds, septic systems built over wetlands , Native American artifacts, wells, herbicides, pesticides, fertilizers, destruction of endangered species, wells and ground water contamination and on and on. In my mind, a person aspires to be part of the DNR to be a steward of the our natural resources. A champion of our land. A voice for our most precious places, animals and birds who have no voice but yours. Please, please remember why you are there, why you have the most powerful voice, and why one of the last

Thank You,  
Pamela Marquardt  
Town of Wilson resident

**From:** [TOM THEUNE](#)  
**To:** [DNR Kohler Proposal](#)  
**Subject:** The end  
**Date:** Friday, July 29, 2016 1:18:42 PM  
**Attachments:** [773.JPG](#)  
[717.JPG](#)  
[666.JPG](#)

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Who else is there who can protect this?

Thanks for your time,  
JoAnn Theune













**From:** [Gary](#)  
**To:** [DNR Kohler Proposal](#); [Gary Hughes](#)  
**Subject:** Town of Wilson Golf course.  
**Date:** Tuesday, July 12, 2016 8:46:48 AM

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Golf Course comments:

I moved to Sheboygan more than 40 years ago. When we first arrived, Sheboygan was a busy and growing community. The downtown was the place to go. Many things have changed since then, most big stores left not only downtown but the county. Businesses that used to be here left or went out of business. One of the companies that stayed here was Kohler. They employed a lot of people then and now more. It seems that Kohler and the vision they had about making Sheboygan a tourist destination was a blessing not only to Sheboygan but to the entire state.

The opportunity to have a world class golf course added to the already great courses in the area would be another reason for people to come and see Sheboygan. It appears that Kohler is willing to make every effort to make great neighbors with Kohler -Andre State Park, Town of Wilson residence and Sheboygan County.

This project gives the town and the county more jobs and more tax revenue. It adds an opportunity to draw more qualified people to our work force thru out Sheboygan County.

I say lets quit fighting and work together to make this a jewel of Sheboygan County.

Sincerely

Gary Hughes  
9525 Middle Road  
Oostburg WI

**From:** [davewilke@charter.net](mailto:davewilke@charter.net)  
**To:** [DNR Kohler Proposal](#)  
**Subject:** Town of Wilson Kohler Golf course EIS  
**Date:** Monday, July 18, 2016 10:34:30 AM

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Jay Schiefelbein  
WI DNR  
2984 Shawano Ave.  
Green Bay, WI 54313

Hello Jay,

I just want to send you a few comments on the proposed Kohler Golf course EIS. I am a resident of the Town of Wilson, in fact I live about ½ mile from the proposed site.

First of all, I received a letter in the mail from the so called "Friends of the Black River Forest" regarding the proposed golf course. In this letter were many false statements, exaggerations, if not outright lies, which I assume was distributed throughout the town.

I do not believe they will be destroying any rare or endangered species, since both acts would be against existing laws or rules. Next they state Kohler will be destroying rare wetlands, animal habitats, and migratory bird route sanctuaries. Again, untrue. Building a septic system where the water table is very high. You cannot do that if the land does not perk for said system, period. Destroying thousands of years of Native American cultural heritage artifacts, which we probably all did when we built our homes. Again, Universities have stated that there are literally hundreds of thousands of the artifacts they talk about and none are believed to be special to that area or rare. Their list goes on and on with many other misrepresentations, and falsehoods, none are based on fact, since they only attempt to persuade uniformed people. They complain that they no longer will have access to walk on this land, well isn't that nice, no longer able to trespass on someone else's land that they pay the taxes. How about you go purchase a piece of land and you can then have the luxury of walking to your heart's content, instead of complaining that your "free" land is going away. There's a State park adjoining this land which you have hundreds of acres to wander on for FREE. This golf course is not using the only open land within miles of our homes.

I live less than a half mile from the proposed site and welcome the jobs, tax base and other benefits that will result from a 20 or 30 million dollar investment by a man that has done a world of good for Sheboygan county.

Please do not let a small, vocal, dishonest group of self-serving people be the biggest voice in this debate. I have talked to many neighbors, and other residents of the Town of Wilson and the majority of them feel as I do. It's his land, let him do with it as he pleases. Please allow

him to build this course and invest in the Town's future.

Respectively yours,

David Wilke  
6529 Leona Ln.  
Sheboygan, WI 53081

**From:** [Lisa Johnston](#)  
**To:** [DNR Kohler Proposal](#)  
**Subject:** UNDESIRABLE LOCATION FOR THE KOHLER GOLF COURSE  
**Date:** Tuesday, July 12, 2016 7:01:13 PM

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Jay Schiefelbein  
Wisconsin Department of Natural Resources  
2984 Shawano Avenue, Green Bay, WI 54313-6727

When you look at the location of the proposed Kohler golf course, the logistics aren't desirable for a project of this magnitude.

The golf course would be located just a few miles outside of the Sheboygan city limits and there are residential areas to the North and to the West, and Lake Michigan to the East and Kohler Andrea State Park to the South. It's a poor choice for the location of an 18 hole championship golf course in the middle of this residential area. There is a reason for local zoning ordinances, and this is a good example why townships have comprehensive plans and zoning maps.

You can't compare Whistling Straits to this proposed golf course because Whistling Straits is in a low density populated area, so the impact to the local residents is minimal. However, this proposed Kohler golf course is located in a moderate densely populated area. There are only 2 existing roadways leading to the proposed entrance of the golf course and the State Park. The roadways are narrow and they won't be able to accommodate the higher traffic volumes of both the State Park, the golf course and local resident traffic.

I don't think the impact study took into account the current roadways and the existing infrastructure with relationship to the density of population currently living there.

It is unrealistic to think that all of this can co-exist in that location.

Thank You,  
Lisa Johnston

**From:** [Gloria Misiaszek](#)  
**To:** [DNR Kohler Proposal](#)  
**Cc:** [Jeff Crawford](#); [Aaron Loomis](#); [Sara Drescher](#)  
**Subject:** WDNR Draft EIS - Kohler Golf Course - Public Input Opportunity - Forest County Potawatomi Community  
**Date:** Friday, August 26, 2016 11:07:56 AM

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Dear Mr. Schiefelbein,

Attached is a copy of Forest County Potawatomi Community's comments on the Wisconsin Department of Natural Resource's draft Environmental Impact Statement with respect to the proposed Kohler golf course. If you have any questions please contact Sara Drescher.

Thank you.

Gloria

Gloria A. Misiaszek, Paralegal  
Legal Department  
Forest County Potawatomi Community  
313 North 13<sup>th</sup> Street  
Milwaukee, WI 53233  
Phone: (414) 847-7750 Direct Dial: (414) 847-7811  
Email: [Gloria.Misiaszek@fcpotawatomi-nsn.gov](mailto:Gloria.Misiaszek@fcpotawatomi-nsn.gov)

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Think Green. Please consider the environment before printing this message. Thank you.

**From:** [TOM THEUNE](#)  
**To:** [DNR Kohler Proposal](#)  
**Subject:** woods  
**Date:** Friday, July 29, 2016 12:44:16 PM

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Since it's not a very nice day, went to my picture file and here in a couple of emails are what will be traded for a golf course....





**From:** [Jayne Zabrowski](#)  
**To:** [DNR Kohler Proposal](#)  
**Subject:** Written comments to Draft EIS for Kohler Project  
**Date:** Friday, August 19, 2016 1:45:04 PM  
**Attachments:** [EIS Written Comments with Attachments.pdf](#)  
[ATT00001.htm](#)

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August 18, 2016

Wisconsin Department of Natural Resources

Via email to: DNRKOHLEPROPOSAL@wisconsin.gov

RE: Kohler Project

***I am strongly opposed to the proposed Kohler project in the Town of Wilson.***

After reading the draft EIS, I was shocked that the DNR would issue such a flawed and incomplete EIS. I am not a scientist, but one does not need to be to realize the glaring problems this EIS presents.

My first question is: Why would you release the draft EIS now? The purpose of an EIS is to educate the public. This EIS presents mostly theory.

The significant lack of information, scientific analysis and scientific data deprives the public of our right to make informed comment. This EIS relies too much on Kohler's own very prejudiced EIR report of March 2015.

The following are actual statements taken directly from the EIS pointing out the horrible impacts of the proposed project.

- **50% of the trees will be removed**

While is always difficult to determine the actual effects of deforestation before it is too late and already happening you are well aware that once you remove a significant number of trees in a mature, tall timber forest such as the one on this property the following will happen eventually no matter how careful they try to avoid it:

- Many of the remaining tall trees, especially evergreens, will be blown down by high winds This will occur because exposed trees are no longer supported by the dense surrounding forest to curb the strength of the wind, plus the very shallow root systems and lack of real soil(only loose dry sand) to hold them in place.

- Many trees will die from all the bulldozing and compaction of soil/sand near them. Crushes and cuts root systems, exposing them to diseases and loss of nutrients and water intake. Often don't see this for a year or more but

eventually many succumb to the damage they received during development. Many other trees will be damaged by falling the forest trees as they are chain sawed or bulldozed down around them to make way for roads, parking lots, and greens....especially when nearby root systems of downed trees are excavated and hauled away.

-Although much of the dune systems on the Kohler property are tree covered there are significant remnant dune blowouts, wetlands, and dune plants (some rare and threatened) that will disappear forever. All related biomasses to the sand dune/ dune forest areas will also be destroyed. They can't just pick up and move since many are specific to only dune habitat.

- "Fragmentation" of larger forests into smaller and smaller woodlot separated by roads, buildings, and other developments (like golf courses) have been studied for years by biologists. Nothing good ever comes from fragmentation of woodlands, especially larger, tall timber tracts like that found on the Kohler property.

- **Tournaments will be held at the proposed course but no mention of traffic issues/crowd management/emergency response/parking**
- **There will be increased congestion at the State Park**

The traffic system calculations were incomplete and as stated, did not occur during the heaviest use times. Where is the emergency response plan? Where is the plan for tournament parking? Where is the plan for crowd management?

- **EIS states 4 acres of State Park land will be taken away from state residents but the map shows 20-25 acres of state land will be used**

There is absolutely no reason to use State Park Land to help accomplish Kohler's goals. The DNR should not even consider giving away state park land. This land is owned by ALL residents of the State. This is not land that should ever be given to a private entity for their personal profit. Kohler already has their own existing entrance off of 12<sup>th</sup> Street thru River Trails. Please see attached **Exhibit A** from Sheboygan Press dated 7/31/16. This is a nice gated entrance with available access to their proposed project land.

- **Globally Rare Wetlands will be permanently impacted**
- **The [REDACTED] are rare and are not able to be replaced**

These [REDACTED] wetlands are the rarest, most irreplaceable wetlands in the State of Wisconsin. Very few areas exist like this worldwide. There is no wetland mitigation possible for these rare [REDACTED] wetlands. You are well aware and understand why these areas should and must be protected.

- **No mention of how to avoid LAWCON issues**

The Kohler-Andrae State Park Land acquisition was supported by Federal LAWCON funding. Kohler Company request a road easement on the north side of J. Michael Kohler State Park in 1984. It was determined at that time that this action was a LAWCON 6 (f) violation. **See attached Exhibit B.** If a road access was a LAWCON violation in 1984, it is a violation in 2016. The conversion of these public lands to a private person or corporation is not justified,

- **Dangerous pesticides will be used and there is risk of those pesticides leaching into waterways**

There is no monitoring of pesticide use into adjoining waterways at any of the Kohler current courses. There is absolutely no way that pesticides are not going to leach into Lake Michigan and the Black River. The only guarantee by Kohler that this will not happen is "we follow the package directions." That is simply not acceptable.

- **Risk of wells going dry or needing to be dug deeper with Kohler themselves in "charge" of deciding which ones they will pay for**

**There is significant uncertainty in the prediction of drawdown levels in fracture rock aquifers**

These concerns are well addressed by the expert comments of Lee Trotta. **Exhibit C.**

- **Kohler maintenance and pesticide storage shed will be built on state land**

Again, there is no reason to use State Park land to help Kohler accomplish their goals. Per your own records the former park superintendent requested protection of the existing rare sand dune ecosystem located north of the park office to the shop. He worked diligently to avoid destroying the sand dunes. How can you now even consider allowing Kohler to plow and level a paved road through the dunes and to build a shop and large parking area within the dunes area on state park property? This is not necessary and will permanently destroy this sensitive area of State Park land.

- **A Septic system is proposed without any testing report or addressing the risk of septic failure.**

Where are the documents which indicate: Testing that "confirms conventional septic field systems could be used to treat domestic wastewater" at the site, draft EIS page 5?

- **Sand Dunes will be graded**
- **Soils on the site are not favorable for golf course and buildings**

The same sand dunes that are carefully protected within the park with corded walkways and signing requesting the public stay off the dunes. These dunes are sensitive to footprints but not to bulldozers?

- **There will be impacts to the Black River**

The Black River in Sheboygan County is an impaired Waterway listed in the Level 2 restoration plan. The Black River is in an area of the state which receives a poor aquatic ecosystem health score and high vulnerability rating.

The Black River is impaired due to one or more pollutants and associated quality impacts. At least one macroinvertebrate or fish Index of Biotic Integrity (IBI) scored in the poor condition category.

Of significance is the fact the Black Rivers flows into Lake Michigan. The Black River forms the western border of the proposed project.

I question how the Black River can improve if Kohler is allowed to build a golf course in this rare ecosystem. What testing will be put in place to protect the already failing Black River?

- **Wildlife will be significantly permanently impacted-including endangered and threatened species.**
- **There will be a negative impact to Important Birding Area**

These concerns are well addressed with the written comments submitted by the Wisconsin Ornithological Society. **See Exhibit D.**

- **There will be destruction of rare plant species**

These concerns are well addressed with the written comments of Marlin Bowles, Plant Conservation Biologist at The Morton Arboretum and Timothy Bell, Professor of Botany at Chicago State University. **See Exhibit E.**

- **The natural scenic beauty of the view of the dunes from the lake will be lessened**
- **.There will destruction of archaeological sites and burial grounds**

These concerns are well addressed in the Archeological Report dated 2/16/16 sent to the U.S. Army Corp of Engineers.

- **Fencing and property boundary controls in relation to the state park are not addressed**
- **There is No mention of how the public access will be maintained for the Lake Michigan shoreline.**

These issues must not be ignored. The public lost public beach access in the Town of Mosel for Whistling Straits. The public's right to walk the Lake Michigan beach must remain. Kohler addresses an easement to the beach for the Timberlake property owners as some type of major benefit. While it is a nice gesture, granting an easement to the lakeshore for approximately 27 Timberlake homeowners does not justify taking lakeshore access away from the public. Is it likely Kohler will block access to "their" beach, but open the beach to the north owned by other lakefront property owners to Timberlake residents, who currently have no easement to the lakefront?

The EIS states that there is more information and data that would have been beneficial for the writing of the draft EIS to more accurately and with more certainty review the Project and quantify risk to environmental, historical, & archeological resources.

I agree.

How many more negative impacts do you need to just say NO?

I am asking the DNR to follow their mission statement: To protect and enhance our natural resources.

Nothing in the environment will be enhanced with this project.

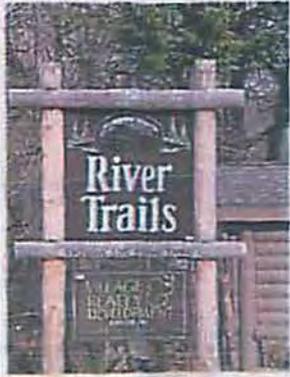
TAKE NO ACTION ON THIS PROJECT.

No economic benefits are worth the amount of destruction to the environment this proposed golf course will do to an entire ecosystem.

Jayne Zabrowski  
212 Whitetail Run Lane  
Sheboygan, WI 53081



The **NO BUILD ALTERNATIVE**, presented by Kohler, would be the best direction for the DNR's decision.



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A

Shelbygan Pres 2.9.12

# CORRESPONDENCE/MEMORANDUM

STATE OF WISCONSIN

Date: November 16, 1984

File Ref: 8700/2500

To: D.L. Weizenicker - P&R/4

From: Ed Trecker

Subject: Kohler Corporation Access Desires

Too often in our zeal to accomplish some other worthy objective we may forget laws and procedures which have been established to protect the public interest. We don't do this out of malice--we simply forget these because we don't deal with them very often. One of these situations is LAWCON 6(f).

Basically, LAWCON 6(f) was put into law to protect park and recreation agencies from raids on their lands for nonrecreational purposes, such as roads, prisons, etc. It prohibits conversion without replacement.

Attached is a request from the Kohler Company (through an agent) for a road easement on the north side of J. Michael Kohler State Park. Also attached is an opinion from our district community relations specialist stating that the action desired by the Kohler Company is a LAWCON 6(f) situation.

In my opinion, the other Kohler Company desires for access across state park lands into their holdings on the lake is also a 6(f) situation. You have the files on this and may wish to check with Pete Jensen to see if I'm correct.

If we are, in fact, dealing in a situation with Federal LAWCON 6(f) protection it may change our bargaining position.

bg

Attach.

c: John Young - Kohler Andrae

B

# CORRESPONDENCE/MEMORANDUM

STATE OF WISCONSIN

Date: November 13, 1984

File Ref: 8700

To: Ed Trecker

From: Tom Blotz



Subject: Kohler Andrae Private Access Easement

My review of the proposed easement request indicates it would violate Section 6(f) of the Land and Water Conservation Fund Act (LAWCON). The LAWCON fund was used to develop a portion of the park. Once LAWCON funds are used in a park the entire park is then subject to the rules of the LAWCON program. Section 6(f) of the program prohibits the conversion of outdoor recreation areas to other than public outdoor recreation use. The granting of an easement for roadway purposes is a definite conversion.

ma

**OVERVIEW OF HEAVILY PUMPING THE SHALLOW BEDROCK AQUIFER IN THE SHEBOYGAN AREA – by Lee Trotta, PG (USGS retired)**

**The Kohler Company had choices in deciding which aquifer to tap in development of a high capacity well for its planned new golf course south of Sheboygan. The Deep aquifers (Cambro-Ordovician age) have plenty of water but would require expensive water-quality treatment. The Shallow aquifers (Pleistocene and Silurian age) are more connected to the lakes and streams and high-capacity wells may show negative effects on those water bodies quickly.**

**With the Silurian bedrock aquifer now chosen for the high capacity well, it now becomes DNR's responsibility to determine how serious those negative effects may be both on surface water bodies and nearby residential wells. With the proper amount of data, good science can make these determinations. This data will consist of pump tests, step drawdown tests, and (more importantly) recovery tests on wells within the affected radius. In the Silurian bedrock aquifer, the radius affected by pumping may be very large due to the nature of flow in fractured bedrock. Studies of this same aquifer by Bradbury, Rayne, Muldoon, and Roffers (1998) show well capture zones extending several kilometers. Standard procedure is to perform a tracer study and/or create a groundwater model to ensure protection of local water supplies.**

C

**Reference:**

Bradbury, K.R., Rayne, T.W., Muldoon, M.A., and Roffers, P.D., 1998, Application of a Discrete Fracture flow Model for Wellhead Protection at Sturgeon Bay, Wisconsin: Wisconsin Geol. & Nat. History Survey Open-File Report 1998-04, 62 p.

## CONCERNS BROUGHT TO DNR on July 14, 2015

1. Please do not allow use of State Park land for private profit.
2. The artesian test wells drilled should be capped immediately if flooding endangers native wildflowers, endangered [REDACTED], insects, or mammals in the immediate area. This is especially important if the quality of the untreated water has high levels of contaminants (see concern #3).
3. The next concern I have is that the golf course will be using an immense amount of water for irrigation, perhaps too much. The effects of this water use will depend on which aquifer is chosen. My advice on water use comes with the experience of having been the Administrator of the Water Use Program for the State of Minnesota for 10 years. The Kohler Company's shallow test wells have apparently shown too much effect on wetlands. The Kohler Environmental Impact Report submitted to DNR states that they intend instead to "pump from the bedrock aquifer" (Section 2.2.2). My first question would be "which bedrock aquifer?" This should be public information. The uppermost bedrock aquifer is the same Silurian dolomite. Having formerly worked for Sam VanderGalien (Kohler's drilling company), I'm pretty sure they have chosen to instead tap the Deep Sandstone aquifer. I would like to explain probable consequences of selecting the deep sandstone aquifer.

The Deep Sandstone aquifer is seldom used in Sheboygan County due to the expense of reaching it and the generally poor quality of the water. For a cross section depicting the relative thicknesses of these aquifer choices and the relative water quality based on dissolved solids of these aquifer choices, see USGS Atlas HA 731 which I co-authored (1998). An excerpt is attached. There is a huge sea of saline water, heavier in weight than normal groundwater, underlying the eastern shore of Wisconsin and stretching to Michigan (from whence it came in Pleistocene time). First described by Ryling in 1961, the fluctuating location of this saline sea was documented by Grundl in 2000 and Trotta in 2006. Though mobile, this heavy water rests on the impermeable Precambrian surface with salinity lessening towards the top of the Deep Sandstone aquifer (as indicated in HA 731, 1998). This water may be fine for irrigation at first until even higher salinity water is drawn upward, but would require expensive treatment to make it drinkable. The Kohler test well is likely in excess of EPA guidelines for radium and strontium. Radium is a carcinogen and over 5 pC/L is considered unsafe for drinking. We don't want our residents or the tourists to be exposed to this health hazard. So please ascertain and report Kohler's plans for water treatment and disposal of treatment sludge (which is especially toxic).

Use of this Deep Sandstone aquifer does remove most danger of well interference, however. The closest municipal well currently tapping the Deep Sandstone aquifer is probably in Fond du Lac. Sheboygan's Fountain Park fountain used to tap the Sandstone aquifer (Trotta, 2013, Stratigraphy Corner – Sheboygan's Fountain Park Well: Wisconsin Ground Water Association newsletter, Vol. 27, No. 4, p. 1).

4. There should still be concern about the **sheer volume of pumping** planned by the Kohler Company and how it may affect general flow directions in the Deep Sandstone aquifer. Please take note of the general flow directions depicted on the attached map prepared by Roger Miller (2013, Black River Area Surface and Groundwater, Miller Engineers & Scientists, 17pp.). The golf course would pump an unprecedented amount of water in Sheboygan County during the irrigation season and would likely change the direction of regional flow arrows directly towards the golf course. The effect of this

“overpumping” may actually draw even worse quality saline water from deeper elevations east of the Wisconsin shoreline permanently degrading this part of the Deep Sandstone aquifer. For background on where these pockets of more highly radioactive waters lie and how they are affected by pumping centers, see published reports by Grundl (Grundl, T, 2000, Makoqueta Shale as Radium Source for the Cambro-Ordovician Aquifer in Eastern Wisconsin. Final Report, Wisconsin Department of Natural Resources. 19 pp.) and Trotta (Trotta, Lee, 2006, The Correlation Between Geology and Where Radium Occurs in Wisconsin: Wisconsin Water Association newsletter, Spring issue, pp. 13-14). A figure from my 2006 report is attached which shows the gross alpha readings of Deep Sandstone water samples generalized from the Fox Valley to Sheboygan. It shows that readings over 5 pC/L occur at Green Lake, over 10 pC/L at Ripon, and over 30 pC/L at Fond du Lac. These readings exhibit a trend of higher radium as one moves east towards the Michigan evaporites, even though there are no more reliable data points in that direction. I would estimate a water analysis from the Deep Sandstone well at the proposed golf course would show well over 40 pC/L of radium and planned pumping will draw in even worse water from east of the well.

Best regards,

Lee Trotta, PG  
Globetrotta Productions - President  
Wisconsin Ground Water Association Editor  
920-334-0937



WISCONSIN  
SOCIETY *for*  
ORNITHOLOGY

11923 W. Bender Rd., Milwaukee, WI 53225

E-mail: [treasurer@wsobirds.org](mailto:treasurer@wsobirds.org)

Phone: 414.353.2624

July 23, 2015

VIA EMAIL to: [DNRKohlerProposal@wisconsin.gov](mailto:DNRKohlerProposal@wisconsin.gov)

Jay Schiefelbein  
Wisconsin Department of Natural Resources  
2984 Shawano Avenue  
Green Bay, WI 54313-6727

Re: Comments of the Wisconsin Society for Ornithology on the scope of the pending environmental impact statement for a Kohler golf course proposed to be developed in the Town of Wilson, Sheboygan County

Dear Mr. Schiefelbein;

I am submitting these comments on behalf of the Wisconsin Society for Ornithology (WSO). WSO is an active, volunteer-based, nonprofit organization established in 1939. We have over 1,400 members throughout Wisconsin. Our mission is to promote the enjoyment, study and conservation of Wisconsin's birds, and we publish a peer-reviewed journal, *The Passenger Pigeon*, on bird research and issues in Wisconsin. WSO provides opportunities for all people to enjoy resident and migratory birds, while being a leading steward of, and ambassador for, Wisconsin birds. Birdwatching is a huge activity in our state. The US Fish and Wildlife Service estimates that over 1.6 million Wisconsinites enjoy watching birds at some level. (U.S. Fish and Wildlife Service 2011)

WSO has an active Conservation Committee that keeps our membership informed of important bird conservation issues, focusing on the state-wide level. These issues can affect bird populations directly or, indirectly, through habitat changes. We work to analyze the issues, provide expert advice, and help develop recommended actions to reduce potential impacts to Wisconsin birds.

The golf course proposed by Kohler here in Sheboygan County is a significant bird conservation issue that it warrants WSO'S concern.

D



Every spring and fall, tens of millions of migrating birds sweep through the Great Lakes region on their journeys between their breeding and wintering grounds. Because some of these birds may breed as far north as Greenland and the Arctic Ocean and many spend their winters as far south as Central or South America, seldom are these migration flights a one-shot deal; most are multiple-leg trips. To successfully make this journey they need spots, called stopover sites, that can provide them with critical food and shelter. Loss of stopover habitats poses an ongoing threat to migratory bird populations nationwide.

The Great Lakes region poses another challenge for migrating birds. The size of the lakes is a barrier to some migrating birds, while others will readily cross these large expanses. Those that do cross the lakes depend heavily on stopover sites along the shorelines. Birds often migrate at night, and at dawn will make their way towards land to find suitable stopover habitat in which to rest and refuel. Likewise, birds encountering bad weather while crossing the lake will also reverse direction and head for shorelines. Wisconsin birders themselves flock to the western shore of Lake Michigan during spring migration to see these flocks of migrants.

Prior to European settlement, the landscape along the Lake Michigan shoreline was dominated by northern or central hardwood forests, interspersed with a mixture of wetlands, and minor inclusions of other vegetative cover. Today, the landscape is dominated by extensive agricultural lands and human developments. The forest cover that remains is generally fragmented and scattered and housing developments have encroached on many of the remaining forest blocks. Those few undeveloped forest stands are the critical remnants of the migration stopover habitat that once was widespread in this region. The Kohler parcel is one of the few remaining large forest blocks with enough resources to support large numbers of migrants of many species through extended stopovers, which migratory bird biologists refer to as “full service hotels.” (Mehlman et al. 2005)

The DNR's *Ecological Landscapes of Wisconsin* publication says this about the lakeshore landscape in the Sheboygan area:

"The Lake Michigan shoreline is heavily used by migratory birds of many kinds, including waterfowl, loons, grebes, gulls, terns, shorebirds, raptors, and passerines. Many sites along the Lake Michigan shore are popular with birders because of the high diversity of birds and many rarities that can be observed there... Providing and maintaining a sufficient variety and abundance of the habitats needed by these birds is a priority conservation goal."

DNR's *Ecological Landscapes* publication goes on to say that one of the management needs for this lakeshore landscape is to:

"Work with private and public partners to identify and protect additional shoreline forests, as these habitats are in very short supply, public land is scarce, and bird use during migration periods is heavy. Reforestation of some areas along the Lake Michigan shoreline that are used as migratory stopover sites for land birds is generally desirable."

The area south of Sheboygan, including the state park lands, has been recognized by others as an important resource for migratory birds. It's been identified as an Important Bird Area, or IBA, a world-wide program in which Wisconsin participates. This area was recognized as an IBA due to the extensive use by birds as on-shore migratory stopover habitat and off-shore wintering waterfowl habitat. This area has also been identified by the Wisconsin Stopover Initiative as a Tier 1 area, the highest level of significance for migratory bird stopover habitat. (Grveles et al. 2011)

The golf course proposed by Kohler would result in a significant adverse change to the existing forest communities on its 247 acre site. WSO asks that the EIS for this project include a thorough examination of the role this parcel plays as stopover habitat. This examination should include the current condition and stopover habitat value of the Kohler parcel, the change that the proposed golf course would make to that habitat, and the regional significance of this area as critical stopover habitat in an already extensively developed landscape.

### **Potential Project Impacts to Breeding Rare Birds**

This section of our comments focuses on the potential effects of the proposed golf course on rare breeding birds, primarily rare forest birds. By rare birds, we mean state-listed threatened and endangered species, along with other birds identified in Wisconsin DNR's *Wildlife Action Plan* as Species of Greatest Conservation Need, or SGCN. The *Wildlife Action Plan* lists species as SGCN if they "have low or declining populations and are in need of conservation action."

We are hampered in reviewing this project's potential effects on rare birds by the protected nature of information on rare species. Exemptions in Wisconsin's Open Records law restricts public disclosure of information on the locations and populations of threatened and endangered species, and this information has been redacted in the Environmental Impact Report. Thus, WSO does not have access to information on the occurrence of those bird species that are of most interest to us or which may be at greatest risk from this proposal, but we were able to determine the listed bird species that are known to occur in area via the DNR's web-based Natural Heritage Inventory County and Township Tool, and the online database eBird.

According to eBird, 20 SGCN landbird species have been observed in the adjacent forests, shrublands, and grasslands of Kohler-Andrae State park that would be affected by this development. Based on the county-wide listing from the DNR's Natural Heritage Inventory database, there are four threatened forest songbird species, one threatened forest hawk, and one endangered shorebird that potentially could occur in the project area.

The Environmental Impact Report states in Section 2.1 that under the preferred design for the golf course, 50% of the forest cover will be removed, and Section 5.1.3 states that this loss will be irreversible. Figure ES-1 of the report shows that the remaining forest will not be a contiguous block, but will be highly fragmented by the fairways. It has been known since the 1980's that forest fragmentation is detrimental to many species of breeding forest birds, including SGCN species such as Wood Thrush and Hooded Warbler, both of which are found in the state park. One detrimental effect is the creation of edge habitat, where nest predators such as raccoons, skunks, possums, snakes, and invasive Brown-headed Cowbirds are more common than in deep woods. The nest success of breeding birds is reduced, the nests fail entirely, or the nests produce cowbird chicks instead the SGCN species. (Robinson et al. 1985) In addition, some forest-breeding birds are "area sensitive", meaning they require a certain size forest block in order to establish a viable territory and breed successfully. One example is the Ovenbird, which may be found singing in small woodland patches but not successfully breeding there.

The Environmental Impact Report states in section 4.4 that the forest cover remaining after the construction of the course will be comparable to that of the nearby residential developments. This will negatively impact breeding bird populations in the adjacent Kohler-Andrae State Park, in addition to the effects on the Kohler property itself. A recent study by the University of Wisconsin, Cornell Laboratory of Ornithology, and USDA Forest Service, currently in press in the *Journal of Ecological Applications* (Wood et al. 2015, in press), found that housing developments that are adjacent to protected lands reduce the number and abundance of species of greatest conservation need and other habitat specialists within the protected lands, although birds associated with human habitation, such as American Robins, increase. The Kohler (Black River) forest currently buffers Kohler-Andrae State Park from the effects of housing development to the north, but construction of the course and its support facilities (clubhouse, maintenance buildings, rest stations, cart barn, and parking lots) will act like other low-intensity development and affect the bird abundance and diversity in the state park.

The EIS DNR prepares on the Kohler project should include a thorough evaluation of the potential impacts to threatened, endangered, and other SGCN birds that breed in the area of Kohler's proposed golf course. We support the DNR's request for information on breeding and migratory bird surveys that may have been conducted as part of the Environmental Impact Report. We also strongly suggest that formal breeding and migratory bird surveys, following

established protocols, within the park and the Kohler forest will help define the species in greatest conservation need that are likely to be impacted by the permanent 50% loss of forest that will accompany the course construction. A formal survey will also suggest potential strategies to modify or mitigate the impact of the proposal if it is eventually approved. The Department's assessment should also include a review of the published literature on the habitat needs of the SGCN species that breed in or migrate through the area and the impact of the project on that habitat, including the quality of the remaining post-construction forest species composition, tree age diversity, ground cover, etc.

Finally, we urge the Department to thoroughly analyze the cumulative impact of this project on the entire landscape of forest and wetland bird habitat along this important migratory corridor, the western Lake Michigan shoreline, where few intact forests remain. The fragmentation of this forest, together with the past fragmentation of other habitats in the corridor, does not bode well for migratory birds.

Thank you for the opportunity to provide input into the scope of the EIS. Please contact me if you have any questions or if we can be of further assistance. I can be reached at (608) 335-2546 or at [jaegermj@charter.net](mailto:jaegermj@charter.net).

Sincerely,

[REDACTED]

[REDACTED] Vice President  
Wisconsin Society for Ornithology, Inc.

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Received Date : 19-Oct-2014

Accepted Date : 26-Jun-2015

Article type : Standard Paper

Editor: Richard Fuller

**Long-term avian community response to housing development at the boundary of US protected areas: effect size increases with time**

Running head: Refugia-benefit of protected areas lost

*Eric M. Wood<sup>1,2,†</sup>, Anna M. Pidgeon<sup>1</sup>, Volker C. Radeloff<sup>1</sup>, David P. Helmers<sup>1</sup>, Patrick D. Culbert<sup>1</sup>, Nicholas S. Keuler<sup>3</sup>, and C. H. Flather<sup>4</sup>*

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This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi:

10.1111/1365-2664.12492

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## ***Summary***

- 1. Biodiversity conservation is a primary function of protected areas. However, protected areas also attract people, and therefore land use has intensified at the boundaries of these lands globally. In the USA, since the 1970s, housing growth at the boundaries (< 1 km) of protected areas has increased at a rate far higher than on more distant private lands. Here, we designed our analyses to address our central hypothesis that increasing housing density in and near protected areas will increasingly alter their avian communities.**
- 2. We quantified the relationship between abundance and richness of protected area avian species of greatest conservation need, land-cover affiliates (e.g. species associated with natural land cover such as forest breeders), and synanthropes (e.g. species associated with humans) with housing density on the boundary of protected areas and on more distant private lands from 1970 to 2010 in three ecoregions of the USA. We accomplished this using linear mixed-model analyses, data from the U.S. Census Bureau and 90 routes of the North American Breeding Bird Survey.**
- 3. Housing density at the boundary of protected areas tended to be strongly negatively related with the abundance and richness of species of greatest conservation need and land-cover affiliates (upwards of 88% of variance explained) and strongly positively related with synanthropes (upwards of 83% of variance explained). The effect size of these relationships increased in most cases from 1970 to 2010 and was greatest in the densely developed eastern forests. In the more sparsely populated West, we found similar, though weaker, associations.**
- 4. Housing density on private lands more distant from protected areas had similar, but more muted negative effects.**

5. *Synthesis and applications.* Our results illustrate that as housing density has increased along the boundary of protected areas, the conservation benefit of these lands has likely diminished. We urge conservation planners to prioritize the purchase of private land inholdings in order to maximize the extent of unfragmented natural lands within protected areas. Further, we strongly recommend that land use planners implement boundary management strategies to alter the pattern of human access to protected areas, cluster development to concentrate the footprint of rural housing, and establish conservation agreements through local land trusts to buffer protected areas from the effects of development along protected area boundaries. To maximize the conservation benefit of protected areas, we suggest that housing development should be restricted within 1 km of their boundaries.

**Key-words:** avian abundance, avian richness, BBS, inholding, private land, public land, species of greatest conservation need, synanthrope

## ***Introduction***

Land-use and land-cover change, human population growth, excessive resource use, and climate change are leading drivers of global biodiversity loss (Cincotta, Wisnewski & Engelman 2000; Jetz, Wilcove & Dobson 2007). To stem this loss, laws and regulations have been established to protect biodiversity and critical habitats. One of the most widespread – and arguably the most important – conservation action has been the establishment of protected areas (Gaston *et al.* 2008). Since the founding of Yellowstone National Park in the USA in 1872, protected areas have become the dominate strategy for biodiversity preservation with > 12% of

the global land surface having some type of protected status (Chape *et al.* 2005). However, protected areas also attract humans, and thus land use pressures, such as extraction (Defries *et al.* 2005) and settlement (Wade & Theobald 2009; Radeloff *et al.* 2010) have increased at the boundaries of protected areas throughout the world, often with deleterious effects on protected area conservation (e.g. Woodroffe & Ginsberg 1998; Brashares, Arcese, & Sam 2001).

Globally, land-use pressures at the boundaries of protected areas have greatly intensified since the midpoint of the 20<sup>th</sup> century (Radeloff *et al.* 2010; Laurance *et al.* 2012). For example, over the past 40 years in the USA, rural housing development in the amenity-rich areas associated with inholdings and protected area borders has greatly expanded owing to the phenomenon of 'exurbanization' (Wade & Theobald 2009; Radeloff *et al.* 2010). A particular concern with housing growth in and near protected areas in the USA is the intensity and frequency of this land-use pressure since the 1970s. For example, development within 1 km of protected areas has outpaced that on more distant private lands by upwards of 13% of the national average and there are predictions for an additional 17 million housing units to be built from the present to 2030 within 50 km of protected areas (Radeloff *et al.* 2010). Housing development can affect biodiversity by causing both habitat loss and fragmentation (Radeloff, Hammer & Stewart 2005; Piekielek & Hansen 2012), which in turn affects ecosystem processes such as animal migrations (Berger 2004), species dispersal (Fagan, Cantrell, & Cosner 1999), and breeding success (Hansen & Rotella 2002). Therefore, increases in housing development at the boundaries of protected areas threaten to erode their conservation benefit (Brown *et al.* 2014; Wood *et al.* 2014).

In a previous analysis, we determined that protected area avian communities do indeed covary with housing development; species of greatest conservation need showing negative relationships and synanthropes (i.e. native and non-native species associated with humans) showing positive relationships (Wood *et al.* 2014). However, this work was focused on a single year (2000), and provided only a static look at the link between housing density and protected area avian communities. Despite establishing a spatial association between housing development and patterns of protected area avian guild abundance and richness, how this relationship changed over time remained unclear. We investigated how increasing housing density along the boundaries of protected areas and on more distant private lands has affected avian communities in these protected areas. Quantifying this relationship over time is crucial for landscape planning and management purposes because the conservation implications, and their associated costs, will be very different if avian communities have some capacity for adaptation.

Our goal here was to quantify the strength of the relationship of housing density from 1970 to 2010 with protected area avian guild abundance and richness throughout the conterminous USA. Our central hypothesis was that as housing density in and near protected areas has risen in recent decades, it has increasingly altered the avian communities in these protected areas. Based on previous efforts (Wood *et al.* 2014), we predicted that if housing density increased from 1970 to 2010, we would detect increasingly negatively relationships for species of greatest conservation need and land-cover affiliates and increasingly positively relationships for synanthropic species. We had two objectives to address this. Specifically, we quantified: (i) housing density within, and on immediately adjacent private lands of protected areas, (hereafter referred to as housing density at the boundary) and (ii) on private lands more distant from protected area boundaries (hereafter referred to as housing density outside of protected areas)

from 1970 to 2010 versus the proportional abundance and proportional richness of different avian guilds, including a) species of greatest conservation need, b) land-cover affiliates (i.e. bird species associated with a dominant land cover type such as forest breeders), and c) synanthropes.

## ***Materials and methods***

### ***Study area***

Our study area included 12 Bird Conservation Regions spanning the conterminous USA, which we grouped into three broad ecoregions based on similar land cover composition and avian communities (Fig. 1). Bird Conservation Regions (BCRs) were delineated by the North American Bird Conservation Initiative and have similar climate, vegetation, land use, and avian communities (<http://www.nabci-us.org/bcrs.htm>). We analyzed three ecoregions (Fig. 1): (i) the Appalachian and Northwoods, which included the Boreal Hardwood Transition (BCR 12), the Atlantic Northern Forest (BCR 14), and the Appalachian Mountains (BCR 28); (ii) the Deserts, which included the Great Basin (BCR 9), Sonoran and Mojave Deserts (BCR 33), and the Chihuahuan Desert (BCR 35); and (iii) the Western Mountains and Valleys, which included the Northern Rockies (BCR 10), the Southern Rockies/Colorado Plateau (BCR 16), the Sierra Madre Occidental (BCR 34), the Northern Pacific Rainforest (BCR 5), the Sierra Nevada (BCR 15), and Coastal California (BCR 32).

### ***Breeding Bird Survey data***

We gathered breeding bird count data from the North American Breeding Bird Survey (BBS, [Sauer, Hines, & Fallon 2011]). We removed BBS route-year data collected by first-year observers and route-year data collected during poor weather. For each BBS route, we used the

raw count data (abundance), and estimated species richness using COMDYN (Hines *et al.* 1999) to account for detectability issues common in avian surveys. We averaged both abundance and COMDYN-estimated richness (hereafter richness) within a five-year window bracketing each of the following five decadal time steps: 1970, 1980, 1990, 2000, and 2010. The five-year window included the two years before and after each time step. We choose the decadal time steps in order to match the US decadal census housing density data (see below). At the time of analysis, BBS data were not available for 2012. Thus, for the 2010 time step, we averaged bird abundance and richness data in a five-year window from 2007 to 2011.

When > 50% of a BBS route was within the boundaries of protected areas (see protected areas data), we included it in our sample of protected area boundary routes. We used this sampling design to quantify housing density on private-land inholdings and on lands immediately adjacent to protected areas. We only included BBS routes that were surveyed in all five decadal time steps so that we could use a repeated measures sampling design (see statistical analysis). We identified 45 BBS routes at the boundary of protected areas within the three ecoregions that met these criteria (Fig. 1), of which 13 were in the Appalachian and Northwoods region (average area of BBS route within protected area, 68%), 14 in the Deserts region (average 80% within protected area), and 18 in the Western Mountains and Valleys (average 70% within protected area).

Further, we were interested in the effect of housing outside protected areas (i.e. protected area borders or more distant private lands) on protected area avian communities. To measure this, we matched each protected-area BBS route with the nearest private-land BBS route (i.e. < 40% within the boundaries of any protected areas), and calculated the linear distance between pairs using the 'near tool' in ArcGIS 10.1 (ESRI California, USA 2012). We used a < 40%

threshold in order to capture housing density surrounding BBS routes that were located primarily on private lands neighboring protected areas, because we hypothesized that the broader modification of the landscape may impact protected area avian communities. Of the 45 private land routes in our analysis, 41 intersected the border of a protected area (see protected areas data), with an average of 23% of BBS route-area located within protected areas. The other four private-land BBS routes (14186, 69035, 72017, and 83184) were completely outside of protected areas. In order to scale the proximity-effect of private-land housing to protected areas, we divided the housing density of the 'nearest neighbour' private-land BBS route by the distance between route centroids. We performed this analysis to guard against overestimating the effects of distant high-density housing areas. In the Appalachian and Northwoods, the average distance between pairs was 30 km. In the Deserts, the average distance was 74 km, whereas in the Western Mountains and Valleys, the average distance was 61 km.

To understand how avian communities may be affected by housing development, and to scale the response variables among regions that vary greatly in avian species diversity, we calculated the proportional abundance and proportional richness of three avian guilds per ecoregion. These included (i) species of greatest conservation need (expected negative association with housing density, see Appendix S1 & S2 in Supporting Information), (ii) land-cover affiliates (expected negative association with housing density, Appendix S1, S2), and (iii) synanthropes (expected positive association with housing density, Appendix S1, S2). We considered 282 breeding bird species in all, excluding species that do not breed in our study regions, or are difficult to count with BBS methods (waterfowl, shorebirds, waterbirds, and raptors, Appendix S2). To calculate proportional abundance and proportional richness of an avian guild, we divided guild abundance or richness of each BBS route by the total abundance or

species richness of that route. We checked for correlation between pairs of avian response variables and found that the range of collinearity (absolute value of Spearman's rho) was  $|\rho| = 0.1 - 0.9$  and was strongest in the Appalachian and Northwoods. Nonetheless, we retained each guild for further analyses to understand the relationships of unique components of regional avian communities with the independent housing-density variables.

### *Protected areas data*

We used the USGS National Gap Analysis Program (GAP) Protected Area Database, version 1.2, released in April 2011, for protected areas boundary information, which demarcated private inholdings within the administrative boundaries of public lands (<http://gapanalysis.usgs.gov/padus/>). We grouped public lands by four protected area designations. GAP 1 lands have management plans in place to ensure natural processes are allowed or mimicked to maintain a natural state. These lands accounted for 4% of the area (i.e. the combined 400-m linear buffer surrounding BBS routes) of public-land BBS routes included in our study. GAP 2 lands have similar management plans as GAP 1 lands, except that infrequently used management practices, such as fire suppression, may affect the natural community. These lands accounted for 19% of the area of public-land BBS routes considered in our study. GAP 3 lands provide protection for federally endangered and threatened species, but are subject to resource extraction (e.g. mining) or recreation (e.g. off-road vehicle use). These lands accounted for 64% of the area of public-land BBS routes considered in our study. Most public-land private inholdings occur within U.S. Forest Service lands, and the majority of these are categorized as GAP 3. GAP 4 lands are publicly owned and protected from housing development, but have no known mandate for biodiversity protection. These accounted for 13%

of the area of public-land BBS routes considered in our study. The majority (87%) of public-land BBS routes under consideration in this study were located primarily (> 50% of each BBS route) in GAP 1 -3 lands. Three BBS routes in the Northern Rockies (53003, 53015, and 89007) were primarily (> 50% of each route) situated on Native American lands, which fall under GAP 4 status. However, we included these routes because they were adjacent to other public lands of our study, dominated by natural land cover (> 50% forest or grassland cover, NLCD 2001), and had the necessary bird data across the time series for our analysis. Housing density, which was our independent variable of interest (see below), is restricted on all of the four public lands categories. Further, conversion of natural land cover is restricted on all public lands of this analysis, except GAP 4 lands. Thus, we refer to all public lands as protected areas throughout the manuscript. We considered all lands not included within protected areas boundaries as private.

### *Housing density data*

We obtained housing density (hereafter referred to as housing) data, which includes permanent residences, seasonal housing, and vacation units, from the 2000 US decennial census. These data were processed at the partial block group level, which is the finest resolution unit for which the U.S. Census releases data on the year a housing unit was built (Hammer *et al.*, 2004). The average size for partial blocks throughout the conterminous USA is 2.45 km<sup>2</sup>, with rural partial block groups being larger, on average, than urban ones. We used housing backcasts calculated from the 2000 census data by Hammer *et al.* (2004) for 1970, 1980, and 1990 housing values. For 2010 housing values we used a housing projection calculated by Radeloff *et al.* (2010). We used the backcasting method because US Census data for our earlier time periods are only available at the county level (Hammer *et al.* 2004; Radeloff *et al.* 2005). We summarized

mean housing at the boundary of 400 m of BBS routes using the tool 'zonal stats' in ArcGIS

10.1. Housing at the boundary and outside protected areas was only moderately correlated from 1970 to 2010 in the Appalachian and Northwoods ( $\rho = 0.53$  to  $0.63$ ), the Deserts ( $\rho = 0.33$  to  $0.47$ ), and the Western Mountains and Valleys ( $\rho = 0.53$  to  $0.57$ ). Because the correlations were not strong in any region, we included both variables in analyses to understand effects of local and regional housing development on protected area avian community structure.

### *Statistical analysis*

To quantify the relationship between housing either at the boundary or outside protected areas and the avian community within protected areas, we fit linear mixed-effects models. We fit separate models for each guild and region, using either proportional abundance or proportional richness as the response. In each model, we included the fixed effects of either housing at the boundary or housing-outside protected areas, time step as a repeated categorical variable, the interaction between housing and time step, and a random effect of BBS route. Our models thus fitted a different slope and intercept to the relationship between the avian community and chosen housing measure for each time step, while additionally allowing for a random shift in intercept due to BBS route. We designed our analysis in this way to address our central hypothesis that increasing housing density in and near protected areas will show increasingly negative relationships on species of greatest conservation need and land-cover affiliates (negative statistical interactions over time) and increasingly positive relationships on synanthropic species (positive statistical interactions over time). The number of observations (i.e. BBS routes within protected areas) was low in all ecoregions so we fitted a separate model for housing at the boundary or outside protected areas, rather than combining both fixed-effects in the same model.

We used a *t*-statistic value of 2.0 to assess variable significance of the fixed effect parameters, and a *F*-statistic value of 2.5, derived from an ANOVA test, to identify significant interactions among time-steps. We evaluated pair-wise comparisons of slopes between time-steps using a Markov-chain Monte Carlo simulation with a Bonferroni adjustment of the alpha value ( $\alpha = 0.05/10 = 0.005$ ). We fit linear mixed-effects models using the *lme4* package (Bates et al. 2012), and the Markov-chain Monte Carlo simulation using the *languageR* package (Baayen 2011), in the R statistical software package 2.8.2 (R Core Team 2013).

## **Results**

Housing increased both at the boundary and outside protected areas in all ecoregions from 1970 to 2010 (Fig. 2). Housing at the boundary of protected areas was highest in the Appalachian and Northwoods and lowest in the Deserts and Western Mountains and Valleys (Fig. 2). The pattern was similar for housing outside protected areas, except in the Western Mountains and Valleys, where housing spiked from 1980 to 2010. Ecoregions with the greatest magnitude of relative housing growth at the boundary of protected areas included the Western Mountains and Valleys (129% increase from 1970 to 2010) and the Deserts (83% increase, Fig. 2). Relative housing growth at the boundary of protected areas within the Appalachian and Northwoods was not as strong (43% increase, Fig. 2). Absolute housing growth at the boundary of protected areas (summarized within 400 m of BBS routes) was also highest in the Western Mountains and Valleys (40 units), followed by the Appalachian and Northwoods (22 units), and the Deserts (20 units). The greatest magnitude of relative housing growth outside protected areas occurred again in the Western Mountains and Valleys (265% increase) and the Deserts (142% increase, Fig. 2). Housing outside protected areas in the Appalachians and Northwoods was high in all time steps,

but the magnitude of relative growth was less (62% increase, Fig. 2). Absolute growth outside protected areas was again highest in the Western Mountains and Valleys (69 units), followed by the Appalachian and Northwoods (46 units), and the Deserts (32 units).

The proportional abundance and proportional richness of both species of greatest conservation need and land-cover affiliates were negatively associated with housing at the boundary of protected areas in all ecoregions in all but three time steps (Deserts, proportional richness, species of greatest conservation need, 1980–2000, Fig. 3). These relationships were generally strongest and most consistent in the Appalachian and Northwoods, followed by the Deserts and then by Western Mountains and Valleys. The proportional abundance and proportional richness of species of greatest conservation need and land-cover affiliates was also negatively associated with housing outside protected areas in the Appalachian and Northwoods and Deserts. We found similar patterns for the proportional abundance of species of greatest conservation need in the Western Mountains and Valleys, but the negative association was further reduced relative to the other ecoregions (Fig. 3). Housing outside protected areas was positively associated with the proportional abundance and richness of land-cover affiliates in the Western Mountains and Valleys, which was in contrast to the other ecoregions. The proportional abundance and proportional richness of synanthropes tended to be positively associated with housing at the boundary of protected areas in all ecoregions (the lone exceptions being proportional richness: 1970 and 1980; in the Deserts), with the strongest relationships again in the Appalachian and Northwoods and the Deserts (Fig. 3). This same guild was positively associated with housing outside protected areas in the Appalachian and Northwoods, with a general trend of an increasingly positive relationship from 1970 to 2010 (Fig. 3).

We found significant negative interactions between the slope of the relationship of species of greatest conservation need (proportional abundance and proportional richness) and land-cover affiliates (proportional richness), and significant positive interactions for synanthropes (proportional abundance) with housing at the boundary of protected areas from 1970 to 2010 in the Appalachians and Northwoods (Fig. 3). We did not find the same significant interactions in other ecoregions, possibly because housing was either comparatively lower or located further away from protected areas, therefore likely muting the effects. Nonetheless, the increasingly significant interactions in the Appalachians and Northwoods reflect the pattern in which the relationship between the proportional abundance of species of greatest conservation need and housing at the boundary of protected areas became progressively, negatively, steeper whereas the relationship between the proportional abundance of synanthropes and housing at the boundary of protected areas became progressively, positively, steeper from 1970 to 2010 (Fig. 4). An explanation for these trends is that as housing increased in every decade along the boundary of individual protected area BBS routes from 1970 to 2010, the proportional abundance of species of greatest conservation need declined and synanthropes increased at an increasing rate (Fig. 4). On the other hand, as housing remained low on the boundary of protected area BBS routes from 1970 to 2010, the proportional abundance of the avian guilds remained similar (Fig. 4).

## *Discussion*

Our central hypothesis was that as housing density in and near protected areas has risen in recent decades, it has increasingly altered the avian communities in these protected areas. Specifically, we predicted that rising housing density from 1970 to 2010 resulted in increasingly negative relationships for species of greatest conservation need and land-cover affiliates and

increasingly positive relationships for synanthropic species. Indeed, we found that from 1970 to 2010, increasing housing density at the boundary of protected areas had strong negative relationships with the abundance and richness of avian species of greatest conservation need and land-cover affiliates, whereas this relationship was positive for synanthropes. We also found that increased housing outside protected areas was negatively related with the abundance and richness of avian species of greatest conservation need in the Appalachian and Northwoods and Desert ecoregions. These relationships were, however, always weaker than the effects of housing at the boundary of protected areas. Although we were only able to look at a small percentage of individual BBS routes for our study (45 total routes), our results provide evidence that the increase in housing density in and near protected areas has had increasingly negative impacts for the biodiversity conservation potential of these lands.

Housing development affects biodiversity across broad spatial-temporal scales (Hansen *et al.* 2005; Suarez-Rubio *et al.* 2013). Locally, housing development alters avian communities (Marzluff 2001; Bock, Jones & Bock 2008; Suarez-Rubio, Leimgruber & Renner 2010), negatively impacts breeding success (Hansen & Rotella 2002), and introduces non-native predatory pets (e.g. cats, [Lepczyk, Mertig & Liu 2004]), and invasive species (Gavier-Pizarro *et al.* 2010). Regionally, housing development is associated with road development (Hawbaker *et al.* 2005), fragmentation and habitat loss (Radeloff, Hammer & Stewart 2005), and the homogenization of landscapes, which in turn negatively affects biological diversity (McKinney 2002, 2006; Pidgeon *et al.* 2007, 2014). We build on the previous studies by illustrating that as housing density has risen from 1970 to 2010 in and near protected areas, this has increasingly altered avian communities (both abundance and richness) within these lands in many of the ecoregions of the USA. Thus, an increasing effect size has frequently accompanied the rise in

rural housing development. More broadly, our findings support the notion that intensifying land use at the boundaries of protected areas likely influences biodiversity within their boundaries (Woodroffe & Ginsberg 1998; Brashares, Arcese, & Sam 2001).

A central goal of protected area management is to “protect natural biodiversity along with its underlying ecological structure and supporting environmental process...” (Dudley 2008). Protected areas in the USA have greater amounts of natural land cover (e.g. forest) than surrounding private lands, have high occurrences of migratory birds (La Sorte *et al.* 2015), and support higher abundance of breeding species of greatest conservation need and land-cover affiliates (Wood *et al.* 2014). Synanthropes, which include widespread, adaptable species (e.g. American Robin, *Turdus migratorius*) have expanding population sizes (Sauer, Hines & Fallon 2011) and are most likely to thrive near housing developments (Hansen & Rotella 2002). On the other hand, endemic species and habitat specialists are declining (e.g. Kentucky Warbler, *Geothlypis formosa*, [Sauer, Hines, & Fallon 2011]), and are most at-risk due to housing development in and near protected areas. Protected areas in the USA provide habitat heterogeneity across broad spatial extents and largely limit development within their boundaries (Wood *et al.* 2014). Nonetheless, even marginal increases in housing development pose a threat to the amount of natural land cover, and in turn, the structure and diversity of protected area avian communities (Wood *et al.* 2014). Additionally, even if protected areas have high levels of protection for biodiversity within their boundaries, they are still susceptible to outside land use pressures that threaten their conservation potential (Piekielek and Hansen 2012), and development can occur on private inholdings within protected areas (Radeloff *et al.*, 2010). We extend the previous findings of Wood *et al.* (2014) by documenting the increasingly negative relationship between past increases in housing development at the boundary of protected areas

and avian communities within these protected areas. Here we show the increasing magnitude of these effects in the densely populated eastern USA, with no evidence that bird assemblages are adapting to housing development trends, and hints at the beginning of a possible degradation of avian communities in protected areas in the West. Understanding the nature and strength of this relationship was not possible with the sampling design employed by Wood *et al.* (2014) because prior work analyzed data for a single year only. Further, we found that as housing development has risen on more distant private lands, there were similar, albeit, more muted effects on protected areas avian communities. These findings call to attention the continuing need for protection of more distant private lands to ensure the ecological integrity of protected areas. Based on our results, we provide further information necessary for the management of housing development within and on surrounding lands of US protected areas.

Stemming the effects of housing development on protected-area biodiversity requires targeted conservation actions. The most important management implication from our study reflects the urgent need to limit housing development on privately owned lands within the boundaries of protected areas (i.e. inholdings) and on lands immediately adjacent to protected areas. We urge conservation planners to prioritize buying and conserving inholdings in order to maximize the extent of unfragmented natural lands within protected areas. Our results suggest that even modest housing growth on inholdings of protected areas will negatively impact species of greatest conservation need, and positively affect synanthropes. Further, our findings imply there is no evidence that bird assemblages are adapting to this land-use intensification, which we suggest indicates possible lag effects of housing development on protected area avian communities. The increasing strength of these effects was only detectable over the four-decade period of our study, and therefore our analysis revealed that identifying patterns such as we

have done here are likely not possible from shorter-term studies (e.g. Wood *et al.* 2014). While rates of relative housing growth on the boundaries of protected areas are high in the western USA, housing density is still comparatively low there. We recommend protected areas in the West, especially where there are substantial inholdings, or plans for development, should be a priority for conservation efforts. Further, a possible tangential benefit to managing housing growth in the wildland-urban interface throughout the West could be reduced economic impacts tied to fuel-wood management and firefighting costs associated with protection of structures. There are far fewer protected areas in the eastern USA compared with the West. That is why we suggest that conservation planners focus efforts on purchasing the remaining inholdings in protected areas in the East.

Furthermore, our results suggest that housing development outside protected areas will likely also negatively affect the conservation benefit of these lands. The most critical step to minimize this effect is to constrain and manage the extent of additional housing developments on neighboring lands of protected areas. Housing growth within 1 km of protected areas has far outpaced the national average (Radeloff *et al.* 2010). While our study was not designed to address the conservation effectiveness of varying buffer-extents of protected areas, we suggest that because housing development has been so strong within 1 km of these lands, development within this buffer should be limited. Our recommendation is precautionary because once homes are built it is not possible to reverse any lasting effects on protected area biodiversity. A recent review of the effects of residential development on biodiversity revealed inconclusive support for mechanisms (e.g. density, extent) in which patterns of housing development affect natural systems (Pejchar *et al.* 2015). Nonetheless, our work here highlights the urgent need to manage

housing developments on private lands adjacent to protected areas in order to maximize conservation of avian communities within protected areas. We recommend that land use planners consider and implement alternative development strategies such as conservation development (Milder 2007; Pejchar *et al.* 2007; Reed, Hilty & Theobald 2014), clustered development (Odell, Theobald & Knight 2003; Vaughn *et al.* 2014), and conservation easements (Rissman *et al.* 2007) in order to conserve natural and unfragmented habitats on private lands that can supplement protected areas in maintaining ecological processes such as migration (Berger 2004). Further, we suggest that local planning jurisdictions attempt to anticipate where future development may occur and to use existing, or pass new, ordinances that incentivize development designs that conservation scientists believe will minimize rural development impacts (see, Reed, Hilty & Theobald 2014). Only after putting such alternative development strategies into practice will we begin to establish a growing set of examples from which to adaptively confirm or refute these expectations. Also, we strongly recommend that land use planners implement boundary management strategies to alter the pattern of human access to protected areas. In addition to proactive development planning, we urge protected area managers to engage the public and private landowners in outreach and education. Such outreach should focus on direct human-wildlife conflicts, indirect conflicts (e.g. pet management), and ways to minimize threats (i.e. invasive plant species) that contribute to the anthropogenic footprint.

### ***Acknowledgments***

We gratefully acknowledge support for this research by the U.S. Forest Service Rocky Mountain Research Station, and the NASA Biodiversity Program. We thank the volunteers who have collected Breeding Bird Survey and housing census data, which have made this study possible.

We thank M. Whittingham, R. Fuller, and two anonymous reviewers for their very helpful comments to improve our manuscript. All authors declare no conflicts of interest with this work.

### ***Data accessibility***

The following data are available from Dryad Digital Repository: doi:10.5061/dryad.c2ss6 (Wood *et al.* 2015).

- Breeding Bird Survey routes.
- Housing Density backcast and forecast data summarized in 400 m buffers from associated inside and outside protected areas Breeding Bird Survey routes.
- National Land Cover Database (2001) proportional land cover summaries in 400 m buffers of inside protected areas Breeding Birds Survey routes.

Proportional richness and proportional abundance of North America Breeding Bird guilds.

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## **Supporting Information**

Additional Supporting Information may be found in the online version of this article:

Appendix S1: Additional materials and methods.

Appendix S2: BBS code, common, and scientific name of 282 bird species from which we created eight bird species groups.

Figure 1. Distribution of 45 North American Breeding Bird Survey (BBS) route centroids located on the boundary of protected areas (red dots) and their associated outside protected area ‘nearest neighbour’ BBS route centroid (black dots). We categorized three ecoregions by a combination of similar Bird Conservation Regions. The Appalachian and Northwoods were composed of the Boreal Hardwood Transition (BCR 12), Northern Atlantic Forest (BCR 14), and the Appalachian Mountains (BCR 28). The Deserts were composed of the Great Basin (BCR 9), Sonoran and Mojave Deserts (BCR 33), and the Chihuahuan Desert (BCR 35), and the Western Mountains and Valleys were composed of the Northern Rockies (BCR 10), the Southern Rockies/Colorado Plateau (BCR 16), the Sierra Madre Occidental (BCR 34), the Northern Pacific Rainforest (BCR 5), the Sierra Nevada (BCR 15), and Coastal California (BCR 32). BBS routes within protected

areas were distributed among four protected area treatments: GAP 1-4. The darker (GAP 1) to lighter (GAP 4) color gradient represents a higher to lower level of protection.

Figure 2. Mean summary  $\pm$  standard error of housing density within and outside protected areas, among three ecoregions of the USA, across five decadal time steps.

Figure 3. Coefficient values, calculated from a linear mixed-model analysis, of the relationship among the proportional abundance and proportional richness of three avian guilds, including Species of Greatest Conservation Need (SGCN), land-cover affiliates, and synanthropes, and the fixed effects of housing at the boundary or outside protected areas (PA) in three ecoregions of the USA. Coefficient values in bolded color indicate significant slope ( $t$ -value  $\geq 2.0$ ). Coefficient values with same letter (A-B) indicate slopes between time steps do not significantly differ ( $F$ -statistic  $\geq 2.5$ ). Pair-wise comparisons of slopes between time-steps were evaluated using a Markov-chain Monte Carlo simulation with a Bonferroni adjustment of the critical alpha value ( $\alpha = 0.05/10 = 0.005$ ).

Figure 4. Scatterplot and associated least-squares fitted line for the proportional abundance of species of greatest conservation need (SGCN), land-cover affiliates, and synanthropes with housing density (Housing) at the boundary of protected areas throughout the Appalachian and Northwoods region across five decadal time steps. Housing density was transformed on the natural logarithmic scale for analysis purposes, and the housing density values on the x-axis represent the exponential value (i.e. back-transform) of the transformed data (-0.5, 0, 0.5, 1, 1.5). Individual North American Breeding Bird Survey (BBS) routes are identified by unique color classification. Lines with different colors (black or gray) or patterns (solid or dashed) indicate a significant interaction of slopes among time steps based on a linear-mixed model analysis.

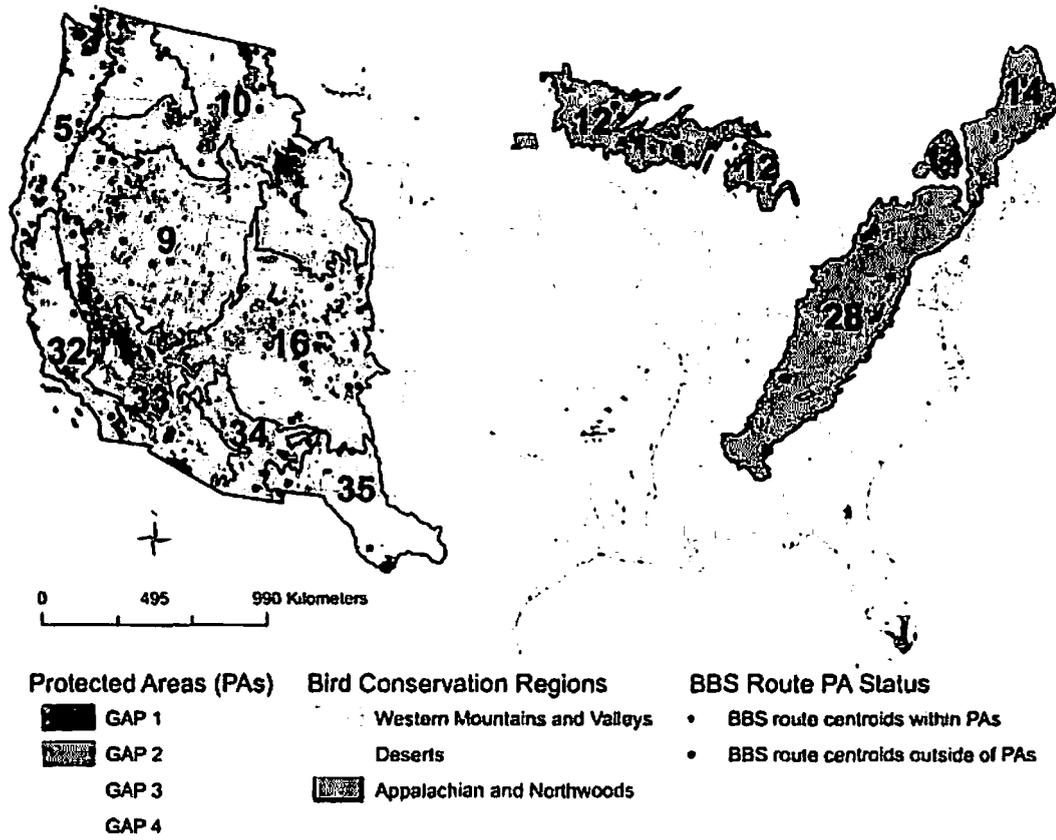


Figure 1

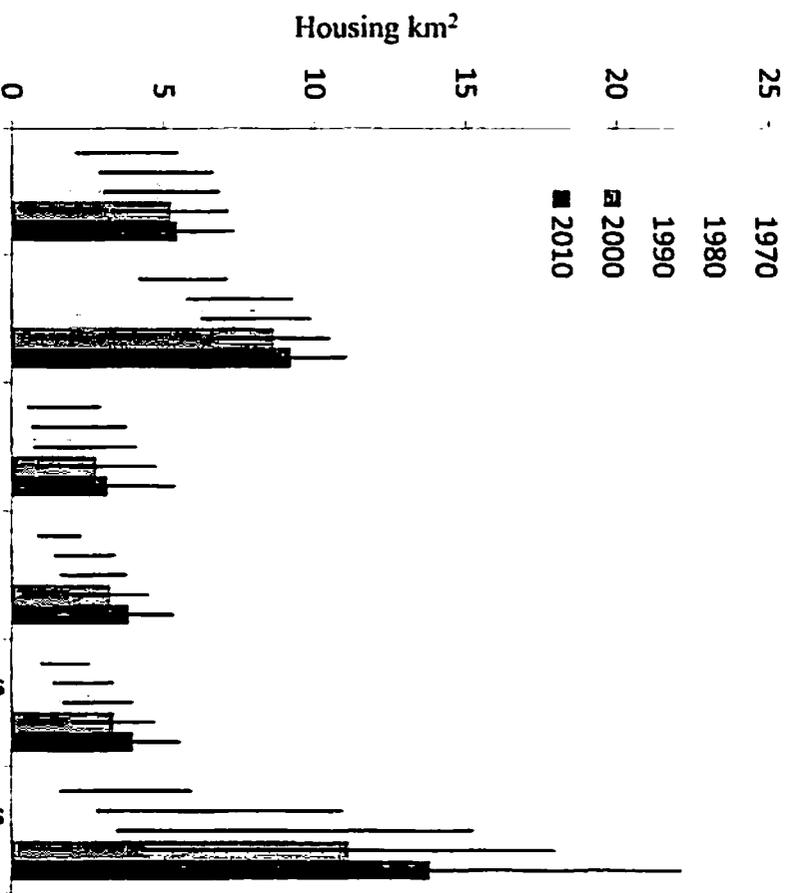


Figure 2

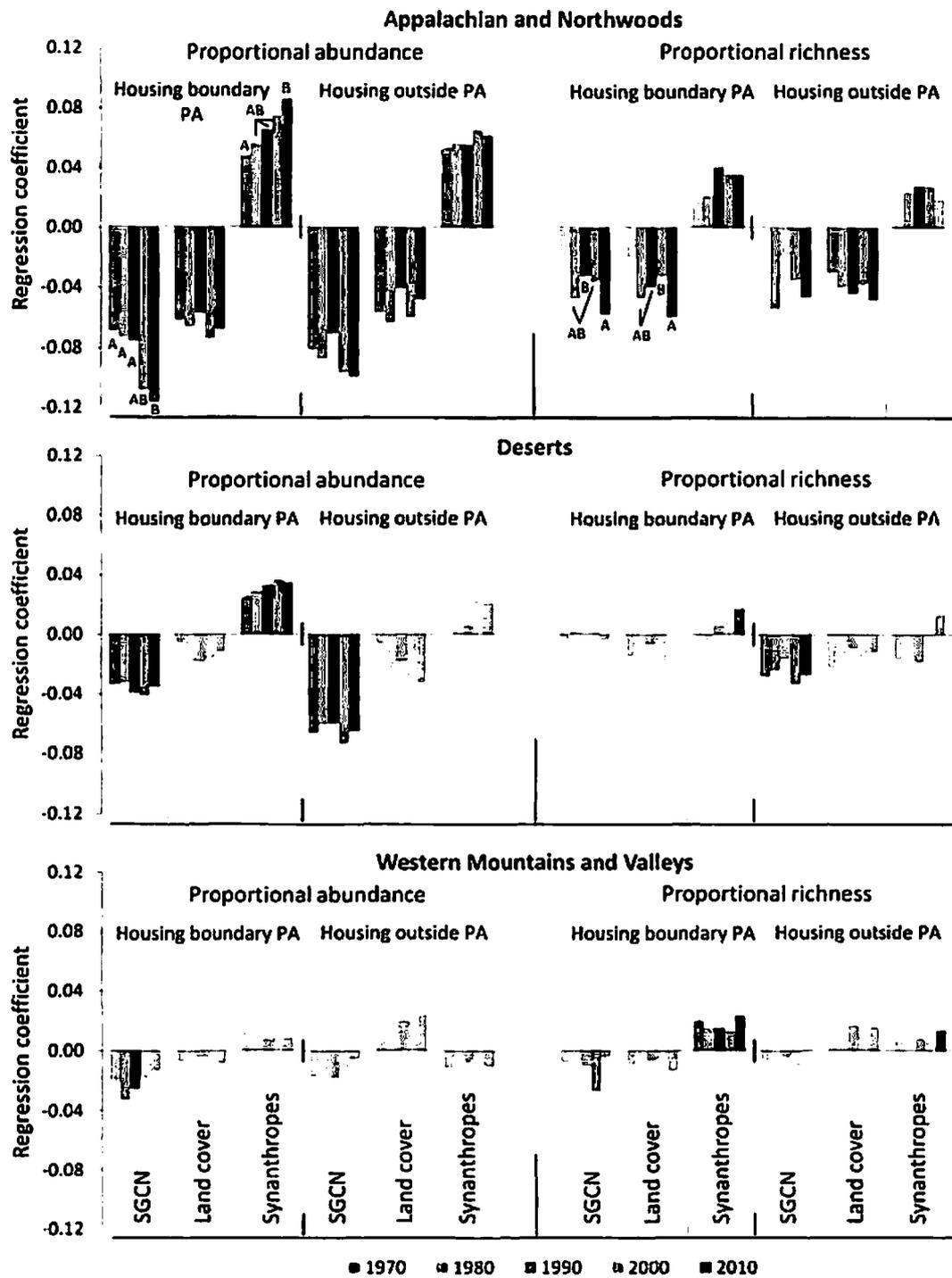


Figure 3

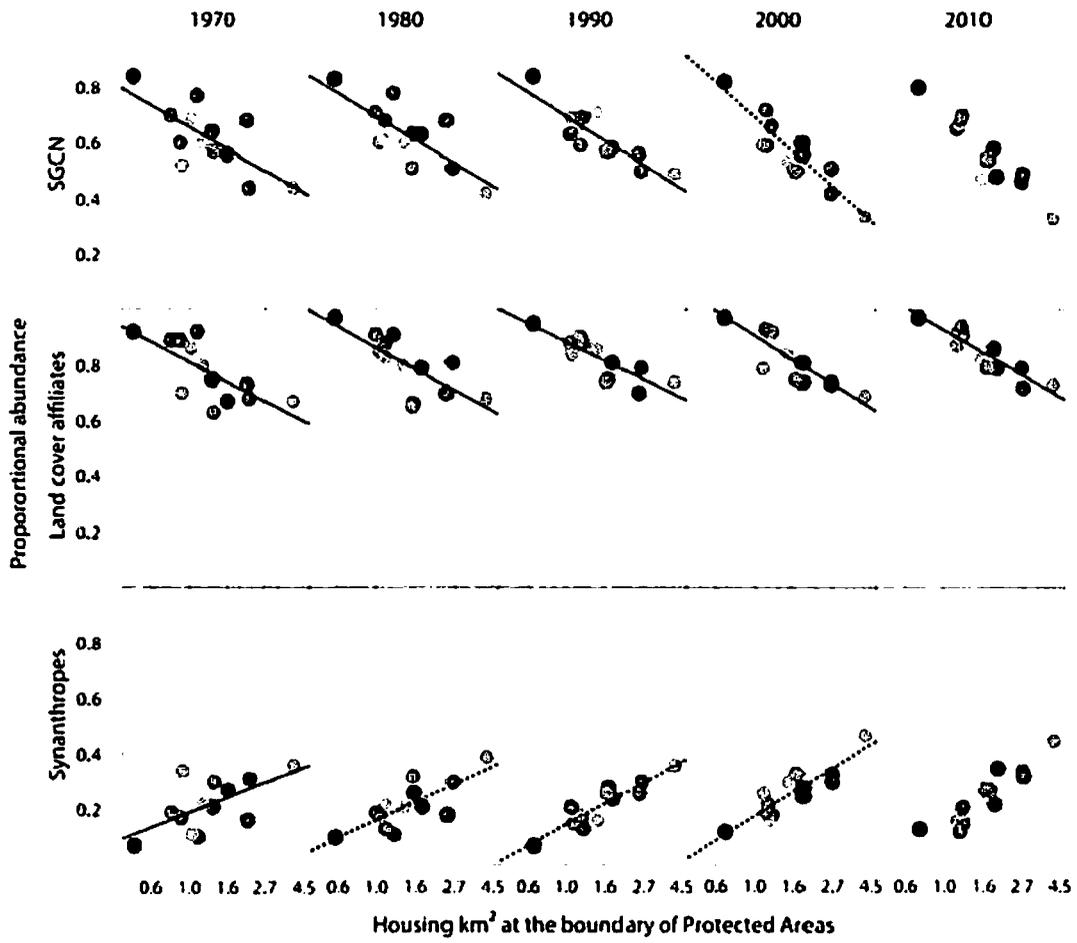


Figure 4

[Mike Thompson](#)

Natural resources region program manager

Dear Mr. Thompson:

We have reviewed the Environmental Impact Report (Project No. 193703078; proposed Golf Course-Town of Wilson -Kohler Co.) for its approach to impacts to the [REDACTED]

The report's assessment of potential impact's on [REDACTED] and proposed solutions are not adequate. The species is addressed twice, as follows:

Section 3.2.1 (Terrestrial Habitat) indicates:

sp. J. Areas of unstabilized sand provide habitat for annual dune species, including the [REDACTED]. These populations are found along the Kohler Property lakeshore.

Section 3.2.5 (Threatened, Endangered, and Rare Species) indicates:

Populations of [REDACTED] were observed on the Kohler Property with the vast majority occurring in areas outside of proposed development. The potential for minor impacts from the project exists. Although State threatened, endangered, and special concern plants are not protected on private property, Kohler will work with the WDNR to develop mitigation, such as transplanting individual plants to suitable habitat or establishing new populations in suitable areas.

As indicated in the attached February 11, 2015 letter, this information does not address [REDACTED] population size nor potential environmental impacts requirements to the population. It also does not address the presence of additional plants in the adjacent Kohler-Andre State Park and potential impacts to this population. It also implies that transplanting will be used to mitigate impact.

Our work with this species has shown that populations require shoreline ecological processes maintained by natural sand dune ecosystems. We have also found that populations with close proximity may rely on gene exchange through pollinators and seed dispersal for population maintenance. We have also found that transplanted plants have relatively low potential for survival and seed production., and thus reduced input to population maintenance.

These issues need to be addressed and expanded in the EIS. Critical questions include 1) what are the size, structure, and dynamics of the [REDACTED] populations on property adjacent to the proposed golf course (this includes populations on adjacent dunes and in the adjacent state park)? 2) What environment processes maintain these populations and

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how do the populations interact (do they comprise a single population), 3) what is the potential for golf course construction and maintenance to alter ecological and biochemical processes that maintain these [REDACTED] populations and their habitats, including impacts to adjacent habitats (e.g., sand loss or deposition in the state park). 4) what are potential mitigation efforts?

Marlin Bowles

Plant Conservation Biologist

The Morton Arboretum

Timothy Bell

Professor of Botany

Chicago State University

cc: Kathy Pollack, US Fish & Wildlife Service.