



# Power to the Pedal E-Bikes: Your Next Mode of Travel?

by David Chase

If you'd like to bike more but are put off by hills, a relatively long commute, or the need to combine children or other cargo with a long or hilly commute, you might consider an e-bike—a bicycle with a battery-powered electric motor assist.

A modern e-bike adds a compact battery-powered motor to a regular bike frame (though many are designed specifically to be e-bikes). The electric motor provides extra oomph. The e-bike motor, sized between 100 and 1,000 watts, can be mounted in one of the bike wheels or drive the chain. Wheel drive is more easily added

to an existing bicycle; chain drive can take advantage of a bicycle's gearing and thus provide more effective assistance through a wider range of speeds.

The battery is mounted either to the frame or in a rack, and the control is typically located on the handlebars. Controls can be throttle-style (like a motorcycle or scooter) or proportional input. Proportional controls measure how hard you are pedaling and use that to determine how much electric-assist to add. If you rest, the motor rests; if you pedal hard, the motor runs more.



The BionX motor is integrated with the gears. This unit can be added to a non-electric bike.

DAVID CHASE

## *Trend began in the 1990s*

E-bikes have become more common, affordable, and practical with improvements in batteries, electronic controls, and high-strength magnets developed for laptop computers, cell phones, and hybrid and electric automobiles. This has led to their increasing popularity. In Spain, Madrid has bike share, but Madrid also has hills, so the city's "Hubway" equivalent has e-assist. Japan produced the world's first e-assist bicycle in 1993, and five years later developed an electric "mamachari" bicycle for carrying children and groceries; now there are numerous models by several manufacturers. Some Chinese cities have banned two-stroke scooters because of high pollution levels. The ban led to a huge new

market for "electric two-wheelers," both motor-assisted bicycles and electric scooters.

For some idea of how much a small motor can help, consider how much power a human produces and how fast that propels them. An ordinary adult can produce about 100 watts pedaling without too much trouble, enough to travel 12 to 14 mph on an efficient bicycle.

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**An ordinary adult can produce about 100 watts pedaling without too much trouble, enough to travel 12 to 14 miles per hour on an efficient bicycle. A motor adding 250 watts can get you up a hill at 12 mph.**

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**Belmont Citizens Forum Inc.** is a not-for-profit organization that strives to maintain the small-town atmosphere of Belmont, Massachusetts, by preserving its natural and historical resources, limiting traffic growth, and enhancing pedestrian safety. We do this by keeping residents informed about planning and zoning issues, by participating actively in public hearings, and by organizing forums. Our **Newsletter** is published six times a year, in January, March, May, July, September, and November. Published material represents the views of the authors and not necessarily those of the Belmont Citizens Forum.

Letters to the editor may be sent to  
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Doubling that speed to 25 mph requires about 300 watts, a power output that only the best athletes can sustain for more than a few minutes; but with a motor adding 200 extra watts, it's no problem for an ordinary cyclist.

### *E-bikes help you add speed and/or cargo*

Hill climbing consumes far more power. For a total weight of 220 pounds (100 kilograms), 100 watts (human power) will propel you up a 5% grade at only 4.5 mph. With an assist that adds 250 watts, you can easily maintain a 12 mph speed while riding up a 5% grade.

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**A 1,000-watt assist might seem extravagant, but Belmont has a few roads with at least a 15% grade.**

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A 1,000-watt assist might seem extravagant, but Belmont has a few roads with at least a 15% grade, and a heavy cargo bike carrying children and some groceries can easily total 250 pounds before adding its rider. Tripling the grade and doubling the weight requires six times as much climbing power for a given speed—600 watts for 4.5 mph, 1,200 watts for 9 mph. That's not practical on your own, but with 750 or 1,000 watts of assist, it is. For someone trying to live without a car, this can make the difference.





The Xtracycle is built with the battery attached to the frame and the motor is attached to the front crankset.

### *Working the hills*

Christine Flood, a friend and former colleague, commented, "I own a bright purple Pedego. I mostly use it for riding around town. I tried to use it to commute to work, but the bike lockers weren't big enough to accommodate it. I bought it because I live on the top of a hill and I need to keep up with two teen/tween boys. I've had it for several years and it's been mostly trouble free. There was the one time my elder son tried to accelerate into a curve and wiped out. Both the bike and the kid had minor injuries."

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I found myself starting to make excuses to not ride my bike to the local supermarket four blocks away because I dreaded that hill.

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Todd Consentino, Belmont's geographic information systems and database administrator, lived at the top of a steep hill. "I was carrying two children on my bicycle and knew I would soon be carrying a third. My kids were getting heavier. I found myself starting to make excuses to not ride my bike to the local supermarket four blocks away because I dreaded that hill. Installing a mid-drive e-assist on my cargo bike eliminated my excuses. It's one of the best decisions I've ever made."

Like many, Carice Reddien of Belmont, owner of Bicycle Belle in Somerville, was motivated by a major hill (Centre Avenue/Old Concord Road). "I ride pretty much every day, between 10 and 25 miles a day (occasionally 30) carrying kids, groceries for a family of four, library books, and miscellaneous. I commute five days a week, pick up my kid from preschool two days a week, and then do errands/outings on the other weekdays. I get about 25 miles per charge—depending on how much of a hurry I am to get home.

"People are often surprised how fast this giant bike is going," she adds, "especially since the motor is small, quiet, and central and the battery is inside the box."

### *How green are e-bikes?*

People often ask whether adding an e-assist to a bike lessens the "greenness" of cycling. E-bikes are very green transportation. There's a tendency to think that because an e-assist relies on power usually supplied from fossil fuel, it is less green than relying on our own legs to propel a bicycle. If we bike daily, however, we eat more food to power our legs, and that food also has an environmental cost. An exact comparison is messy, but as long as the e-assist is used at bicycle-like speeds, it generally has a slight edge over legs as a power source. If the alternative is a car, there's no contest; even an electric car uses far more energy than an electric assist bicycle.

### *E-bikes currently lack a uniform legal status*

The federal government regulates what may be sold as an e-bike, but each state also has its own definition and rules for how they may be used. The federal definition is relatively sensible and conservative: bikes must have pedals, may have a motor that provides an assist of up to 750 watts, and assisted speeds may not exceed 20 mph. States have power limits ranging between 500 watts and 2,235 watts, and speed limits of 20, 25, and 30 mph. Alabama and New York State require registration like motorcycles, plus a driver's license to operate.

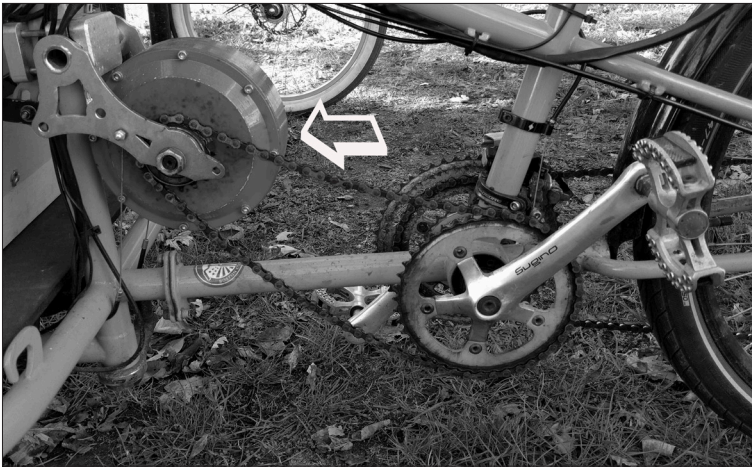
## Massachusetts's e-bike regulations

In Massachusetts, an e-bike may have up to 1,000 watts of assist and a speed limit of 25 mph. Operators must have at least a learner's permit, and they are required to wear a helmet. E-bikes are excluded from off-street recreational bicycle paths, which includes the Minuteman Bikeway and the Fitchburg cutoff path from Belmont to



DAVID CHASE

Todd Consentino uses his bike to carry children and other "cargo." His bike has an older, aftermarket assist called a "StokeMonkey." It only fits on cargo bikes; normal bikes don't have enough room. The arrow shows the StokeMonkey in closer detail below.



DAVID CHASE

Alewife. In practice I've seen e-bikes on these paths, and I've never heard of the law being enforced there, but I have heard of the law being enforced on the unpaved path around Fresh Pond.

California's e-bike regulations are important because it is such a large market that it is likely to set de facto standards for the rest of the country. Their rules can be summarized as "federal standards, used just like a bicycle:" no age limit, no special helmet rules, no licensing rules, no exclusion from paths.

California's regulations also include a definition of "type 1" (pedal proportional assist) and "type 2" (throttle-controlled assist) e-bikes, though both are currently treated alike.

## Safety depends on the rider

The main safety concern for e-bikes is increased speed. For most people, a steady stream of passing cars is uncomfortable and so as a default they prefer to travel at the speed of traffic. However, safety statistics suggest that traveling at higher speeds, with the flow of traffic, is not actually safer. Higher speeds produce more violent crashes, reduce the time available to avoid a crash, and increase the chances of surprising drivers who weren't expecting something bicycle-sized to move quite so fast. Higher speeds also increase risks to pedestrians. Bicycle-caused pedestrian deaths are very rare, but they usually involve speeds higher than 20 mph.

The federal (and California) limit of 20 mph is a compromise; it's a little faster than typical bicycle commuting speeds. Slower speeds would be safer, but many fit cyclists can maintain 20 mph for half an hour or more, so it's not that unexpected or unusual.

## What do they cost?

They're relatively pricey, until the economies of scale bring the prices down. Cargo bikes such as the xtracycle 8e are \$5,000, while the nicest non-electric cargo bikes are about \$3,300.

The WorkCycle Kr8 bakfiets is \$4,000, \$6,700 with stokemonkey assist added. (If you import it yourself, the price comes down considerably.) The lowest price model currently is the Pedego at \$2,300, which comes with a twist throttle.

For comparison, my cargo bike, if you could buy it outfitted as it is, would be well over \$3,000, probably closer to \$4,000.

## Where to try or buy

If you're interested in trying and perhaps buying an e-bike, they're sold in several local stores. Pedego has a shop in Cushing Square, and Wheelworks in Waverley Square sells several models. Bicycle Belle in Somerville carries a variety of e-assisted cargo bikes.

David Chase is a member of the Belmont Citizens Forum board and is an avid cyclist.



# A Cleaner Town, One Driveway at a Time Belmont Drives Electric Campaign Continues

by Madeleine Barr



Lara Hirner and Jason Reed, the first Belmont residents to purchase an EV through the BDE program, with their new Chevrolet Volt.

Join the movement.

Belmont is one of the top five towns in Massachusetts for electric vehicle adoption.

Belmont Drives Electric (BDE) is a community initiative launched in October 2016 designed to highlight the benefits of driving electric vehicles (EVs) and make it easy for you to get behind the wheel. Through this initiative, Belmont residents in cooperation with several local dealers have taken test drives and moved forward with a lease or purchase of an EV.

Below is an interview with Jason Reed and Lara Hirner, the first Belmont residents to purchase an EV through this program.

***What kind of car do you drive?***

We have a 2017 Chevy Volt.

***What inspired you to get an electric vehicle?***

We wanted an electric car because we're very environmentally conscious and decided it was finally time to put our money where our mouth was with our vehicle. Our previous car was 27 years old. We have a Tesla Model 3 reserved but won't get it for another two years or so. We heard about the BDE program and decided to check it out to see if there wasn't an option for us to fill

in the time to the Tesla with a more environmentally friendly car.

***What is your favorite aspect of driving an EV?***

What isn't our favorite part? Fluid gearless acceleration, freakishly quiet, almost never visiting gas stations anymore. But perhaps the best and most unexpected benefit is that our driving mindset has transitioned from 'how fast can I get there?' to 'how efficiently can I get there?' Driving is now a more mindful experience and previous impatience has been replaced with a sense of calm.

***How long have you lived in Belmont?***

We're new to Belmont (we moved from Somerville) but love the sense of community. The electric car program has certainly been a part of that. Plus Belmont is close enough to the city for a decent commute but far enough out to give us more space and a yard with a great neighborhood.

***How likely are you to recommend Belmont Drives Electric to a friend or relative?***

Very likely. In fact, we have already told many friends (some Belmont residents) about the program.

As of December 30, 2016, there were 53 electric vehicles in Belmont, and 10 of those were newly purchased since the BDE program launched in October, 2016.

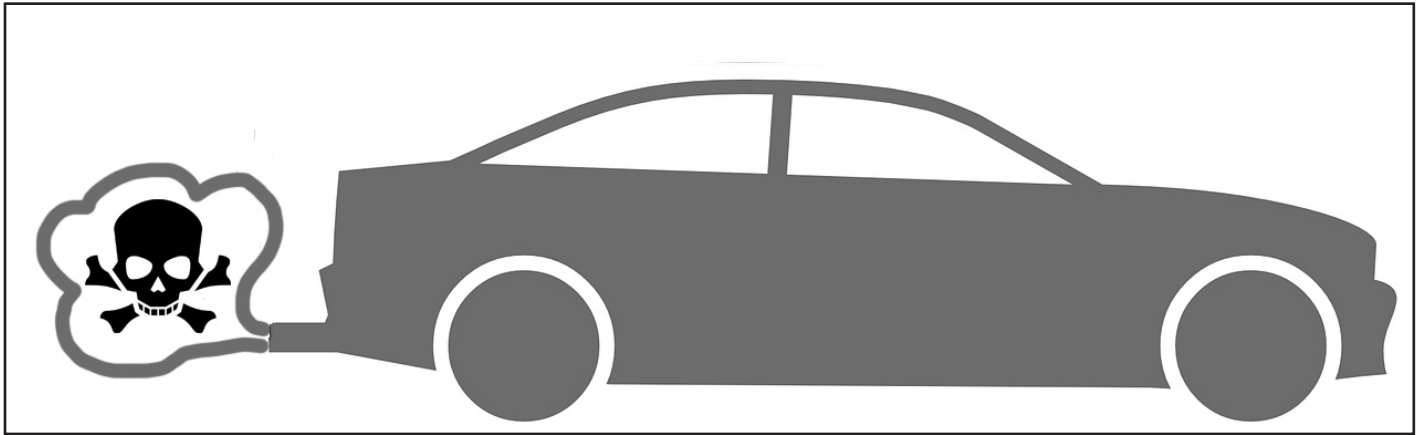
If you want to learn more or get behind the wheel of an EV for a test drive, please visit [BelmontDrivesElectric.org](http://BelmontDrivesElectric.org).

Madeleine Barr is the community outreach manager at Sagewell, Inc., a consulting partner of Belmont Light on energy-saving projects.

## No Idle Threat

# Idling Harms Your Car and Your Health

Compiled by John DiCocco



PIXABAY STOCK IMAGES

Idling your car—leaving the engine running while the vehicle is parked or standing—is bad for your car, your wallet, your own health, and the environment.

One of the unfortunate inventions of the past few years is the auto ignition feature that allows owners to start their cars remotely (to “warm up the engine”), without having to step outside. With new car technology, it’s totally unnecessary. But beyond that, it’s dangerous, because it allows carbon monoxide to build up in your driveway, and may even seep into the car.

Everyday in the US, millions of cars and trucks idle needlessly, sometimes for hours, and an idling car can release as much pollution as a moving car. Even worse, the pollutants build up in a contained area, concentrating their toxicity.

### *Never idle in a garage*

Never let a car idle in a garage, even with the garage door open. Carbon monoxide, remember, is odorless, tasteless, invisible—and deadly.

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**Idling for more than five minutes is illegal in Massachusetts.**

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Also, you might be surprised to learn, *idling for more than five minutes is illegal in Massachusetts* (Massachusetts General Laws, Chapter 90, Section 16A).

With newer cars, warming up an engine and warming up the car’s interior both work more efficiently once the car is moving. No one loves getting into a cold car. But we choose to live in New England, we have warm coats, and most cars today will warm up within two or three minutes, once they’re on the road.

There are numerous sources describing the problems with idling, and one of the most succinct and informative comes from Sustainable Belmont’s Cleaning the Air Campaign. Its webpage lists interesting myths and the facts that clarify them.

Sustainable Belmont members work with Belmont’s public works and police departments and the Belmont Public Schools on the Cleaning the Air Campaign.

For more information or to join the Cleaning the Air Campaign Working Group, please contact [sustainablebelmont@gmail.com](mailto:sustainablebelmont@gmail.com).

### **Selected websites for more information:**

- [gogreenwilmette.org](http://gogreenwilmette.org)
- [edf.org/climate/reports/idling](http://edf.org/climate/reports/idling)
- [mass.gov](http://mass.gov) (Energy and Environment Dept)
- [green4ema.org/everything-you-need-to-know-about-idling/](http://green4ema.org/everything-you-need-to-know-about-idling/)
- [edf.org/transportation/reports/idling](http://edf.org/transportation/reports/idling)
- [fueleconomy.gov/feg/driveHabits.shtml](http://fueleconomy.gov/feg/driveHabits.shtml)
- [consumerenergycenter.org/transportation/](http://consumerenergycenter.org/transportation/)



## IDLING MYTHS AND REALITY

**Myth: The engine should be warmed up before driving.**

- Idling is not an effective way to warm up a vehicle—driving is.
- An engine is sufficiently warm after 30 seconds, even in winter.

**Myth: Idling is good for your engine.**

- Engines are designed to drive, not idle.
- Excessive idling can damage engine components including cylinders, spark plugs, and the exhaust system.
- Your engine is not working at peak operating temperature when it's idling, *so fuel does not go through complete combustion.*
- Idling allows water to condense in the exhaust system causing corrosion and can reduce the life of the exhaust system.

**Myth: Shutting off and restarting is hard on your engine and uses more fuel.**

- More than 10 seconds of idling uses more fuel than restarting the engine.
- Frequent restarting has little impact on engine components

**Myth: Idling for a few minutes doesn't matter.**

- Idling wastes fuel and money. Idling five minutes here and there throughout the day can add up to more than a gallon wasted in a day.
- Burning gasoline contributes to climate change gases. Every gallon of gas produces about 20 pounds of carbon dioxide when combusted.
- Vehicle idling contributes to air pollution at the local and community level.
- If you're going to be parked for more than 10 seconds, turn off your engine.

**Myth: I need to keep my car running to keep it warmed up in the winter.**

- Cars only need 30 seconds of idling on a cold day before driving. Today's modern engines warm up more quickly once a car is operating.

*Examples of Wasteful Idling:*

- While waiting for passengers
- In drive-through lanes at restaurants or banks
- Pulling over for a phone call (pulling over is good; leaving the car running is not)
- Running quick errands
- Stopping to talk to an acquaintance or friend
- Prestarting the car while preparing to leave the house
- Listening to the end of a song or story on the radio

## FIVE EASY WAYS TO REDUCE IDLING

1. **TURN IT OFF.** Turn off the engine if the vehicle is going to be parked for more than 10 seconds (except in traffic).
2. **DRIVE.** *Drive* your vehicle to warm it up rather than idling (no more than 30 seconds is needed on winter days to circulate the oil through the engine).
3. **KEEP YOUR CAR WELL-TUNED.** A poorly maintained car can release as much as 100 times the pollution of a well-maintained car.
4. **TRIP CHAIN.** Combine multiple trips into one outing.
5. **SPREAD THE WORD.** Tell a friend about how to keep an engine healthy, save money, reduce pollution, and never idle in the driveway—or anywhere else, if you can avoid it.

# Response To Reader Comments

## Pay As You Throw—More Information

By Kim Slack

*In our last issue, we published an article by Belmont resident Kim Slack, a member of the town's recycling and waste committee, advocating for the Pay As You Throw (PAYT) approach to trash collection. One hundred and forty-three Massachusetts communities use PAYT. With PAYT, you pay for each trash bag you want to have collected. The BCF Newsletter received a few notes that offered dissenting views and we invited Slack to respond.*

I appreciate everyone's feedback. I hope this will clarify the benefits of PAYT. Hiding the cost in our taxes for trash disposal is unfair, inefficient, costly, and degrades our environment. Nearly half of Massachusetts' communities have found the PAYT approach—where those who produce more trash pay more—a workable solution, and our current Republican governor and former Democratic governor both back this approach.

The objections to PAYT raised by some readers are understandable. Allow me to address them.

*"It may contribute to illegal dumping."*

According to the Massachusetts Department of Environmental Protection, communities that have strong outreach during a transition period (e.g., warning citizens about the fines for dumping), see very few incidents of dumping. Belmont has a per household annual income over \$100,000, so it reduces the odds of folks trying to avoid the \$2 bag fees due to financial hardship. However, cleanliness is a strong value in Belmont, and many have seen and picked up litter. With the savings from PAYT, the town could afford to do more picking up and litter prevention with public barrels and recycling bins, as well as enforcing dumping laws.

*"The 1990 override."* Some feel the town is bound by a decision that was made 26 years ago that raised additional funds in an override to pay for trash and recycling. That decision never

prevented the town from charging for trash, yet some believe it still does. Global warming wasn't as well-known an issue then as it is today. New solutions should not be removed from consideration just because we couldn't foresee our current situation back in 1990.

*"It's burdensome for low-income families."*

Special arrangements could be made for those in low-income housing and seniors on fixed income to provide discounted bags.

*"It's politically challenging."* A 2014 poll by Public Policy Polling of mostly Massachusetts communities with PAYT shows that 79% of residents view it favorably and only 20% claimed that having PAYT made them less likely to vote for the official who implemented it.

Belmont pays more money for a system that produces 25% more trash and greenhouse emissions. Again, I urge citizens to consider this alternative to our current system, and help provide a cleaner environment for all of us.

Kim Slack is a member of Sustainable Belmont.

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**Contact:**  
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# Go West, Young Rider Mass Central Rail Trail's Westward Progress

by John Dieckmann

When completed, the Mass Central Rail Trail (MCRT) will stretch 104 miles, from North Point Park (opposite the Museum of Science at the Boston-Cambridge line), all the way to Northampton. The Belmont Community Path would eventually be a segment of the MCRT. As the community path feasibility study moves forward here in Belmont, several towns to our immediate west are making ongoing progress developing segments of the trail.

The epicenter of trail progress today is Wayland, which is likely to be first to complete the projects listed below. We'll describe the plans town-by-town in order heading westward, in Waltham, Weston, Wayland, and Sudbury.

**WALTHAM.** As the Belmont Citizens Forum reported in its November-December 2016 *Newsletter*, an RFP for the detailed design of the Waltham section was released in October, though it was soon rescinded in order to add more detail. Currently Waltham is redrafting the RFP to include information about a critical gap in the Waltham portion of about 3,800 feet, from Waverley Square to Beaver Street.

The town intends to pay for the detailed design using Waltham Community Preservation funds, then pay for construction with state and federal highway funds via the Boston Region Metropolitan Planning Organization, whose Transportation Improvement Plan allocates capital funding over a five-year period. In preparation, local residents have cleared the Waltham right-of-way during several volunteer days over the past two years. It has since been kept up almost single-handedly by Laurel Carpenter, a Lexington resident and leader of the Waltham Land Trust volunteer trail stewards. The Waltham right-of-way now is easily passable on foot or on mountain bike.



JOHN DIECKMANN

The ceremonial groundbreaking in Wayland. Manning the shovels, from left to right, are Cherry Carlson, chairwoman of the Wayland board of selectmen; Dan Hill, Wayland planning board member; and Larry Kiernan, leader of the Wayland Friends of the MCRT. Both Carlson and Hill have been longtime local supporters of the MCRT.

**WESTON.** Planning and design is underway to continue the trail from the Waltham western border for three miles in Weston. An Eversource transmission line shares the Weston right-of-way; the company will build an access and maintenance road that it will share with the MCRT. (Eversource, formerly Northeast Utilities, merged with Boston-based NStar, and is New England's largest energy provider.)

**WAYLAND.** The access road from Weston will continue for about two miles into Wayland until it reaches the Wayland Depot. The project was presented to the Wayland Conservation Commission on October 20. The plan is for construction to get underway in spring of 2017.

From the Wayland depot, the MCRT crosses Routes 27 and 126 just north of Route 20 (Boston Post Road). A short segment (0.3 miles) runs westward until it crosses Route 20 near Russell's Garden Center. A crowd of about 50 public officials and grassroots advocates was on hand for this segment's groundbreaking November 15.

This work has been combined with a flood control project and will improve parking at the depot as well. The cost of the project is being covered by a combination of developer funding and Wayland Community Preservation funds.

JOHN DIECKMANN



The MCRT right of way, looking eastward from the Wayland Depot Area.

**SUDBURY.** Going west from the Wayland project, again the right-of-way is shared with Eversource, which will build another access road, again doubling as the community path for the MCRT. That segment will include the rest of Wayland (another mile) and all of Sudbury (five-and-a-half miles), joining with the north-south Bruce Freeman Rail Trail, which continues through Framingham, Sudbury, Concord, Acton, Westford, Carlisle, and Chelmsford. This segment is advancing steadily, and will be the subject of an update in a future newsletter.

#### Conclusion

Within a relatively few years, these segments of the MCRT could be complete, including the Belmont section. Belmont residents can look forward to travelling unimpeded from Somerville all the way to the Sudbury-Hudson town line, a distance of about 20 miles.

John Dieckmann is vice president of Belmont Citizens Forum and an avid cyclist.

## Environmental Events

### Friends of Fresh Pond Reservation Annual Meeting and Potluck Supper **Sunday, January 22, 5-7 PM**

Help us celebrate over 15 years of educational programs and stewardship. Enjoy good food and learn about the activities of the Friends group. Following supper, we will briefly review the past year, then share ideas for future programs and projects at Fresh Pond in a relaxed roundtable discussion. Guests and newcomers welcome. RSVP to Catherine Pedemonti at [friendsoffreshpond@yahoo.com](mailto:friendsoffreshpond@yahoo.com). *Basement of Neville Place, 650 Concord Avenue, Cambridge*

### Winter Nature Storytime at Fresh Pond **Friday, January 27, 10-11 AM**

Friends of Fresh Pond host children and their caretakers for some arts and crafts, followed by nature story time. We will read about what humans and wildlife do during the winter. Bring warm clothes for a winter walk. Enter the back of the building and turn left. *Art Room at Neville Place, 650 Concord Avenue, Cambridge*

### Mass Audubon's Superbowl of Birding 2017 **Saturday, January 28, 5 AM-5 PM**

How many species can you spot? The challenge is renewed this year, with prizes awarded in 10 categories. Rules and entry fees at [bit.ly/2ilz5ro](http://bit.ly/2ilz5ro) *Joppa Flats Education Center, 1 Plum Island Turnpike, Newburyport*

### "More than Honey" Documentary Screening **Monday, January 30, 6-7:30 PM**

Friends of Fresh Pond host a film journey through the honeybee colonies in California, Switzerland, China, and Australia. This 2012 documentary explores the phenomenon known as colony collapse disorder and how it will impact humanity. *First floor of Neville Place, 650 Concord Avenue, Cambridge*

### Sustainable Belmont Meetings **Wednesday, February 1 & March 1, 7-8:30 PM**

Sustainable Belmont's regular monthly meeting. *Assembly Room, Belmont Public Library, Concord Avenue, Belmont*

### MA Water Resources Commission **Thursday, February 9, 1-4 PM**

Discussions of conditions, regulations, hydrologic monitoring, and more. *Conference Room 2B, 100 Cambridge Street, Boston*



## Stew & Brew: Eat, Drink, and Be Merry

**Friday, February 3, 6:30-9 PM**

Join us by our cozy fire for a hearty meal to celebrate midwinter with friends in true local style. Enjoy a sampling of tasty winter stews and locally made beers from Jack's Abbey, Rapsallion, and Peak Organic. *Drumlin Farm Wildlife Sanctuary, 208 S. Great Road, Lincoln*

## Cambridge Climate Protection Action Committee Meetings

**Thursday, February 9 and March 9, 6-8 PM**

Meetings are open to the public. February agenda: Project Drawdown, Decarbonizing the City. March:

Decarbonizing the City, Compact of Mayors. *City Hall Annex, 344 Broadway, Cambridge*

## The Merrimack River Eagle Festival

**Saturday, February 18, 2017, 9 AM-4 PM**

Please join us for a grand celebration of these special winter residents—a joint event by Joppa Flats Education Center and the Parker River National Wildlife Refuge. Visit eagle hot spots 9 AM–4 PM; eagle tour 9 AM–1:30 PM; photograph eagles with Hunt's photo experts 2-4 PM. *Joppa Flats Education Center, 1 Plum Island Turnpike, Newburyport*

*All listings are subject to change without notice. Call or write ahead to confirm.*

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PHOTOS by Madeleine Barr, David Chase, and Evanthia Malliris.

COPYEDITING by Sue Bass, Virginia Jordan, Evanthia Malliris, and Edward Sanderson.

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