



# Cycling in an E-Bike Fleet

A Multi-Phase Approach  
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# WPI

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# Multi Phased Approach to Implementing an E-bike Fleet

We recommend that GLAC use a phased approach for implementing e-bikes. This plan is designed to reduce the initial cost of the program. Phase one of this plan is a small-scale e-bike program designed to allow the park to understand interest and demand. If the initial program is successful, then the additional phases can be set up as guidance to expand the fleet. As the fleet ages, cyclic replacement can be completed in later phases when the bikes from the first phase become too old.

## Overview of Plan Phases

1

Station five e-bikes in West Glacier for staff commuting between headquarters and Apgar Village, as well as other areas on the west side. The Volunteer Bike Patrol can use these bikes during the hiker-biker season.

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2

Add 5 more bikes to the West Glacier fleet if interest and demand are high. All previous use cases still apply. Expand to rangers so they can also use e-bikes for patrolling.

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3

Expand to East Glacier, St. Mary, Two Medicine, and Many Glacier if there is interest in those locations. This would involve obtaining another grant to purchase bikes and build infrastructure suitable to house them.

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4

Expand the fleet so any staff are able to use an e-bike if they choose to. At this point, staff would have access to as many e-bikes as traditional bikes.

# Phase 1

## **Sourcing**

Refer to e-bike model comparative analysis to determine the e-bikes that best fit the park. This decision will be made by park administration based on current park and financial conditions.

## **Sourcing Options**

1. Buying e-bikes being rotated out of a vendor’s fleet. These e-bikes are still generally in very good condition, with over 200 charge cycles remaining. 200 charge cycles will last several years in GLAC’s use case. Sourcing e-bikes this way will significantly reduce the cost per bike.
2. Buying new e-bikes wholesale. This guarantees new e-bikes with 500-1000 charge cycles remaining. Wholesale purchasing of e-bikes can reduce the cost per bike by up to 50%.

**Table 1:** E-bike model comparative analysis

→ <b>Comparing Class 1 E-bike models</b>				
<b>MODEL</b>	<b>USE</b>	<b>COST (RETAIL)</b>	<b>REMOVE BATTERY?</b>	<b>FEATURES</b>
<b>Scott Sub Sport eRide 20</b>	<b>Utility</b>	<b>~\$3900</b>	<b>Yes</b>	<b>Pannier rack, rear wheel lock</b>
<b>Kettler Traveller E-gold 5 Plus Belt</b>	<b>Utility</b>	<b>~\$3900</b>	<b>Yes</b>	<b>Pannier rack, rear wheel lock, drive belt</b>
<b>Aventon Pace 500.3 Step Through</b>	<b>Cruiser</b>	<b>~\$1599</b>	<b>Yes</b>	<b>Pannier mounting points</b>
<b>Specialized Haul ST</b>	<b>Utility</b>	<b>~\$2800</b>	<b>Yes</b>	<b>Pannier Rack, largest battery</b>
<b>Aventon Soltera Step Through Ebike</b>	<b>Hybrid</b>	<b>~\$899</b>	<b>Yes</b>	<b>Pannier mounting points</b>

**Table 1.** Comparison between top, middle, and low tier e-bikes pick based on the needs of GLAC that have been mentioned in interviews.

## Sourcing Continued

- Start with five to ten e-bikes. Phase one also includes additional equipment including rear panniers, helmets, and locks.
  - Every bike needs a helmet and lock.
  - One pannier will be needed for every e-bike.
  - A stock of basic repair parts for the new e-bikes, which includes chains, brake pads, shifter cables, and tires

## Storage

- The e-bikes will be stored and charged in the current Red Bike garage. The current garage can support 12 e-bikes charging simultaneously.
- Batteries will be charged when not in use or overnight in the Red Bike garage.
- Removable batteries are highly recommended for GLAC. Removable batteries can be charged separately from the e-bike. Lithium-ion batteries are damaged by being charged in very hot or cold environments, so being able to charge them indoors will greatly extend their lifespan. Removable batteries also lessen the indoor storage requirements of an e-bike program, since the bikes themselves can be stored outside or at people's homes. The batteries can be charged on a rack as seen in Figure 1. Once the batteries are charged, e-bike fleet users can pick up batteries for their bike.

**Figure 1: Battery Storage**



**Figure 1.** Glacier Outfitters, an activity vendor in Apgar Village that rents e-bikes, has an e-bike battery charging setup showing batteries on a metal rack in a raised storage shed. (J. Wessler, 2023)

## Maintenance

- Cyclic replacement: The bikes can be slowly added in the phase plan similar to ones that exist with other equipment in the park, to minimize the upfront cost of the fleet each year.
- We spoke to Montana E-bikes, Glacier Outfitters, and A7 cyclery. All expressed interest in working with GNP on a potential e-bike fleet.
  - Glacier Outfitters located in Apgar Village, which is inside the park. However, they are a small operation that may be overwhelmed with GNP's fleet.
  - A7 Cyclery and Montana E-bikes are located in the Whitefish area, a 50-60 minute drive from the headquarters area. This introduces a greater risk of damage. We learned that a very common cause of e-bike damage is during transport, since e-bikes are heavier and more likely to fall off bike mounts. However, A7 and Montana E-bikes are much larger businesses that can support GNP's e-bikes.
- Scenario 1: If there is a maintenance engineer at Glacier Outfitters, the maintenance could be outsourced there. Although Glacier Outfitters does not hire a maintenance engineer every year, they could be a possible source of assistance.
- Scenario 2: Maintenance could be insourced with proper funding. A grant could include funding for a maintenance engineer. The engineer would care for the e-bikes and make sure the batteries are not on the chargers for an extended period. A grant could also pay a current staff member to take on maintenance of the fleet.

**Figure 2:** A7 Cyclery Maintenance area



## **Distribution**

- E-bikes for Phase one will be stationed in HQ in West Glacier.
- Bikes can be checked out for short periods of time or for the whole summer season. This process will be similar to the process the Red Bike program currently uses. Participants would receive a helmet, key, and a rear pannier if needed.

## **Use Cases**

- Interpretive Staff
  - HQ, Apgar Village, and other areas on the west side
  - Commute from Apgar Visitor Center to guided hikes
  - Apgar Visitor Center to Lake McDonald boat launch
  - Other short distances to replace cars
- Volunteer bike patrol use during hiker-biker season

## **Security**

- Some bikes come with locks that disable the bike and render it useless if the key is not present.
- When a bike isn't checked out for use, it can be stored and charged in the Red Bike garage.

## **Rider Safety**

- A representative from a rental or maintenance vendor can come to Glacier to give a brief educational lesson to show the basics of e-bike safety and maintenance to new users. This education lesson can include many basic fixes such as a broken chain, or a popped tire. Giving staff an educational lesson about e-bike will hopefully increase their e-bike knowledge so that staff do not get stranded.

**Figure 3:** Charging port on an E-bike



## **Cost**

The cost of the e-bike depends on the model, and additional accessories:

- Rear pannier: ~\$100 REI Co-op Brand
- Bike lock: ~\$18 Kryptonite
- Helmet: ~\$50 Cannondale Brand
- Tool Kit: ~\$30 Basic tool set

Total per bike: ~ \$198 per bike in accessories

# Phase 2

## **Timeline**

If Phase one is successful, the park should assess use and demand on a regular basis and determine if additional phases are needed. Phases two to four are designed to roll out e-bikes to more areas in the park and accommodate new use cases.

Demand could be assessed on an annual or bi-annual basis. Topics to consider include staff interest in e-bikes, potential new use cases, and observed maintenance costs of the current e-bike fleet.

## **Sourcing**

- Same as Phase one, unless there are extenuating circumstances or financial restrictions.
- We recommend GLAC analyzes demand, interest and costs to determine the quantity of e-bikes. It is recommended to buy five or more e-bikes at a time to take advantage of wholesale discounts.

**Figure 4:** E-bike fleet at Montana E-bikes



## **Staff Opinion**

- Gauge staff opinion on e-bikes and if the e-bikes have proven useful for work tasks or commuting as part of the decision to move to Phase two.
- Gather staff opinions, which can be utilized when choosing bike models.
  - This can be done if some work groups are not satisfied with the current e-bike models.
  - For example, if staff prefer cruiser style e-bikes over mountain style e-bikes, the second round of e-bike purchasing would focus more on cruiser style e-bikes.

## **Use Cases**

- All previous use cases
- Ranger use while patrolling

# Phase 3

## **Timeline**

If there is demand in East Glacier for e-bikes, a similar program can be implemented in St. Mary or Two Medicine. Similar to Phase one, this program could start with five to ten e-bikes. Depending on demand, Phase two and three could be swapped if there is a high level of demand for e-bikes in East Glacier.

## **Sourcing**

- Same as Phase one, unless there are extenuating circumstances or financial restrictions.
- Consider the different environment of East Glacier when deciding e-bikes models. East Glacier is more hilly and at a higher elevation, resulting in more unpredictable weather patterns. Riders will need more assistance from their e-bikes, necessitating more powerful motors, larger batteries, and more advanced pedal assist features.
- Number of e-bikes can be determined by the park based on observed use of Phase one. It is recommended to buy five or more e-bikes at a time to take advantage of wholesale discounts.

**Figure 5:** E-bike fleet in storage



## **Staff Opinion**

- Taking staff opinions into account is very important for this phase. The e-bikes should not be brought in if there are no staff interested in the program. Local staff could be asked what kind of bike they feel would best suit their job tasks.

## **Use Cases**

- E-bikes will be used for commuting in and around East Glacier.
- Travel between St. Mary and nearby areas
  - St. Mary Utility Area Historic District (staff housing) and St. Mary Visitor Center
  - St. Mary Utility Area Historic District to St. Mary Campground



## **Storage**

- Since there are very few storage options in places like St. Mary and Two Medicine, there will need to be a storage facility built in each location.
- A garage like the current Red Bike garage with charging and maintenance infrastructure would be suitable in these other locations.

## **Maintenance**

- If there is a staff member enthusiastic about the program, they could assume some responsibility for maintenance of a smaller fleet.

**Figure 6:** Existing Red Bike storage and Maintenance Facilities



# Phase 4

## **Timeline**

After the implementation of Phases one to three, GLAC will reassess the e-bike fleet. This will be done in order to identify any issues with the fleet or the bike share model. The park may then expand the fleet so that any staff are able to use an e-bike if they choose to.

## **Sourcing**

- Given that several years will have passed since the introduction of the program, the park may want to consider e-bike models with new technologies or features.
- Add bikes in locations based on demand and projected use.
- Ideally, there would be an equal number of e-bikes and traditional bikes. This will allow staff to choose what type of bike to use and so there are enough of each option for interested staff members.

**Figure 7:** Current Breaker in the Red Bike garage



## **Maintenance**

- Continue using the current maintenance plan unless the park determines they are insufficient. A larger e-bike fleet will need more maintenance. This may require the funding of a maintenance engineer to work on the e-bikes full time or outsourcing to a larger vendor.

## **Storage**

- By this time, bike storage would most likely be full in all locations, especially if the original Red Bikes are still present. A new storage structure would need to be constructed around headquarters.
- If there is still room in the Red Bike Garage, the breaker would need to be upgraded at this time. 12 e-bikes charging at once is 75% of the breakers load. To avoid tripping the breaker, it will need to be upgraded if more than 12 bikes are charging in the garage.

### Funding:

- Provided that this service fleet is popular with staff, some funding that is currently dedicated towards large gasoline-powered vehicles can be redirected to fund the e-bike fleet. This is very dependent on the popularity of the program and the observed ability of e-bikes to replace the roles of large vehicles.
- Otherwise, another grant may need to be applied for to fill out the rest of the fleet. Since this phase could take months or years, there could be accumulating data showing that e-bikes will help GNP reach their climate goals.