MR340pro User guide

CONTENTS

OVERVIEW

MR340ProPaddler offers MR340 race logistical support and navigational assistance for the lower Missouri River, from Kansas City to St. Charles. It provides:

- A graphical display of your location, the channel and river objects, such as wing dams, without the need for a network connection.
- Race state: Accurate river mile readout, distance and estimated time of arrival to checkpoints and river access points.
- Statistics: Efficiency measure, max speed, average speed, track speed, average track speed, minimum speed required to meet arrival goal, bearing error and crosstrack error.
- Race planner: Plan your race and then plot a progress graph, hour vs. river mile, to see how you are doing and adjust the plan as needed.
- Texting of checkpoint information to race officials (auto and semi-auto modes).
- Auto texting to ground support with ETA to a selected access point every X minutes.
- Location tracking with RaceOwl
- Ability to reverse waypoints (if you want to paddle upstream).
- Path logging and export to KML.
- Simulation mode.

DEVICE SETUP

SETTINGS

1. MR340ProPaddler requires that your **standalone GPS services be enabled** on your Android device. If GPS is not enabled, you will only be able to run in simulation mode.

   Instructions for turning on your GPS:

   a. From your home screen, enter your Settings menu.
   b. Scroll down to the “Personal” section.
   c. Tap on “Location services” or “Location access.”
   d. From this screen, you can toggle on or off any of the location services your phone offers.
   e. On most phones, that includes your carrier’s and Google’s location services, plus standalone GPS services.
2. Turn off any unnecessary service to conserve power. For example:
   a. Wi-Fi
   b. Bluetooth
3. It is recommended that you disable the auto-screen rotation. A screen rotation causes an app to restart.

   Instructions for turning off the screen rotation

   a. Open your device’s Settings menu
   b. Scroll to “Display”
   c. Un-check “Auto-rotate screen”

UPDATE TO THE LATEST APP VERSION

You can update apps or allow apps to be updated automatically on your Android device.

1. Open the Google Play Store app.
2. Touch the Play Store icon > **My Apps** to view your downloaded apps. Apps with available updates are labeled "Update."
3. Select individual apps to update or touch **Update all** to download all available updates.

Tip: In some cases, you may need to restart your device to update an app.

See: https://support.google.com/googleplay/answer/113412?hl=en

AUTOMATICALLY UPDATE APPS

1. Open the Google Play Store app.
2. Touch the Play Store icon > **My Apps** to view your downloaded apps. Apps with available updates are labeled "Update."
3. Select the app you want to update.
4. Touch Menu > Check the box next to "Auto-update" (depending on your device, your Menu icon may look different).

- When the **Auto-update** box is selected, the app will update automatically when updates are available.
- To turn off automatic updates and manually approve updates, ☐ uncheck the box next to "Auto-update".

POWER CONSIDERATIONS

Battery life is the biggest issue with using the phones for the MR340 race. You'll need to augment your power and because there are so many phones out there and different race strategies, one solution does not fit them all.

TYPICAL ANDRIOID POWER REQUIREMENTS PER FUNCTION

Power strategy will depend on your device and how you intend to use it. The table below shows 'typical' power needs for an Android. This provides only an estimate since each phone is a little different on how it consumes power.

Item	Meaning	Sample value (mA)
screen.on	Additional power used when screen is turned on at minimum brightness	200
screen.full	Additional power used when screen is at maximum brightness, compared to screen at minimum brightness	200
bluetooth.active	Additional power used when playing audio through bluetooth A2DP	14
bluetooth.on	Additional power used when bluetooth is turned on but idle	1.4
wifi.on	Additional power used when wifi is turned on but not receiving, transmitting, or scanning	2
wifi.active	Additional power used when transmitting or receiving over Wifi	31
wifi.scan	Additional power used when wifi is scanning for access points	100
dsp.audio	Additional power used when audio decoding/encoding via DSP	14.1
dsp.video	Additional power used when video decoding via DSP	54
gps.on	Additional power used when GPS is acquiring a signal	50
radio.active	Additional power used when cellular radio is transmitting/receiving	200
radio.scanning	Additional power used when cellular radio is paging the tower	1.2
radio.on Additional power used when the cellular radio is on.	This is a multi-value entry, one per signal strength (no signal, weak, moderate, strong)	1.2
cpu.active	Additional power used by CPUs when running	100
	Device current draw	**968.9**

As a power consumption example, let's assume you plan on finishing the race in 75 hours, you plan on sleeping 5 hours each night, so your app-on time is 60 hours and assume that you plan on running the screen on all the time.

Screen on + screen on bright + gps + Cpu.active = 200 + 200 + 50 + 100 = 550 mA. 550 mA * 60 hrs = 33000 mAh. This is your power requirement for the entire race. **Note**: this would be worse case since you would not need the screen bright during dusk and night time paddling. But never hurts to be a little conservative.

Furthermore, assume you are planning on using a 3AA battery charger as augmentation and your fully charged phone battery has a 3000mAh capacity (this is typical). Lithium Ultimate AA batteries typically have 3000mAh each capacity. Which means you would need a fully charged phone to start and at 10 Lithium Ultimate AA batteries to finish the race.

ESTIMATED BATTERY POWER REQUIRED FOR THE MR340

The amount of extra power you will need to have access to will vary significantly depending on how you use your device. This table shows the estimated power you will need as a function of usage*.

Estimated battery needs for a 88 hour race	
app use strategy	Extra battery power (mah)
Occasional status (phone is mostly off)	NA
Texting and RaceOwl only	11393
Texting and navigation (audio day, screen night)	17584
Texting and navigation (all screen)	39069

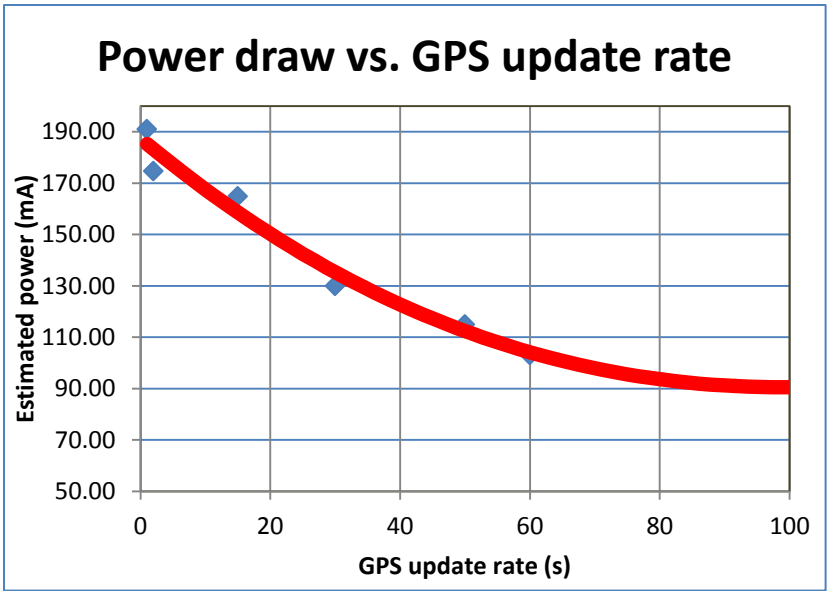
***Note: actual power draw will vary with your device**

POWER DRAIN AS A FUNCTION OF GPS UPDATE

GPS update rate has an impact on battery life. The faster the update rate the better the GPS accuracy but the worse the battery drain.

The chart shows the current draw impact of slowing down the update rate. Update rates longer than 60s* per update do not improve your battery drain significantly.

If you are looking for reasonably accurate speed estimates, then the update rate should be equal to or faster than 5s* per update.



***Note: actual power draw will vary with your device**

POWER SOLUTIONS

Below are just a few solutions that folks have come up with. **It is highly recommended that you test your power solution before the race**. Try to keep your phone running for a representative amount of time. Make sure your battery can both run the phone with app running and charge it at the same time.

1. Battery pack(s). Buy 2 10000 mAh battery packs, as one pack drains, give it to your ground crew for charging
    a. http://www.amazon.com/Poweradd-trade-10000mAh-Portable-Smartphones/dp/B00ITILPZ4/ref=sr_1_1?ie=UTF8&qid=1404470513&sr=8-1&keywords=10000+mah+portable+charger
2. 3AA battery pack. This one is simple and is doable by just a trip to Wal Mart. Get the pack and Lithium Ultimate batteries. Have your crew resupply batteries as needed or just pack a bunch.
    a. http://www.amazon.com/Energizer-Instant-Charger-Mobile-Phones/dp/B0093GIME8/ref=pd_sim_hpc_4?ie=UTF8&refRID=13VMFZFDX8XE93M7A65S
    b. http://www.amazon.com/Energizer-Ultimate-Lithium-Batteries-L91/dp/B004EFT2BU/ref=sr_1_5?s=hpc&ie=UTF8&qid=1404471532&sr=1-5&keywords=lithium+ultimate+AA
3. 5Watt solar panel to charge and run the phone during the day. Use phone's internal battery to run the phone at night. Keep 10000mah rechargeable battery pack as backup. This solution is my favorite as it is the most economical, it works for the unsupported, and you don't have to keep buying batteries each year (app = 5, panel = 35, battery pack=20, total cost = $60)
    a. http://www.harborfreight.com/5-watt-foldable-solar-panel-charger-60449.html

   b. http://www.amazon.com/Poweradd-trade-10000mAh-Portable-Smartphones/dp/B00ITILPZ4/ref=sr_1_1?ie=UTF8&qid=1404470513&sr=8-1&keywords=10000+mah+portable+charger

4. Phone hot swap. Got a ground crew and a friend with an android? Swap phones at each checkpoint and have the crew charge a phone.

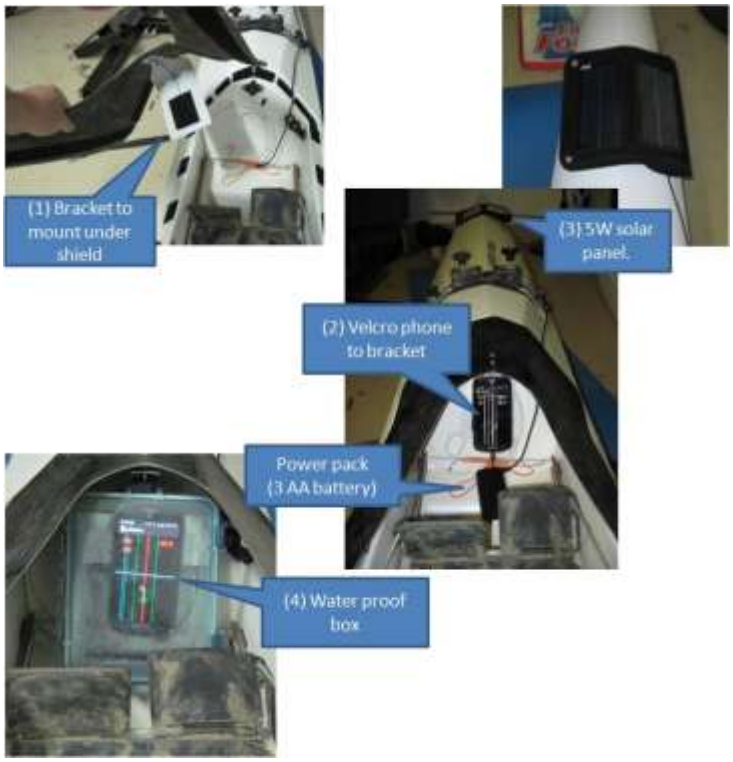
PHONE MOUNTING

Some thought will need to be put into phone mounting.

- Direct sunlight makes viewing the phone's screen very difficult, if not impossible, so you will want to have some shade for the phone.
- You will need to make provisions for waterproofing the phone or at least guarding the phone against stray water droplets. (water droplets will register as 'touch events' on your phone. A badly aimed water droplet can cause hit the back button and cause the app to exit.
- You will need to make provisions for power augmentation.

MOUNTING EXAMPLE

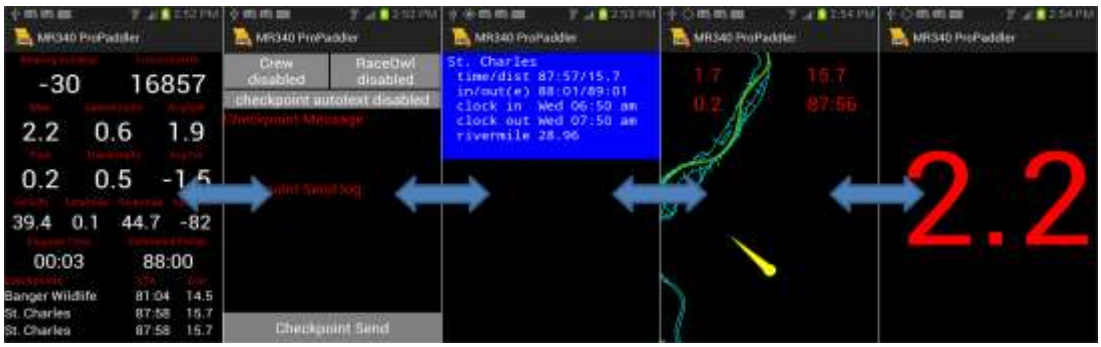
1. A simple bracket out of some sheet metal to support the phone under the sun shield/drip shield.
2. Velcro the phone to the bracket. Use of some sort of splash guard/water proofing is recommended.
3. Velcro the solar panel as far away from paddle drip zones as possible. This minimizes the water drops that will evaporate leaving a little river dirt behind and can eventually degrade the panel's performance. I'll wrap the panel in a gallon zip lock baggy to keep the panel dry and replace the baggy as dirt accumulates.
4. A waterproof box works well if you have the real estate. This worked really well for our canoe. The box was placed near the feet of the stern paddler under a tarp for shade. For my surf ski, real-estate is precious so I'm going forgo the box.



MR340PROPADDLER QUICK START

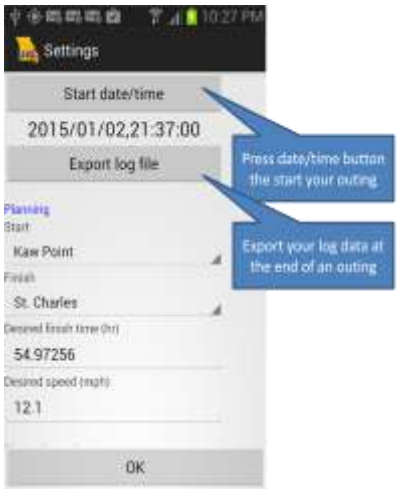
a. Set the appropriate device settings.
b. Open MR340ProPaddler. The app will initialize its location and read waypoints, objects and checkpoints. You will see the status screen, which will appear similar to this:

c. Swiping the screen left to right and right to left moves between MR340ProPaddler views.



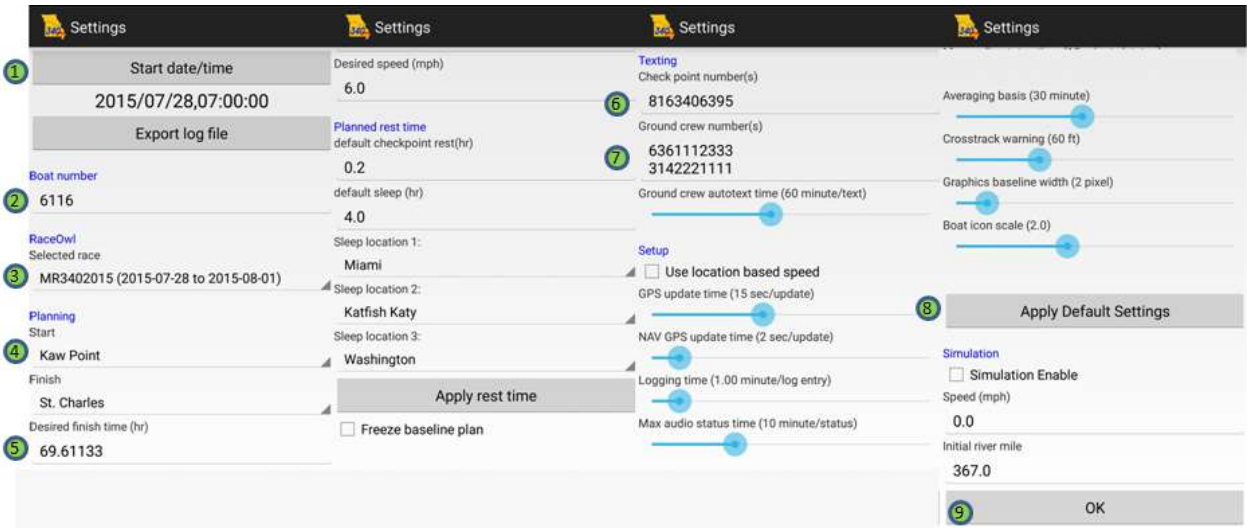
d. Basic setup and usage
   a. Open the Settings menu. The Settings menu is big; scroll to see all options.

   b. Set the start time.



   c. Set your desired settings – see recommended settings
   d. Exit settings.
   e. Swipe the screen to either the status screen or the navigation screen.
   f. Paddle, paddle, paddle.
   g. When done, open Settings and press the Export log file button to create data files from your outing.

RECOMMENDED SETTINGS



1. Enter the start for the race by pressing the Start date/time button. The app will begin operation (texting, logging, etc) after that time is realized. **Do this just before every outing**.
2. Enter your boat number. This will be your ID for RaceOwl and checkpoint texting
3. Select the proper RaceOwl race to enable update of the RaceOwl interactive map with your location (note a cellular service is required for this feature)
4. Verify that the start and finish points are correct.
5. Enter your desired finish time. Enter any planned rest/sleep locations – Press Apply rest times.
6. Enter the checkpoint texting number (no hyphens, no spaces, just the area code and number)
7. Enter your crew text number (you may enter more than one phone if you desire, separate them with a new line)
8. Press the Apply Default settings button. This will restore the settings to the recommended values.
9. Press OK to save your settings and begin ProPaddler operation

OPERATING MODE SETTINGS CONSIDERATIONS

The above settings assume a texting and navigation strategy with audio updates during daytime. Consider the following settings modifications if your strategy

app use strategy	Settings modifications
Occasional status (phone is mostly off)	Settings • Set RaceOwl to none to disable it • GPS update time to 2 seconds. You will want GPS to update quickly once you turn your phone on to check your status • Turn off logging (slide the bar all the way left) • Set averaging basis to minimum (5 minutes) Texting screen – turn off texting • Toggle crew auto text to off (use the context menu) • Toggle the checkpoint autotext to off (use the context menu) NAV screen – recommended configurable parameters • Touch one or all four of the configurable parameters to select: average rivermile speed, plan speed, and estimated finish time
Accurate Speed Monitor	Settings • Set use location based speed – this will give more accuracy to your speed that the normal phones gps. The response will be very accurate if your paddling is accurate, however, it gets that accuracy by trading away reaction time. • Set GPS update rate to 2 seconds or less. The longer between GPS updates, the less accurate the speed. • Set audio status time to 1 minute Big display configurable parameter screen • Use the context menu to select current speed Summary screen • Use the context menu to turn on audio status messages

STATUS SCREEN

MR340ProPaddler status screen provides a summary of the 'state' of your Missouri River experience.

WAYPOINTS

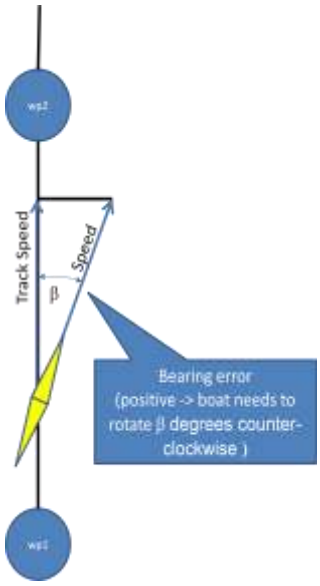
A waypoint is a set of longitude and latitude coordinates that identify a point in physical space. The MR340ProPaddler app defines the recommended navigation path, the *waypoint track*, by 'connecting the dots' of thousands of waypoints. This path is designed to keep you in faster water and away from 'fixed' obstacles such as wing dams and pylons.

NOTE: The MR340ProPaddler waypoint track has been derived from river maps and satellite images. It was tested successfully during the 2013 AND 2014 MR340 Race and appears to be accurate along the entire course from Kaw Point to St Charles. However, this is no substitute for your good judgment since river conditions and GPS accuracy can change to make the track inaccurate.

BEARING ERROR

Indicates the angle between the boat's true heading and the desired track heading.

Positive indicates the boat needs to rotate counter-clockwise. Negative indicates a clockwise rotation is desired.

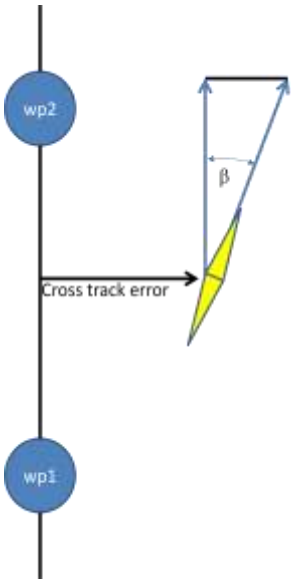


CROSSTRACK ERROR

Crosstrack is the perpendicular distance from your GPS location to the waypoint track.

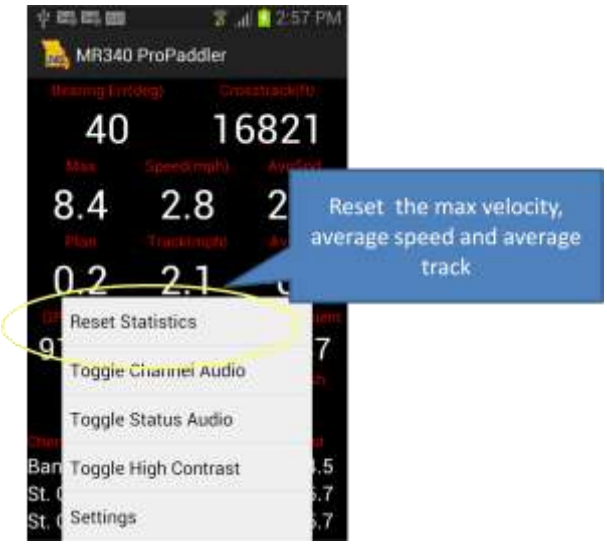
A positive crosstrack indicates that the boat is right of the ideal track; negative means it's to the left.

NOTE: Bearing error and crosstrack error should both be 0 for perfect track following.



MAXIMUM SPEED

The maximum speed reported by the GPS service. The maximum may be reset as desired by pressing the reset averages.



GPS SPEED

The current speed as reported by the device's GPS.

LOCATION BASED SPEED

Typical android GPS units return speed in 0.5 mph increments. MR340ProPaddler provides a location based speed option uses the lat/lon of the GPS to calculate a speed that is accurate to 0.1 mph. This has advantages when traveling at relatively slow speed. The drawback is that the speed signal is heavily filtered and so will lag reality when your speed is changing quickly.

SPEED

Current speed is may be either GPS speed or location based speed. Switch between the default android GPS speed or toggle to the location based speed via the settings menu

AVERAGE SPEED

MR340ProPaddler samples speed up to 120 times and then averages that data to determine your average speed. The time between samples is adjusted through the Settings menu. This allows you to vary the time over which you average between 4 minute and 120 minutes. Speed samples are taken only while you are moving (i.e. speed is > 0.5 mph); this preserves the accuracy of the average speed value while you are stopped.

AVERAGE OVERALL SPEED

Calculated by dividing the total miles traveled with the total elapsed time. The average overall speed is for more general use. When on the Missouri River, the average rivermile speed will be more accurate. Both are 'overall' speed calculations, so they will include time off river.

AVERAGE RIVERMILE SPEED

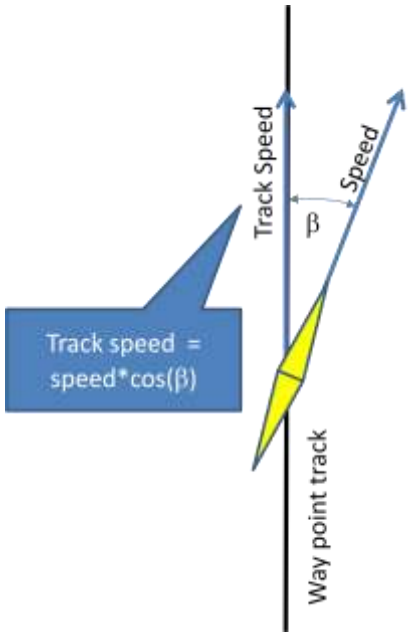
Calculated by abs(current rivermile - starting rivermile)/total elapsed time. The average rivermile speed is for use of the Missouri River. When not on the Missouri River, the average overall speed will be more accurate. Both are 'overall' speed calculations, so they will include time off river.

PLAN SPEED

This is the minimum speed you must maintain if you are to meet your specified finish time goal - with future planned rest periods included in the math.

TRACK SPEED

Track speed is the speed component that is making progress along the waypoint track. If track speed equals your boat speed, then you are 100% steering efficient and your bearing error is 0.



AVERAGE TRACK SPEED

Similar to the average speed, MR340ProPaddler samples the track speed up to 120 times and then averages that data to determine your average track speed. The time between samples is adjusted through the Settings menu. This allows you to vary the time over which you average between 4 minute and 120 minutes. Speed samples are taken only while you are moving (i.e. speed is > 0.5 mph); this preserves the accuracy of the average track speed value while you are stopped.

GPS ACCURACY

Keep in mind that a GPS receiver doesn't actually know its true location. It calculates a location, based on data received from satellites.

GPS accuracy displays the position uncertainty reported by your GPS device. Accuracy or the Estimated Position Error (EPE) is the radius of the uncertainty circle. The true location of the GPS receiver is **probably** within the uncertainty circle of the location reported by the GPS.

Cell phone manufacturers typically do not tell us how they calculate GPS "accuracy" nor how probable it is that you are within the accuracy circle (i.e. is your true position within the circle 95% or 60% of the time). You can consider it a value that says "most of the time, the reported location coordinates are within 'the accuracy' distance of the true location." **This implies that some of the time reported accuracy can be 'way off'.**

GPS navigation is an aid to your senses and good judgment. Do not attempt navigation on GPS only when your senses have become impaired (e.g. fog). Doing so is extremely foolish and dangerous and not worth the risk.

TOTAL MILES

The total miles you have traveled since the last reset of the race start time. MR340ProPaddler sums the distances between GPS samples to obtain this number. You may notice that this value will tend to be slightly larger than the actual miles over long periods of time. This effect is due to GPS 'wiggles' producing small distance changes that are being summed into the overall total.

RIVER MILE

The estimate of your current river mile. The Army Corps has defined the river miles in whole numbers. The MR340ProPaddler app assigns those miles to individual waypoints along the waypoint track and then interpolates the distances between the waypoints to produce a reasonably accurate 'exact' river mile.

% EFFICIENT

% efficiency provides a measure as to how well you are steering the boat along the waypoint path. It is the average track speed / average speed * 100. The lower the number, the less efficient your steering. Feel free to use this as a good reason why your team may need to change drivers.

ELAPSED TIME

The elapsed time in hours and minutes since the last time race start.

ESTIMATED TIME

The estimated time in hours and minutes that you will be pulling into the finish line. This includes your planned rest periods.

CHECKPOINTS

Displays estimated time and distance to the next river access point/checkpoint, the selected river access point/checkpoint and the finish line. The 'selected' checkpoint is selected from the checkpoint screen by tapping on the desired item.

STATUS AUDIO

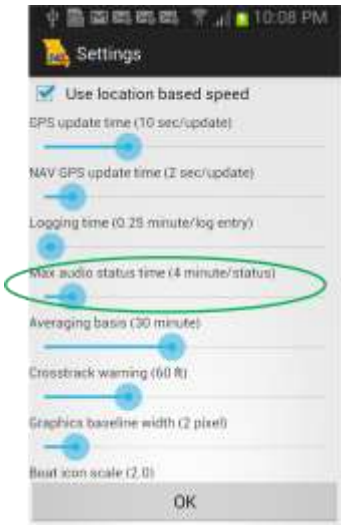
The app will give you a periodic status report. Use this feature to obtain desired information without the need to have the screen on. This will save a lot of power.

Status will be delivered through the media line. You may use a Bluetooth speaker. However, I prefer an ear bud. The ear bud uses less power and you can always pull the bud out of your ear when you don't want touch your phone and you don't want to hear the lady in the app talking at you.

Parameters reported by the app are set on the Nav screen's flexible parameters

Toggle the status report on or off from the status screen's context menu.

Set the status rate on the settings screen.

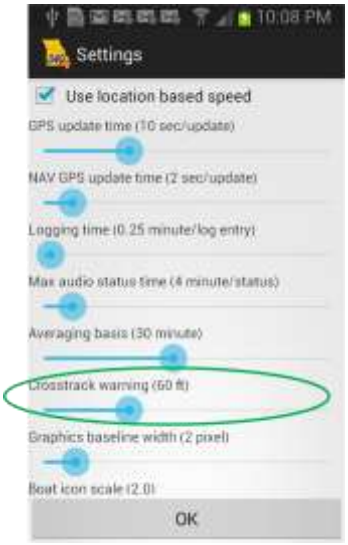


CHANNEL AUDIO

Use the channel audio warning to stay close to the channel. When you paddle too far left or right of the channel, ProPaddler will give you a gentle reminder to ‘go left’ or ‘go right’.

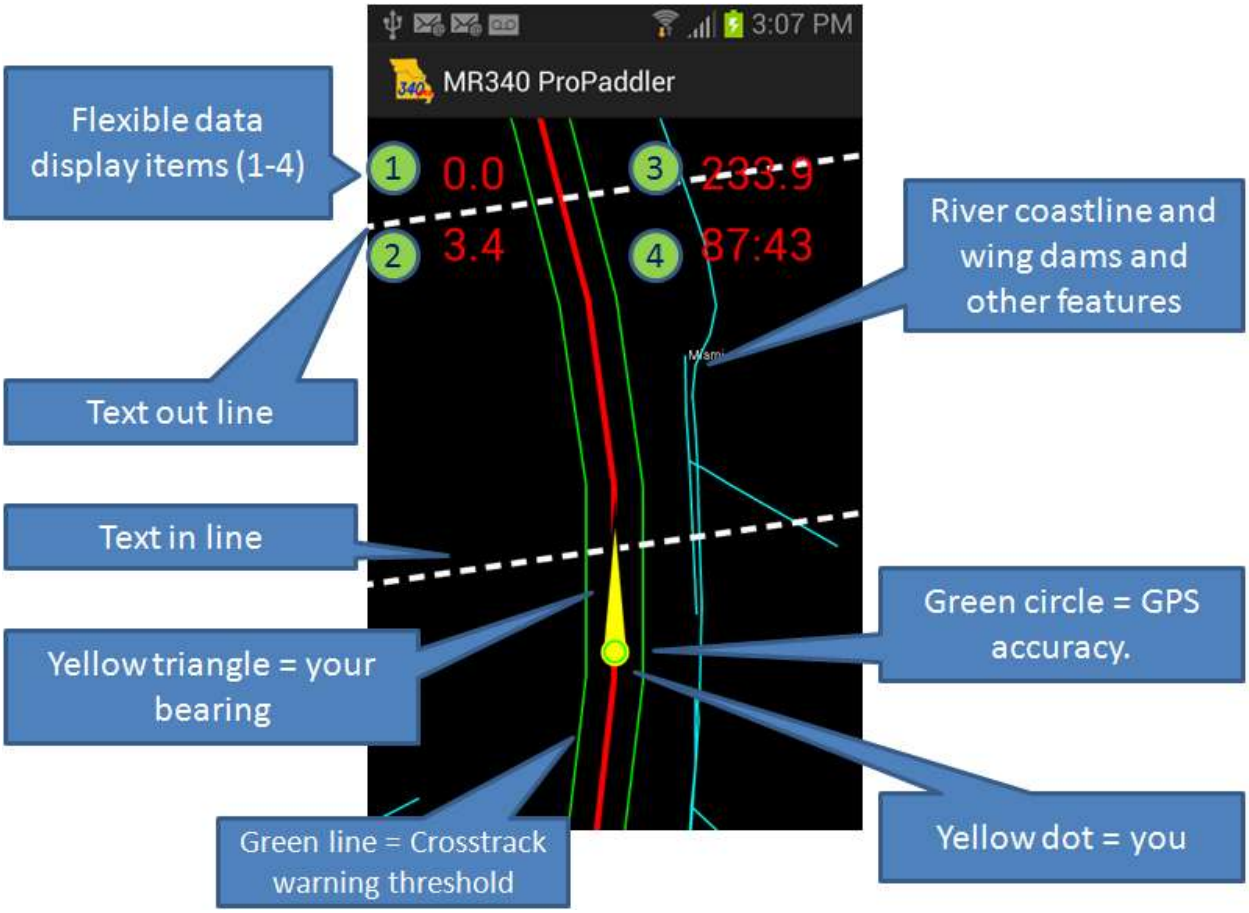
Toggle the channel audio on or off from the status screen’s context menu.

Use the cross track warning to set the channel warning sensitivity.



NAVIGATION SCREEN

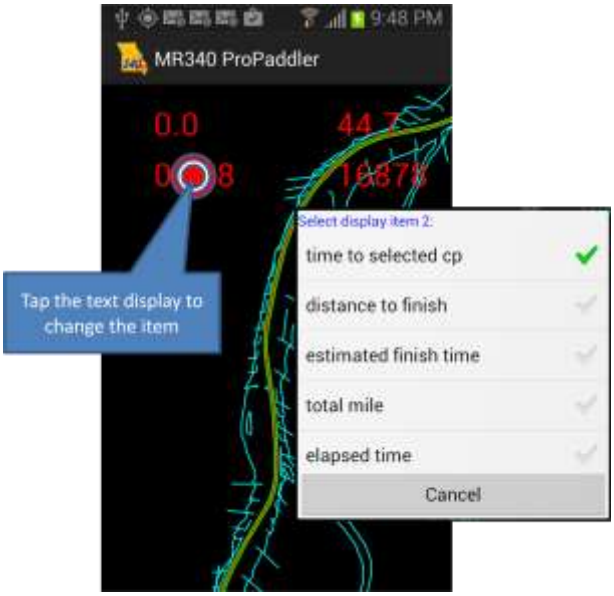
The navigation screen provides visual feedback of your position relative to the Missouri River's channel.



FLEXIBLE DATA DISPLAY

You may select up to 4 data items to display on the data display. Select these items by clicking on the text display you would like to change.

The choices that you make here become the data that the audo status reports to you periocically.



FLEXIBLE DATA DISPLAY CHOICES

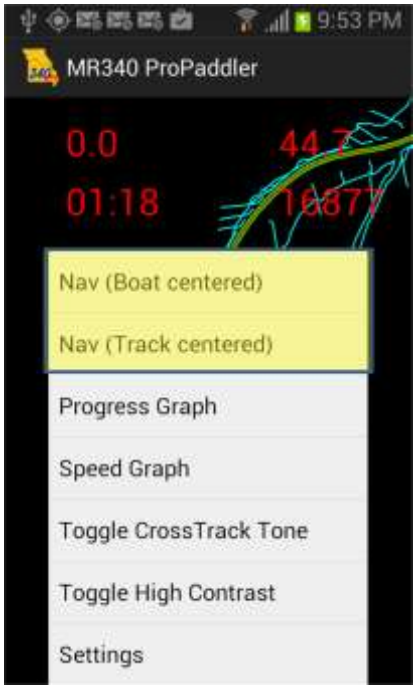
1. None
2. current speed
3. average speed
4. track speed
5. average track speed
6. max speed
7. distance to selected check point
8. time to selected checkpoint
9. distance to finish
10. estimated finish time
11. total mile
12. elapsed time
13. river mile
14. cross track error
15. GPS speed
16. plan speed
17. current time
18. average overall speed
19. average rivermile speed

COORDINATE SYSTEM

The track and river are always oriented such that the optimal boat bearing is pointing straight towards the top of the screen.

BOAT CENTERED VS. TRACK CENTERED

The graphics are drawn relative to the screen horizontal center and 25% screen height from the screen bottom. You may choose to place either the center of the boat at that point or the desired track at that point. Option selection is by the navigation's screen context menu



ZOOM

You may 'pinch' to zoom the Navigation display.

WARNING TRACK

The warning track provides a visual indication that your boat's crosstrack error is getting larger than your desired setting.

The value of the warning track is setup from the settings screen.

In most sections of the river the warning track can be quite large (i.e. 200 ft) before you start running into wing dams. However, there are a few spots where things are a bit tighter (e.g. the Glasgow Bridge has ~90ft between the track and a pylon). Therefore the recommended setting is 60ft.

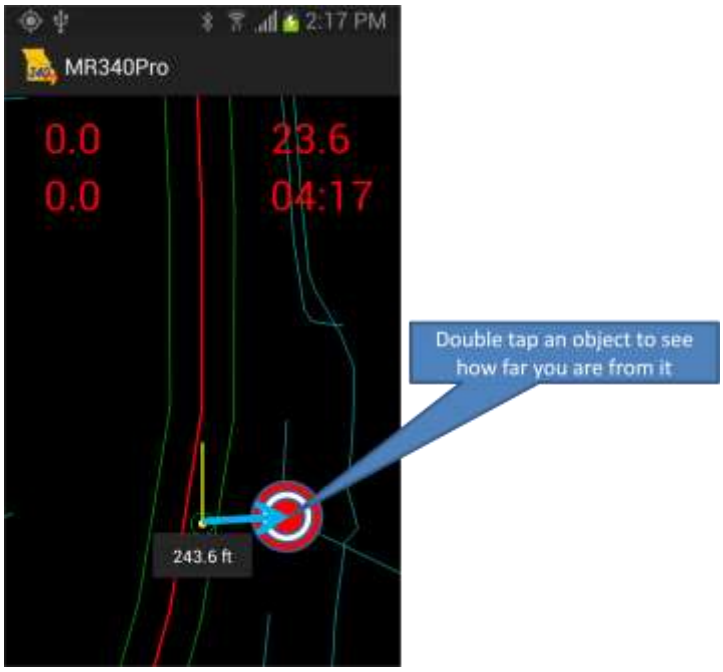
DIRECT SUNLIGHT

It can be a challenge to see your phone's screen in direct sunlight. MR340ProPaddler provides some options.

e. Turn your screen off during the day, save some batteries and just check the app periodically for texting and status. You will naturally be close the channel just by observing your surroundings.
f. If you are trying to stay on the 'perfect' line during the day then you may elect to turn on the audible warning track signal. This will sound a tone whenever your boat strays outside of your desired distance from the channel (warning track).
g. You may elect to leave your screen on but switch to high contrast color (aka black and white) via the settings screen. This mode thickens the lines on the graphics displays and colors them white to make things easier to see.

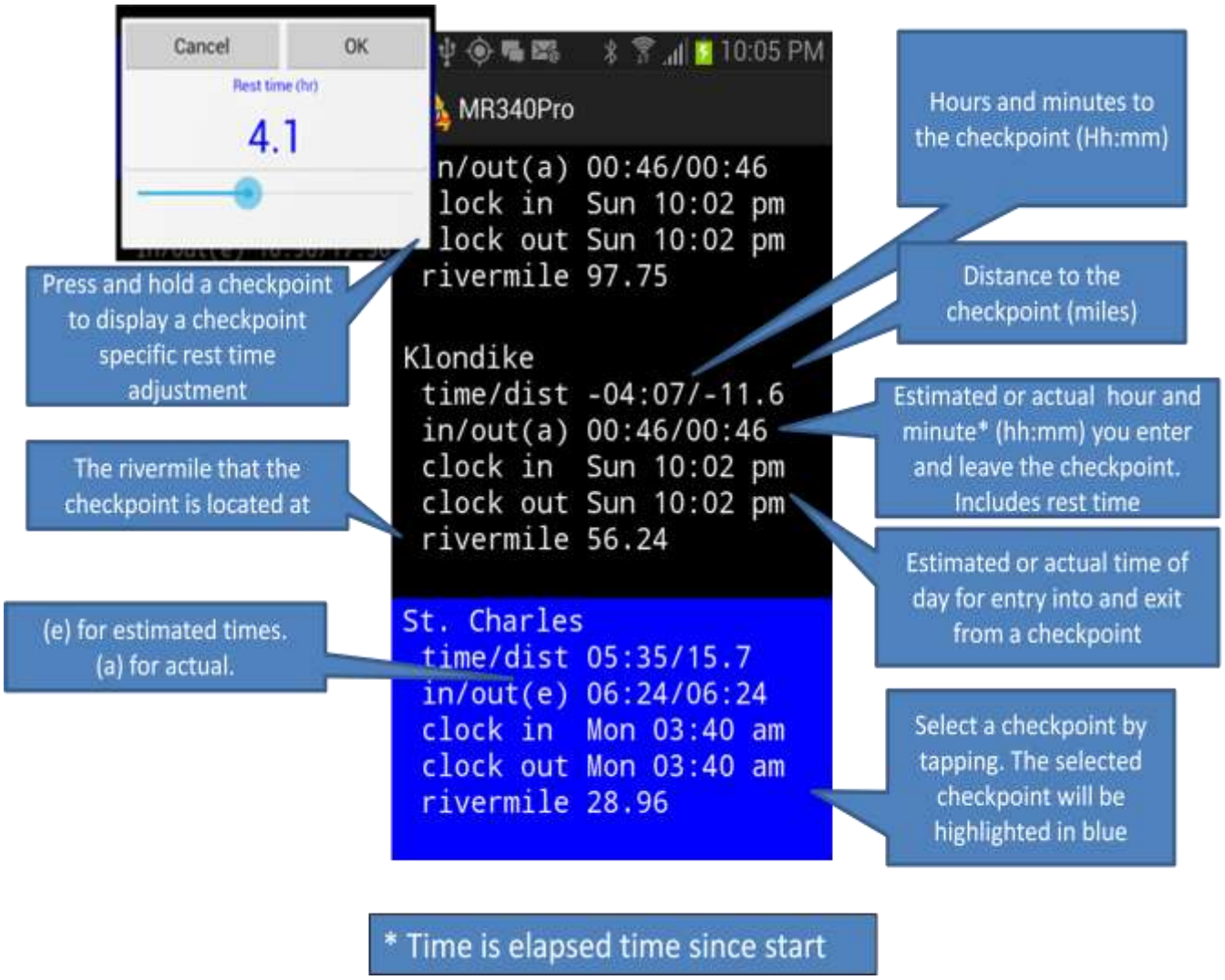
DISTANCE DOUBLE TAP

The straight line distance from you to any place on the screen may be obtained by double tapping the item of interest.



CHECKPOINT DISPLAY

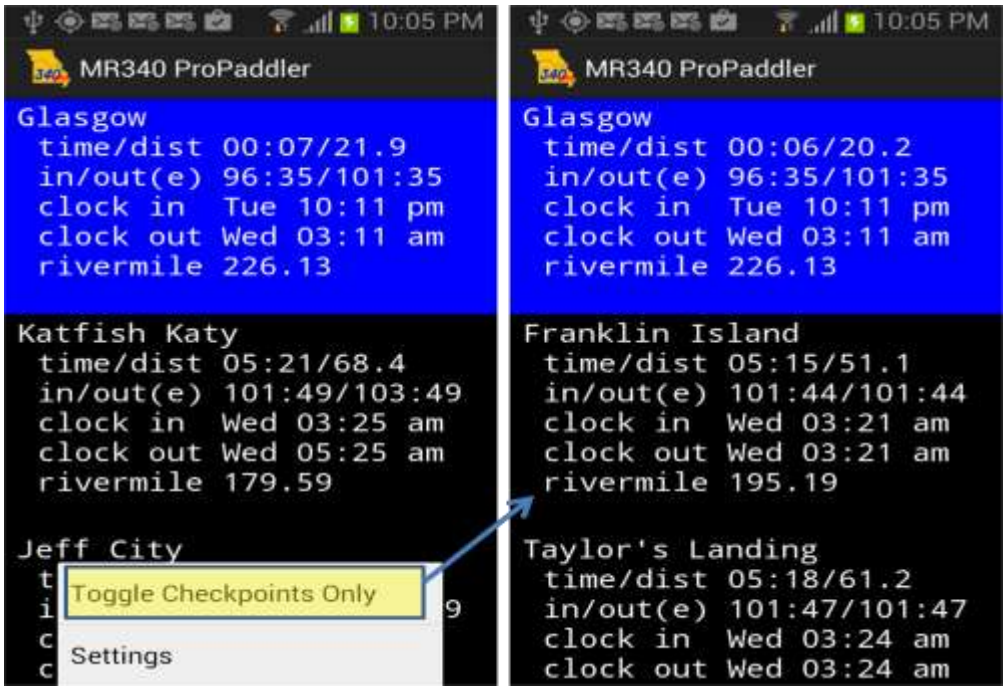
The checkpoint display shows estimated time and distance to future checkpoints. With settings flags you can also display information to many other river access points and checkpoints you've already passed.



CHECKPOINT CONTEXT MENU

TOGGLE CHECKPOINTS ONLY

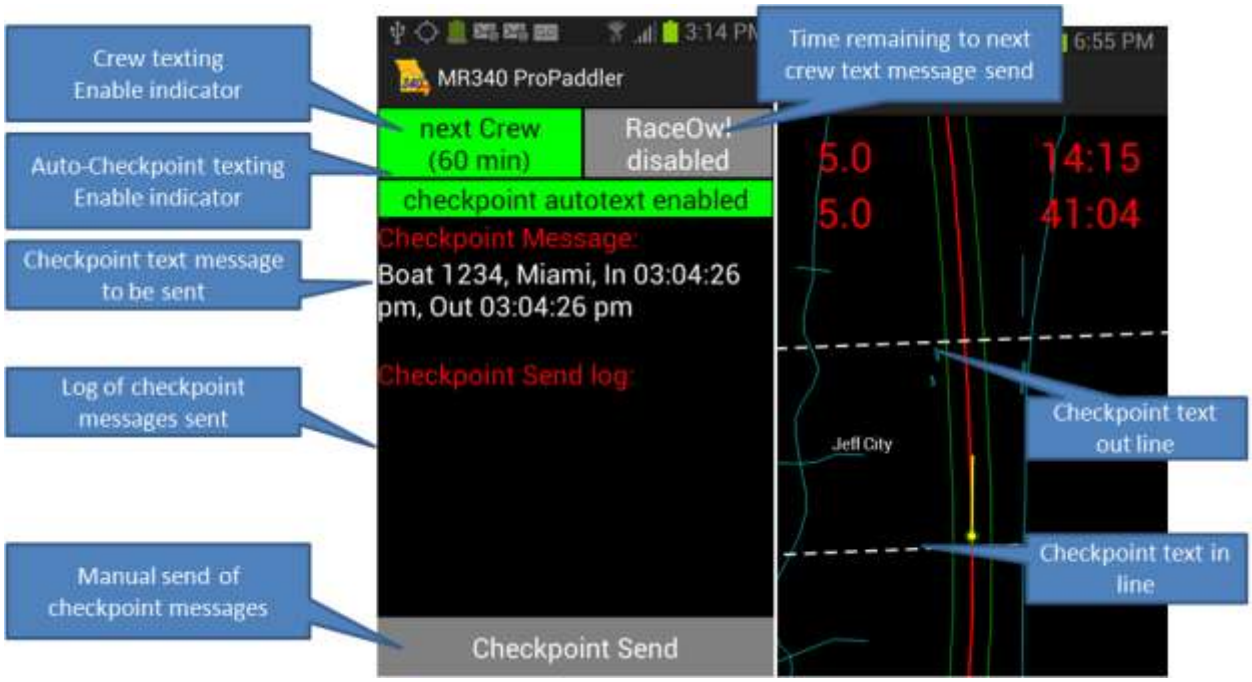
Display or hide additional non-checkpoint river access points.



TEXTING SCREEN

MR340Propaddler has 3 communication functions: automated or semi-automated checkpoint texting to the race officials, periodic location and estimated time of arrival texts to your ground crew, and periodic RaceOwl interactive map location updates.

The Texting screen provides visibility into the state of the texting services such as feature enable/disable and checkpoint texting history.



PHONE NUMBERS

Phone numbers are entered in the setup screen. You may set up multiple numbers to text your checkpoint information (see texting setup). It is recommended that you text to yourself as well as your ground crew and the MR340 race staff. That way you'll know for sure that your text messages were successfully sent.

NOTE: Avoid spamming the volunteers - be sure to remove the MR340 race staff number immediately following the race so that they don't receive automatic texts on future training runs.

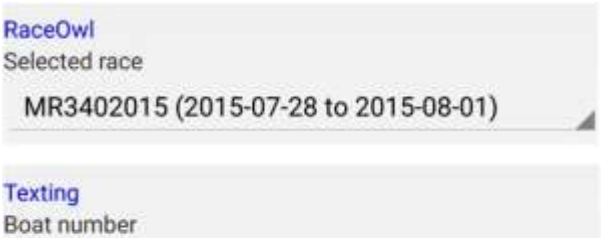
CHECKPOINT MESSAGE

MR340ProPaddler automatically formats your checkpoint IN/OUT text message and is capable of sending it for you if the automatic checkpoint texting settings option is selected. The text message is formatted with in/out times as your boat passes over checkpoint lines. These lines are displayed on the navigation screen and are located 500ft upstream and 500ft downstream of the checkpoint.

NOTE: An MR340ProPaddler design feature allows you to edit the text message. The text message will not auto-fill if you are on the screen where it appears because it's waiting for you to edit it. Wait until you pull out of the checkpoint before sending the text. Otherwise, texting is automatic if that option is selected.

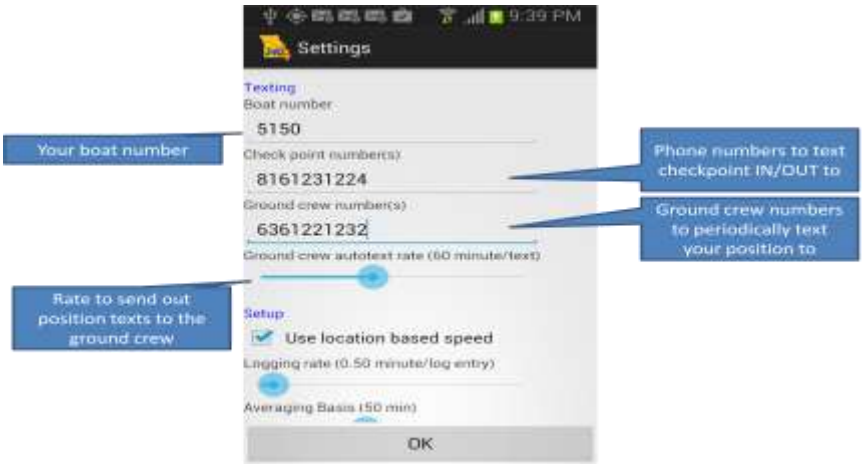
RACEOWL UPDATE

MR340 ProPaddler updates RaceOwl (http://www.raceowl.com) every 15 minutes with boat location for display on the interactive map. This feature requires cell phone service, a valid RaceOwl race be selected and the boat number be entered into the settings screen. **Location updates do not replace the requirement to text checkpoint In and Out**. The raceowl map does not attempt to estimate present positions of each boat; only the last reported position is displayed.



TEXTING SETUP

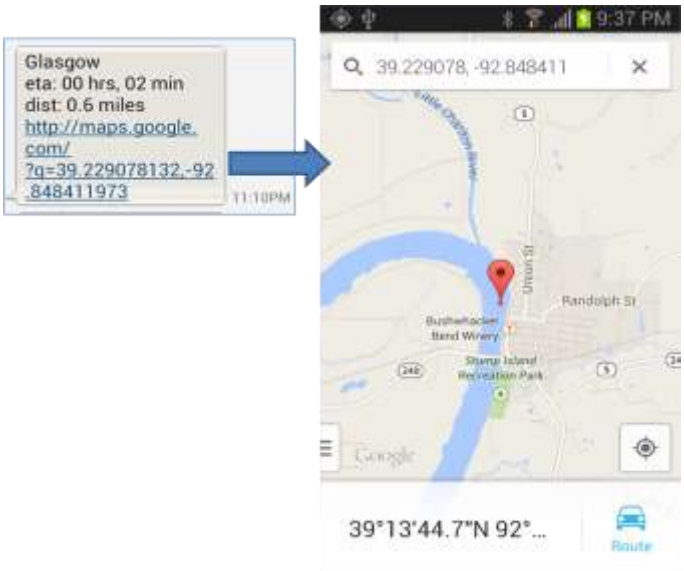
Enter your boat number, checkpoint and ground crew support phone numbers. Format is area code and number with no spaces or dashes. You may enter more than one number. Separate numbers with a new line.



Enabling the automatic checkpoint texting sends an IN text as the boat comes within 500ft upstream of the checkpoint and sends an OUT text 500ft downstream of the checkpoint. If checkpoint texting is enabled the app will always send a text as you cross the texting lines. Messages sent by the phone (no person is pressing the 'send' button) are tagged by the phone only with [auto]. If cell phone service is not available, then MR340ProPaddler queues up the message and will keep trying every 2 minutes until the message is sent successfully.

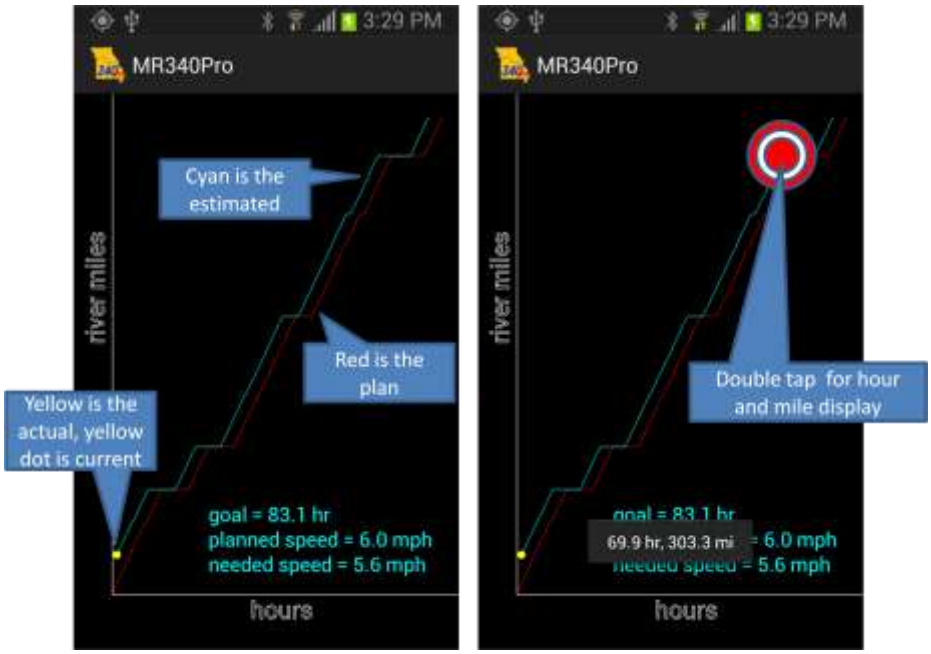
Enabling ground crew texting sends a text every X minutes with ETA to a selected checkpoint and GPS location of your boat with a link to Google maps.

EXAMPLE OF TEXT MESSAGE THE GROUND CREW WILL RECEIVE:



PROGRESS SCREEN

Use the progress screen for feedback on how you are doing relative to how you planned to do. Use this screen in conjunction with the planner section of the settings and the waypoint screen to plan your race.



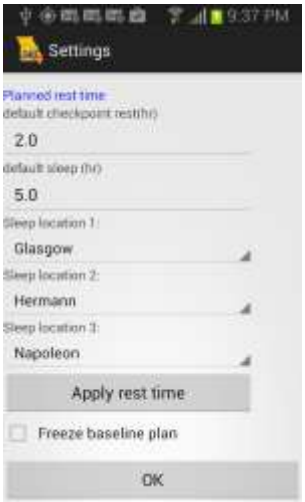
PLANNING YOUR RACE

Open the Settings menu and scroll to the planning section.

Enter desired finish time or desired speed. You cannot set both at once since one is calculated from the other.

Scroll down a bit further to the planner setup section. Enter typical time you intend to spend at each checkpoint.

Enter the time per night you hope to sleep. Select the checkpoints at which you plan to sleep.



Note: You may fine-tune rest time from the checkpoint screen.

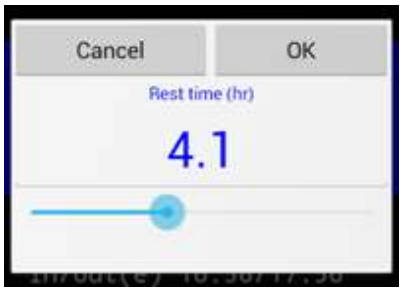
Press the “apply rest time” button.

FINALIZING YOUR PLAN

Planning can be an interactive process where you switch between the settings menu, the checkpoint menu and the progress graph.

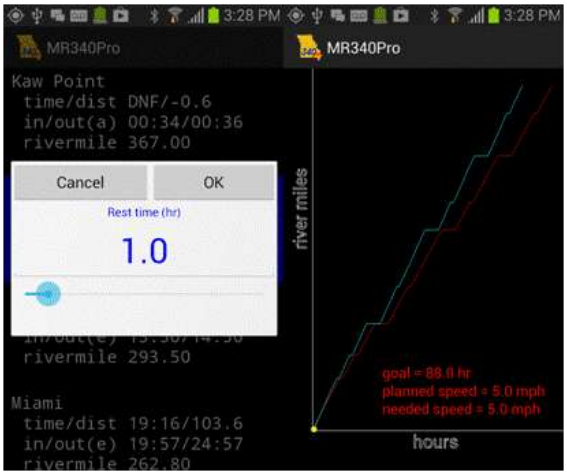
PLANNER REST TIME ADJUSTMENT

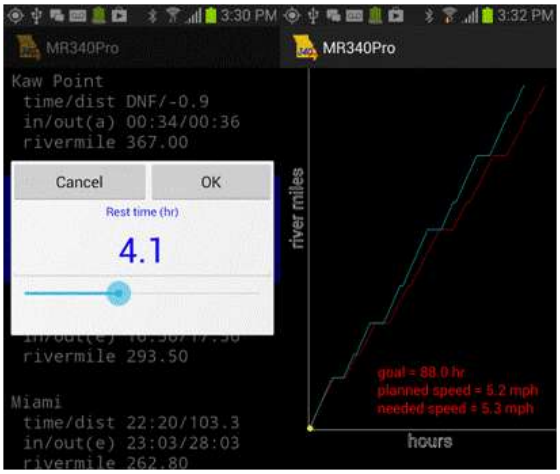
Rest time fine adjustments are made from the checkpoint screen. To adjust, press and hold a checkpoint for 2 seconds to display the rest time adjustment dialog.



Use the slider bar or type your desired rest time.

Toggle back and forth between the progress graph and the checkpoints to visualize the changes.





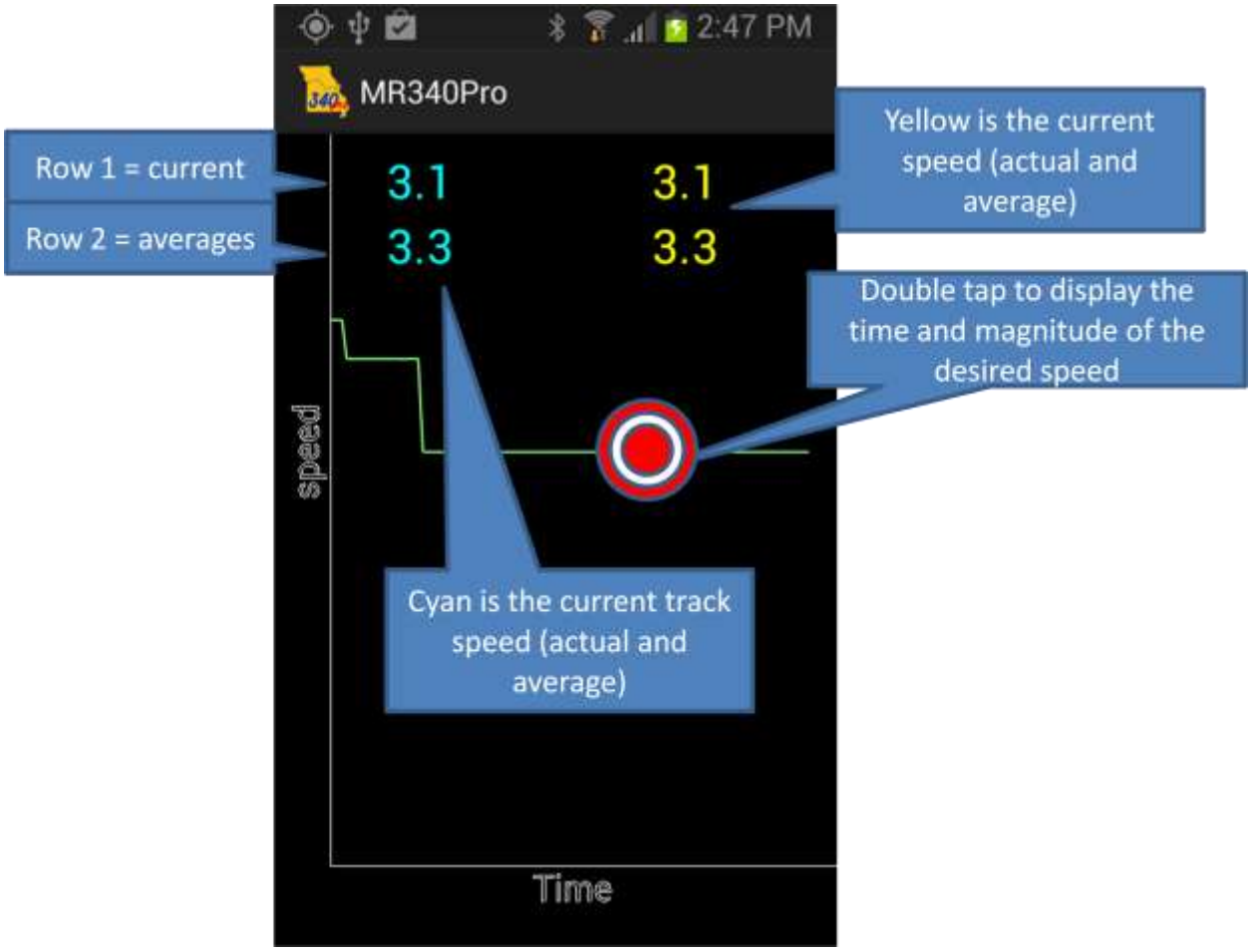
FREEZING THE PLAN

Once you are satisfied with your plan, you may elect to freeze or save the original plan, or you can choose to let it update as you adjust variables such as rest time along your route.

To change the state of the plan, open Settings and Scroll to the planning section. Select “Freeze baseline plan.”

SPEED SCREEN

The speed screen displays your boat's recent speed history. The amount of time displayed (and used for averaging) is selectable from the settings menu.



AVERAGING

Averaging basis may be selected from 4 minutes to 120 minutes.

EXPORTS

When you export your log file, an MR340ProPaddler directory is created on your SD card. That directory contains a <start_time>.csv file and a <start_time>.kml file, where start_time is the beginning of your log.

2014_04_11_13_12_00.CSV DATA EXAMPLE

elapsed_time_hr	speed_mph	track_mph	avg_speed_mph	avg_track_speed_mph	rivermile	totalmile	lat_deg	lon_deg
0.02	0	0	0	0	16.28	0	38.955	-90.45
0.04	3.91	3.26	1.73	0.47	16.27	0.04	38.955	-90.45
0.06	3.91	-0.46	3.17	1.86	16.22	0.12	38.956	-90.45
0.08	3.91	-3.16	3.45	0.09	16.28	0.2	38.956	-90.45
0.1	2.8	-1.34	3.38	-0.6	16.33	0.26	38.956	-90.45
0.12	3.36	-3.34	3.59	-1.31	16.37	0.31	38.956	-90.45
0.14	2.8	-2.72	3.26	-2.66	16.41	0.35	38.955	-90.45
0.16	2.8	-2.52	2.95	-2.49	16.46	0.41	38.955	-90.45
0.17	2.8	-2.23	2.88	-2.45	16.51	0.47	38.955	-90.45
0.19	2.8	-2.55	2.95	-2.46	16.56	0.54	38.955	-90.45

2014_04_11_13_12_00.KML EXAMPLE PLOT IN GOOGLE EARTH

WHEN TO RUN THE APP

MR340ProPaddler should be running on your phone anytime you are on the water.

The app will run until either:

1) You command it to exit with the back key button.

   Note: when you exit the MR340ProPaddler app, the GPS location service may remain enabled for a period of time. The Android operating system will typically allow this service to continue to run until it is sure no applications are making use of it.

2) The Android operating system forces it closed (See running background running).

FOREGROUND RUNNING

I recommend folks run the app with high priority. That is, keep the app in the foreground (i.e. you can see it on the screen) or foreground with screen-off (get here by having the app running, seeing it on the screen and then press the power button to turn off the screen)

BACKGROUND RUNNING

Running other apps will place the ProPaddler in the background where it will continue to run. BUT, because it is in the background it now has been assigned lower priority by the system. Thus, if the system needs more resources to run the other applications, then the system can force it off.

For example, let's say you're paddling down the river with the ProPaddler running. You get a phone call from your crew, this moves the 340 app into the background and brings the phone app to the foreground. You talk to your folks. The system has enough resources to handle 2 simultaneous apps. So, after the call ends the phone app goes away and the ProPaddler automatically comes back into the foreground. You don't need to do anything.

Now let's say you get a text with a link. You open your texting app and then you click on a link which in turn opens a web browser. In the system there are now 3 active apps (ProPaddler, the texting app, and the browser). ProPaddler went to the background first and now has the lowest priority. Depending on the resources your phone has, the system may kill the lowest priority app to allocate resources to your higher priority apps. On my older phone, the web browser takes up a lot of resources, so I'm almost guaranteed that the background tasks will be killed when I start checking websites. If this happens, it is no big deal, just restart the ProPaddler when you are done doing whatever you need to do. The app will restore itself.

EXITING AND RESTARTING MR340PROPADDLER

When you are at a checkpoint it may be desirable to shut down MR340ProPaddler. Reasons for this:

2. If you plan to or need to hike on-shore more than 500ft downstream of the checkpoint (e.g. at Hermann you park your boat, grab a burger and then hike down to sit with your ground support). Travelling more than 500ft downstream will trigger MR340 to record an exit to the checkpoint and will send the IN/OUT text if auto texting is enabled.
3. If you plan on spending the night at a checkpoint, there is no need for the app to continue logging your off-river time or auto-texting ground crew.
4. Power saving/battery charging

Once you restart the app, the last state of the app will be restored; logging will continue, the app 'finds' itself on the river and initializes itself to the correct waypoint, and auto-texting logs are restored. There are a few of exceptions:

1. You will be prompted to continue checkpoint auto-texting.
2. Simulation mode always starts up disabled.
3. Max speed and averages are reset.

USE CASES

The following provide example ways to use the MR340ProPaddler app.

SIMULATION

Simulation provides a great way for you to get to know your app. Use it to test the texting features or to plan your MR340 race. And you can get to know it at warp speed – ever want to complete an MR340 in 34 minutes? Just set the speed to 1000mph.

To start the simulation mode:

1. Open the settings screen.
2. Scroll to the bottom.
3. Enter the desired speed.

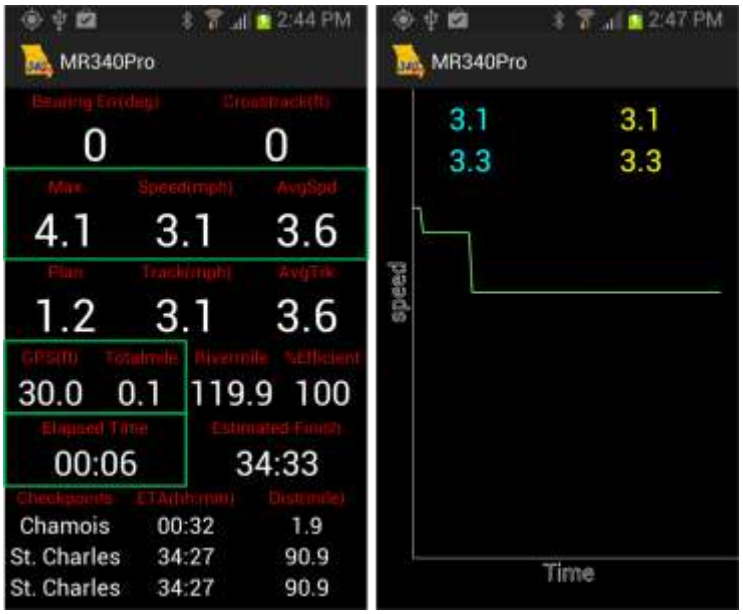
NOTE: You may use the checkpoints screen to obtain the correct initial river mile.

4. Enter the simulated speed and initial river mile.
5. Click on Simulation Enable.
6. Exit the settings screen.

OFF-RIVER TRAINING RUN

The MR340ProPaddler can be used as a GPS tracker when you are not on the Missouri River.

1. Swipe to the graphics screen.
2. Change your graph to the speed view.
3. Open settings and enable logging.
4. Press start date/time and enter desired start time.
5. Press OK to exit settings.
6. Begin your outing.
7. While paddling off the waypoint track, only the green outlined items on the status screen and the speed screen will be valid.
8. When your outing is complete, open the settings screen.
9. Press the Export log file (see exports).
10. Exit the MR340ProPaddler app.



TRAINING RUN ON MISSOURI RIVER – DOWN STREAM ONLY WITH PLANNER USE

Take advantage of training runs to get to know all the features of the MR340ProPaddler app.

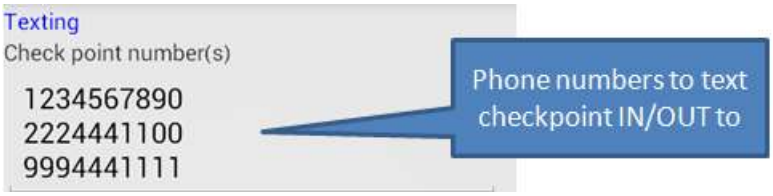
USING THE APP FOR THE MR340 RACE

PRE-RACE

1. Get to know the MR340ProPaddler app through simulation and training runs.
2. Plan your race and enter your plan into the app.
3. Check for any MR340ProPaddler feature updates, bug fixes or data changes.
4. Think through your power needs
5. Think through your mounting strategy
6. Add your ground crew numbers into the ground crew texting settings.

SAFETY MEETING

1. Add the checkpoint phone texting number into your settings.



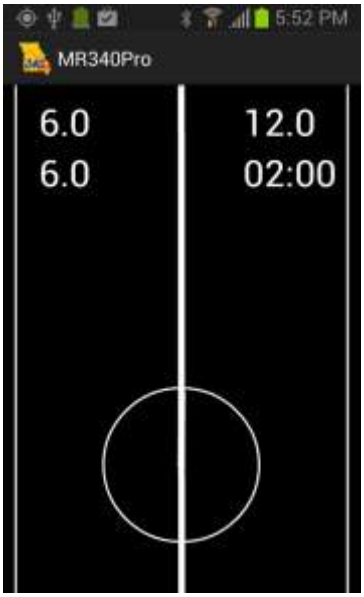
PRE-RACE START

1. Enable logging.
2. Enable autotexting/raceowl/crewtexting.
3. Set your start time to 7:00 or 8:00am

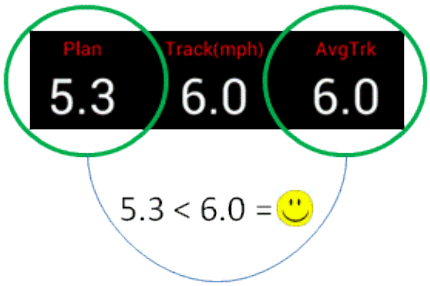
4. Verify the starting checkpoint is Kaw Point and the end checkpoint is St Charles.
5. Exit settings.
6. Swipe to the checkpoint screen and select Lexington.
7. Pick your favorite screen or turn off your screen (see direct sunlight options).

DAYTIME PADDLING

1. Experiment with finding fast water. Turn on your navigation screen and monitor your current speed as you get near the waypoint path. Consider setting your warning path offset to such that your speed is optimized when your boat is within the bounds of the warning track. To maintain that distance you may find it useful to zoom in on your navigation screen such that the warning track is near the sides of your screen.



2. Periodically check your status. Is your average track speed at or above your minimum plan speed? If not then you may need to consider adjusting your goals.



3. Consider auto-texting your position and ETA to your ground crew.

AT A CHECKPOINT

1. Evaluate your plan vs. actual performance. Open the settings and select progress graph. Do you need to adjust your plan?
2. Consider exiting MR340ProPaddler or turning off the autotext if you intend on walking around the checkpoint with your phone, you may inadvertently cross over the text out line and text yourself out (see MR340ProPaddler exit and restart)

NIGHTTIME PADDLING

1. Return to the navigation screen. Zoom out a bit so that wing dams and river crossings do not sneak up on you.

2. Consider turning on the audible warning to give you an indication that you are drifting out of the channel. **NOTE: Watertight containers can impede your ability to hear the audible warnings.**

3. **DO NOT rely on the app alone to guide you. Use your eyes, ears and good judgment. If your other senses are impaired in any way (e.g. fog), you should not be on the river.**

AFTER THE RACE

1. Open settings.
2. Press the Export log file (see exports).
3. Remove the race texting number from your setup.
4. Exit the MR340ProPaddler app.
5. Get some sleep.
6. Start training for next year.

RELEASE NOTES

VERSION 2.2

- Switch to production RaceOwl (http://www.raceowl.com)
- Minor rearrange of settings screen to move the boat number to the top of the list
- Address settings screen bug

VERSION 2.1

- Convert texting format to RaceOwl

VERSION 2.0

- Ability to select slower GPS update rates to extend battery life
- Voice feedback for out-of-channel indication and status updates
- Race Owl integration
- Computational efficiency improvements
- Consistent screen off application behavior
- Additional selectable parameters: GPS speed, plan speed, current time, average overall/ rivermile speed
- Additional river access points
- Addition of the BIG display screen for one selected parameter
- Restore-to-last-selected screen on startup

VERSION 1.8

- Improved graphics for high resolution screens
    1. Scaled text on the navigation screens
    2. Line width adjustment to provide thicker lines for better visibility
- Improvements to memory usage
- Settings simplification and cleanup
    1. Quick settings removed, selections are now available through individual screen menus
    2. Reverse Navigation removed. Direction is now a function of the start and end access points.
    3. Selectable display settings move from settings to the Navigation screen.

4. Replaced text entry with slider bars

- Logging rate may be set as low as every 15 seconds

VERSION 1.7

- Remove possibility for multiple periodic update threads for texting and waypoint following.
- prevent application crash if waypoint reversal for upstream travel and on checkpoint screen
- force boat number, crew texting rate, and averaging rate to be integers

VERSION 1.6

- Added 'none' option to sleep locations
- Reduced memory consumption on graphics screens

VERSION 1.5

- Changed the ground crew message estimated time of arrival from displaying the hours and minutes until you arrive (e.g. 3 hrs, 25 mins) to the time of day (e.g. Wed 12:05 pm). This removes any confusion that might arise if a text is delayed in either send or receive.

VERSION 1.4

- Bug fix: Settings screen data entry could crash the app if a numeric field was empty. Numeric fields are now verified and messages are displayed if the input is not valid.

VERSION 1.3

- Enhanced ground crew texting usability.
- Display actual or estimated clock time for checkpoint entry and exit
- More robust application state recovery after an Android OS forced app exit when running other applications (eg web browser, email, etc)
- Do not show texting lines for non-texting checkpoints or river access points
- Checkpoint texting log order now displays from last texted to first texted.

VERSION 1.2

- Modified auto-text behavior to BOTH text in and text out. Prior to this release, the app would wait until you exit the checkpoint to text IN and OUT times.
- Simplified auto-text behavior such that the app will always send a text as you cross the texting lines if auto-text is turned on. No matter if the paddler over-rides and send additional text.
- Tagged messages sent by the phone only (no person is pressing the 'send' button) with [auto].
- Placed a 'auto-texting' status display on the texting screen to quickly show if auto checkpoint message sending is on or off.
- Added 'quick switch' menu buttons that bypass the need to go through the settings menu.
    - For graphics screen, you can quickly switch between NAV, speed, and progress charts.
    - For texting screen, you can toggle on and off the auto-text feature

VERSION 1.1

- Katfish Katy rather than Coopers checkpoint
- Extended High Contrast to all screens
    - when high contrast color is enabled, all text on status and texting screens is now white.
- Location based speed option added
    - Many devices only return speed in 0.5 mph increments. The location based speed option uses the lat/lon of the GPS to calculate a speed that is accurate to 0.1 mph. This has advantages when traveling at relatively slow speed. The drawback is that the speed signal is heavily filtered and so will lag reality when your speed is changing quickly.
- Nav screen flex display
    - You are no longer stuck with the data choices selected by the short sighted developer for the navigation screen. Select from a multitude of signals and customize your nav screen as you see fit.
- Fire and forget checkpoint texting
    - Version 1.0 would give up on texting if no cell service was available. Now, MR340ProPaddler queues up the message and will keep trying every 2 minutes until the message is sent successfully.
- Texting lines enhanced for better visibility
    - Texting lines were extended to be 1 mile in length, thickened and made to be dashed.
- Bug fixes
    - Zoom factor = 0 application bomb.
    - Total mile inaccuracy when app is restarted

- inadvertent multi-auto-text message send when GPS cycles from disabled to enabled
- Texting send button scrolls off-screen when the send log is full.