# DATA-DRIVEN TRAINING

Presented by Julie Percifield

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# OBJECTIVES

- Clarify terminology
- Get comfortable with how to interpret and use data
- Provide a framework for incorporating data into your training plan
- Simplify the hardware/software selection process
- Open the network for finding experts amongst our club for when you need help down the road

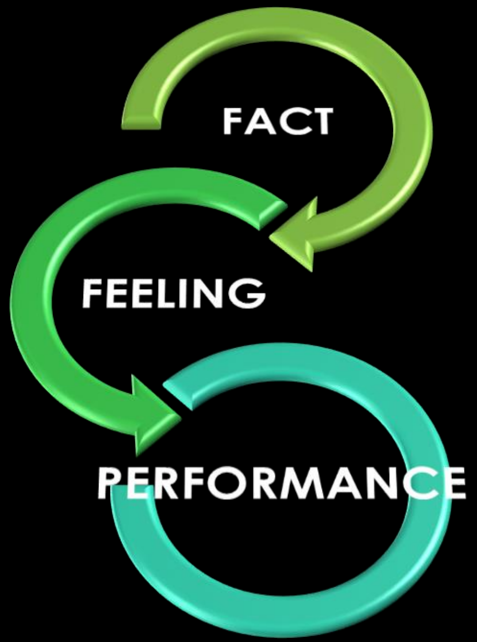
This is <u>NOT</u>:

- A step-by-step tutorial on your program or device of choice
- A one-size-fits-all approach to training

# WHAT CAN DATA DO FOR YOU?

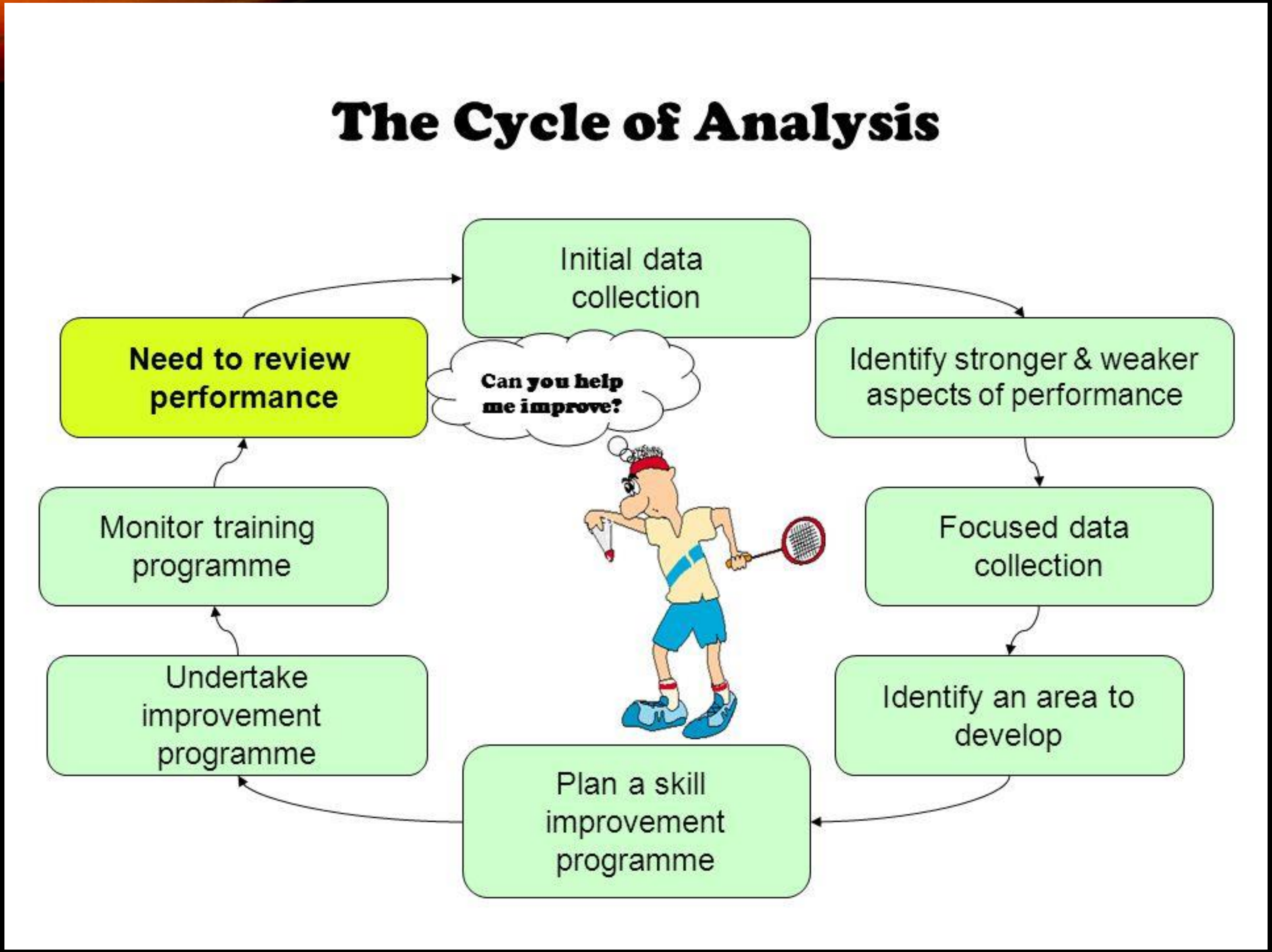
Tell a story: your triathlon journey

Help establish correlations between FACT and what you FEEL




Elucidate behaviors or techniques that contribute to niggles & lingering injuries

Enable consistency


The Cycle of Analysis
Initial data collection
Identify stronger & weaker aspects of performance
Focused data collection
Identify an area to develop
Plan a skill improvement programme
Undertake improvement programme
Monitor training programme
Need to review performance
Can you help me improve?

# DATA 101:
# THE DATA ANALYSIS CYCLE


SENSOR | RECEIVER (DEVICE) | SOFTWARE (PROGRAM/APP) | ATHLETE

# “WHAT ENDURANCE ATHLETES MUST ENDURE ABOVE ALL IS NOT ACTUAL EFFORT, BUT PERCEPTION OF EFFORT”

Matt Fitzgerald

*How Bad Do You Want It*

# BIG PICTURE: WHAT IS RPE & WHY DO WE USE IT?

- Novices to pros can use RPE as a basic metric to guide workouts and racing strategy – easiest metric to use in training
- What differentiates novices & veterans: knowing how hard they CAN push themselves when RPE is high
  - Use supplementary metrics to correlate back to RPE.
  - Use specific workouts to track RPE over training season – same workout should feel easier as fitness improves
  - Use supplementary metrics to measure economy & set pacing strategies for training and racing
  - Use recovery metrics to gauge how hard to push in upcoming training sessions and when to pull back to prevent over-reaching, over-training or injury

# KEY OBJECTIVES BY DISCIPLINE

## Swim

**Technique, technique, technique!**

1. Minimize side-to-side movement
2. Minimize lower-body drag
3. Maximize distance per stroke at low RPE (without losing momentum)
4. Swim in a straight line between buoys

## Bike

1. Optimize power-to-weight ratio
2. Minimize loss of power to the pedal
3. Minimize side-to-side movement
4. Minimize tensing of muscles that don't contribute to moving you forward
5. Maintain consistent power across course & conditions
6. Optimize cadence to minimize RPE on the run

## Run

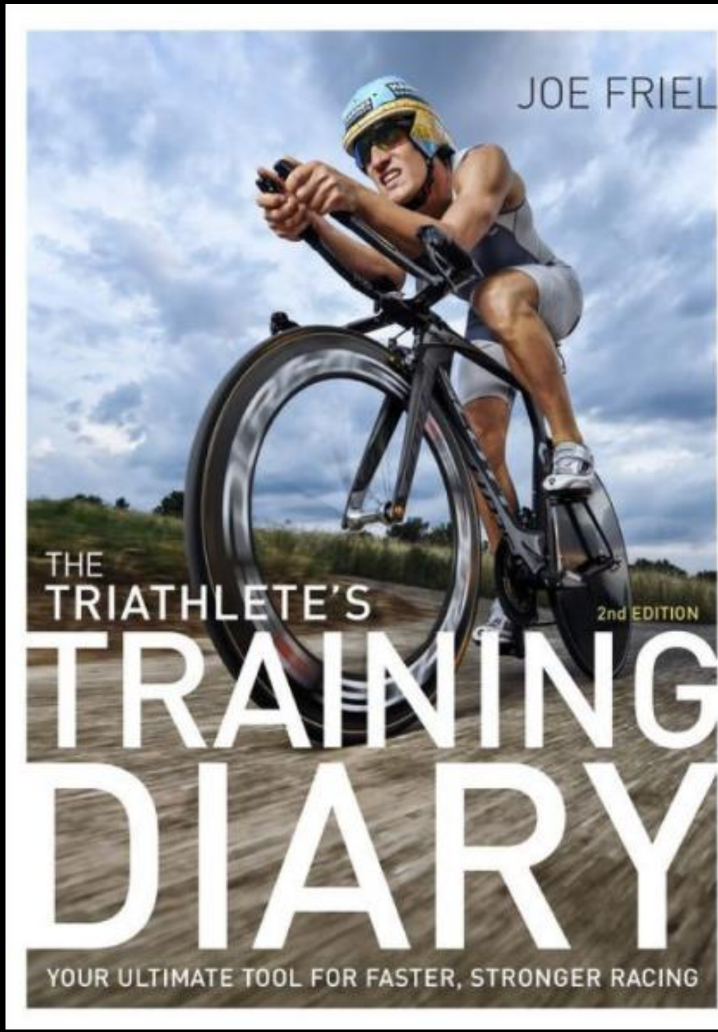
1. Minimize vertical oscillation
2. Minimize side-to-side movement/maintain a straight kinetic chain [front/rear-view]
3. Minimize tensing of muscles that don't contribute to moving you forward
4. Optimize power-to-weight ratio

**BOTTOM LINE: BE EFFICIENT & ECONOMICAL!**

# GENERAL METRICS

These metrics can be applied across all disciplines:

| Metric | Definition | Units | Ex. | Manual | Sensor | Receiver |
|---|---|---|---|---|---|---|
| RPE | Rate of Perceived Exertion: level of perceived difficulty (by the athlete) of effort expenditure from 1 - 20 where 1 represents no difficulty and 20 represents extreme difficult/couldn't maintain effort any longer | - | - | Y | N | N |
| Heart Rate | Instantaneous heart rate indicated in beats per minute | bpm | 133bpm | Y | Y | Y |
| Heart Rate Average | Average heart rate over duration of session or interval | bpm | 133bpm | N | Y | Y |
| Heart Rate Zone | Heart rate zone as determined by test or 200-age ranging from 1 - 5 with 1 representing the easiest/lowest effort heart rate zone (aerobic) and 5 representing the hardest/most difficult heart rate zone (anaerobic threshold) | - | 4 | Y | Y | Y |



# SWIM

| Metric | Definition | Units | Ex. | Manual | Sensor | Receiver |
|---|---|---|---|---|---|---|
| Pace | Speed indicated in minutes per 100 yards or 100 meters | 0:00/ 100yd | 1:30/ 100yd | Y | N | Y |
| Strokes | Number of strokes taken to traverse one length of the pool | - | 19 | Y | Y | Y |
| DPS | Distance per stroke: yards or meters traversed in one stroke | yd or m | 1.8 yd | N | Y | Y |
| SWOLF | Swim Golf: Strokes + average time to traverse one length of the pool | - | 34 | Y | N | Y |

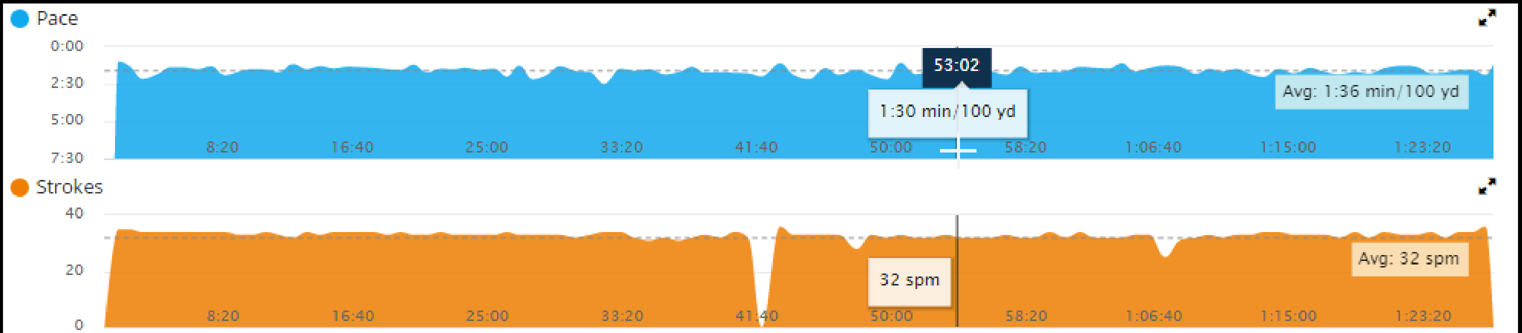
OWS Example: https://connect.garmin.com/modern/activity/1351631733
Pool Swim: https://connect.garmin.com/modern/activity/1543047659

Garmin Forerunner 920XT

# OPEN WATER SWIM


Stats Splits

| Splits ▲ | Time | Cumulative Time | Moving Time | Distance | Avg Distance per Stroke |
|---|---|---|---|---|---|
| 1 | 40:39 | 40:39 | 39:49 | 2,644 | 1.80 |
| 2 | 45:16 | 1:25:55 | 44:48 | 2,742 | 1.71 |
| **Summary** | **1:25:55** | **1:25:55** | **1:24:37** | **5,386** | **1.76** |




Stats Splits

**Distance**

5,386 yd
Distance

**Calories**

817 C
Calories

**Timing**

Pace Speed

1:25:55
Time

1:24:37
Moving Time

1:25:55
Elapsed Time

1:36 min/100 yd
Avg Pace

1:34 min/100 yd
Avg Moving Pace

**Elevation**

0 ft
Elev Gain

696 ft
Elev Loss

0 ft
Min Elev

0 ft
Max Elev

**Swimming Dynamics**

2,806
Total Strokes

32 strokes/min
Avg Stroke Rate

38 strokes/min
Max Stroke Rate

40
Avg SWOLF

# POOL SWIM

**Interval 14** 100 Yards 1:22.9

| FREESTYLE | FREESTYLE | FREESTYLE | FREESTYLE | REST |
|---|---|---|---|---|
| 1 19.3 | 2 20.6 | 3 21.8 | 4 21.3 | 0:22.2 |

**Interval 15** 100 Yards 1:23.4

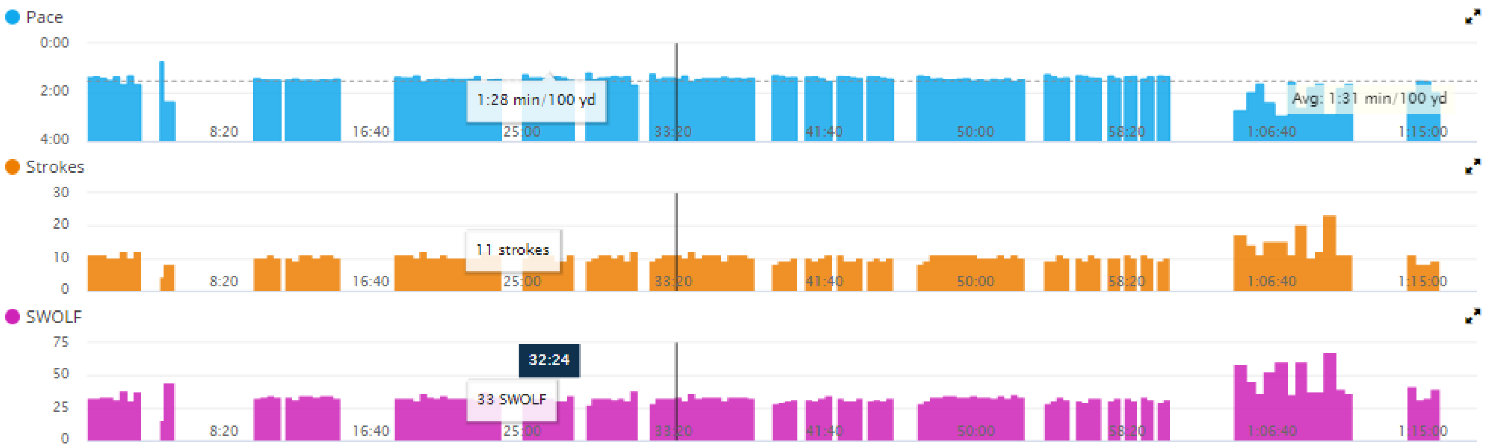
| FREESTYLE | FREESTYLE | FREESTYLE | FREESTYLE | REST |
|---|---|---|---|---|
| 1 20.0 | 2 20.4 | 3 21.4 | 4 21.6 | 0:21.3 |

**Interval 16** 50 Yards 0:41.9

| FREESTYLE | FREESTYLE | REST |
|---|---|---|
| 1 20.2 | 2 21.7 | 0:13.1 |

**Interval 17** 50 Yards 0:41.1

| FREESTYLE | FREESTYLE | REST |
|---|---|---|
| 1 20.7 | 2 20.4 | 0:13.5 |




Stats Intervals

**Distance**

3,350 yd
Distance

25 yd
Pool Length

**Calories**

539 C
Calories

**Timing**

Pace Speed

1:16:37
Time

51:01
Moving Time

1:16:46
Elapsed Time

1:31 min/100 yd
Avg Pace

1:31 min/100 yd
Avg Moving Pace

0:45 min/100 yd
Best Pace

**Swimming Dynamics**

1,413
Total Strokes

28 strokes/min
Avg Stroke Rate

32 strokes/min
Max Stroke Rate

11/length
Avg Strokes

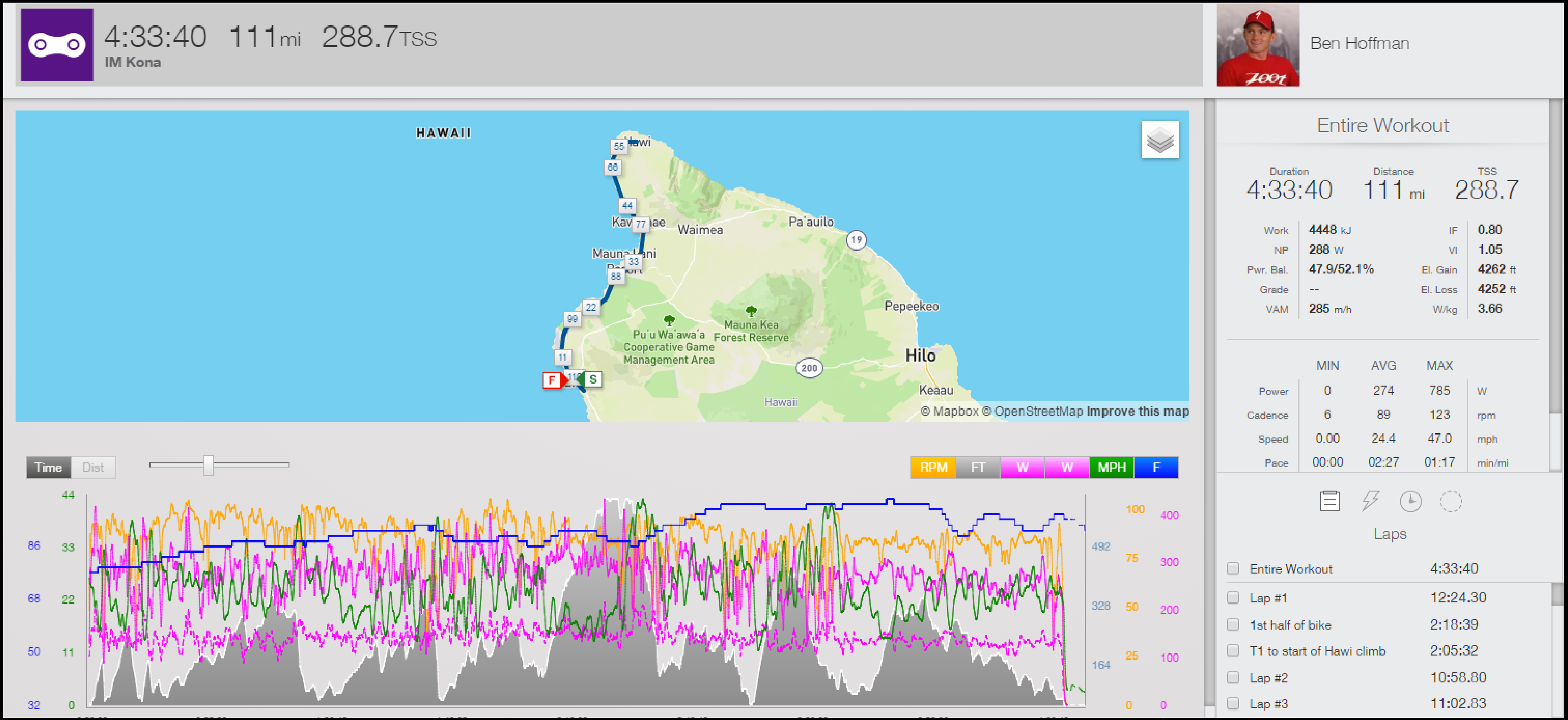
33
Avg SWOLF

# BIKE

| Metric | Definition | Units | Ex. | Manual | Sensor | Receiver |
|---|---|---|---|---|---|---|
| Speed | Instantaneous speed indicated in mph or kmh | mph | 19 mph | N | Y | Y |
| Speed Average | Average speed over duration of session or interval | | | N | Y | Y |
| Pace | Speed indicated in minutes per mile or kilometer | 0:00 /mi | 3:30 /mi | Y | Y | Y |
| Power | Instantaneous power (force & angular velocity) required by rider to move bike forward. | W | 195W | N | Y | Y |
| Power Normalized | Power over duration of session or interval taking into account only active pedaling (removes 0's). | W | 195W | N | Y | Y |
| Power Average | Power over duration of session or interval including pedal idling (0 values). | W | 195W | N | Y | Y |
| Power PerPeriod | Average power over period specificed (i.e. 3s, 5s or 10s) typically used instead of instantaneous power for smoother course correction and comparison to normalized power | W | 195W | N | Y | Y |
| Power Zone | Power zone as determined relative to FTP from 1 - 7 with 1 representing the easiest/lowest effort power zone and 7 indicating the most difficult/hardest effort. | - | 6 | Y | Y | Y |

Ben Hoffman’s 2014 Kona power analysis: http://home.trainingpeaks.com/public/workout/EBSQI7XXLGSVNHALNBMCTIX65A

# TRAINING PEAKS BIKE PROFILE



# BIKE (CONTINUED)

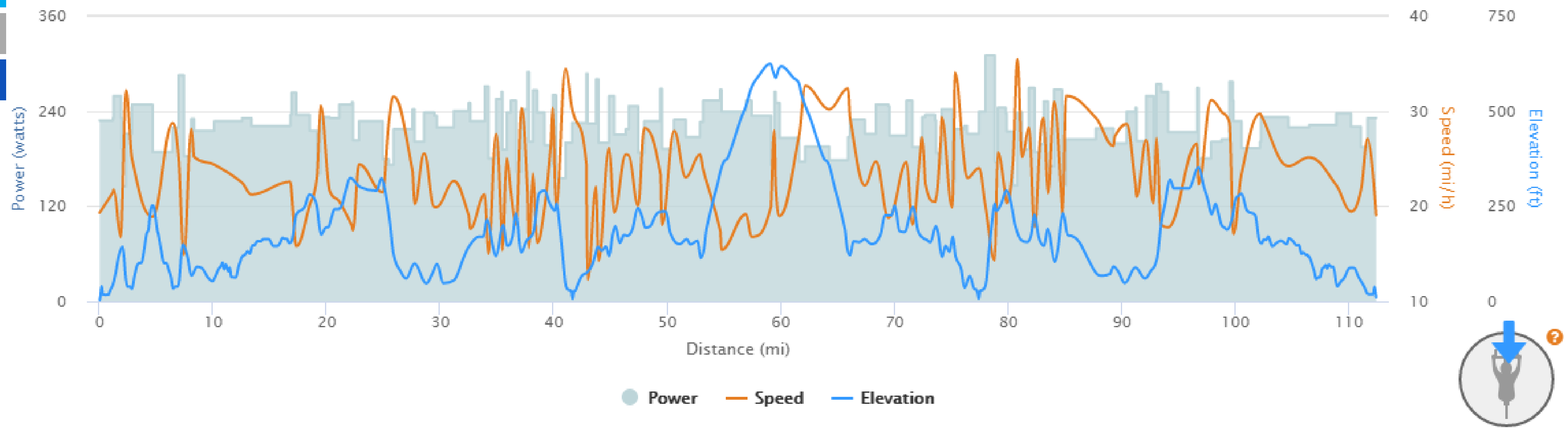
| Metric | Definition | Units | Ex. | Manual | Sensor | Receiver |
|---|---|---|---|---|---|---|
| PWR | Power to Weight Ratio: ratio of power divided by weight (in kg). Used to normalize efficiency rating across riders | W/kg | 4.3 W/kg | Y | Y | Y |
| FTP | Functional Threshold Power: power output estimate to cover 40km. Typically tested in 30 min interval or 1 min then 2 x 8min interval. | W | 195W | N | Y | Y |
| %FTP | Percentage of FTP output by rider. Typically used to define training or racing power targets | % | 75% | Y | Y | Y |
| Cadence | Number of pedal revolutions or strokes per minute. Typically used in triathlon to improve leg heaviness feeling in bike-to-run transition | rpm | 90 rpm | Y | Y | Y |
| Variability Index | How smooth or evenly paced an athletes power output was during a race or work out where a properly paced time trial should have a VI value of 1.05 or less | - | 1.1 | N | Y | Y |
| Grade | Elevation change (or slope) over length of climb/descent relative to the horizontal. | % | 4% | N | Y | Y |

# 2016 KONA BIKE PREDICTIONS & POWER PLANS @ [HTTPS://WWW.BESTBIKESPLIT.COM/CASE-STUDY-KONA](https://www.bestbikesplit.com/case-study-kona)

## 2016 Kona / Daniela Ryf

Power Plan | Time Analysis | Weather | Yaw Angles | Gradients | Peak Power | Notes

Distance | Time



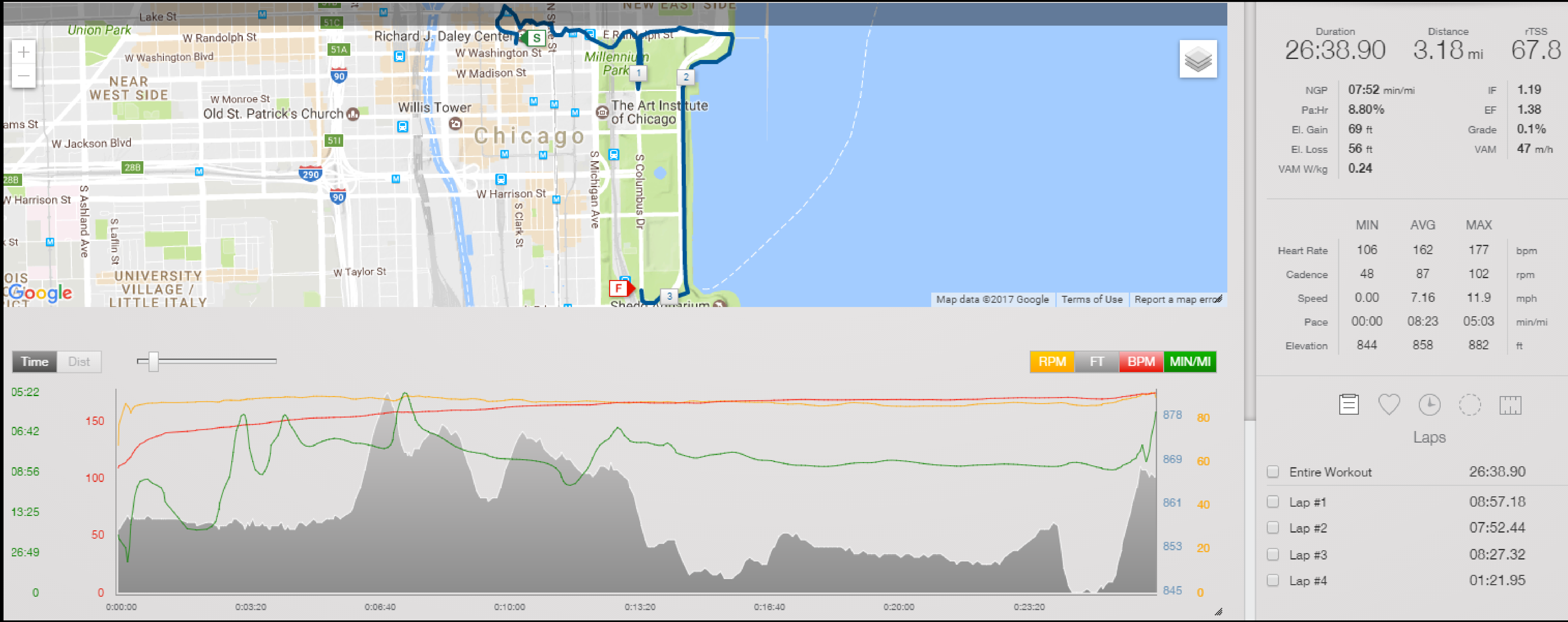

### Race Overview

| | |
|---|---|
| Course | 2016 Ironman World Championship |
| Distance | 112.4 mi |
| Time | 04:53:04 |
| Avg. Speed | 23.01 mph |
| Avg. Power | 224.50 watts |
| Normalized Power® | 229.11 watts |
| Variability Index | 1.02 |
| Intensity Factor® | 0.76 |
| Training Stress Score® | 284 |
| Watts/Kg | 3.81 |
| Avg. Yaw | 9.93 ° |
| Bike | Felt |

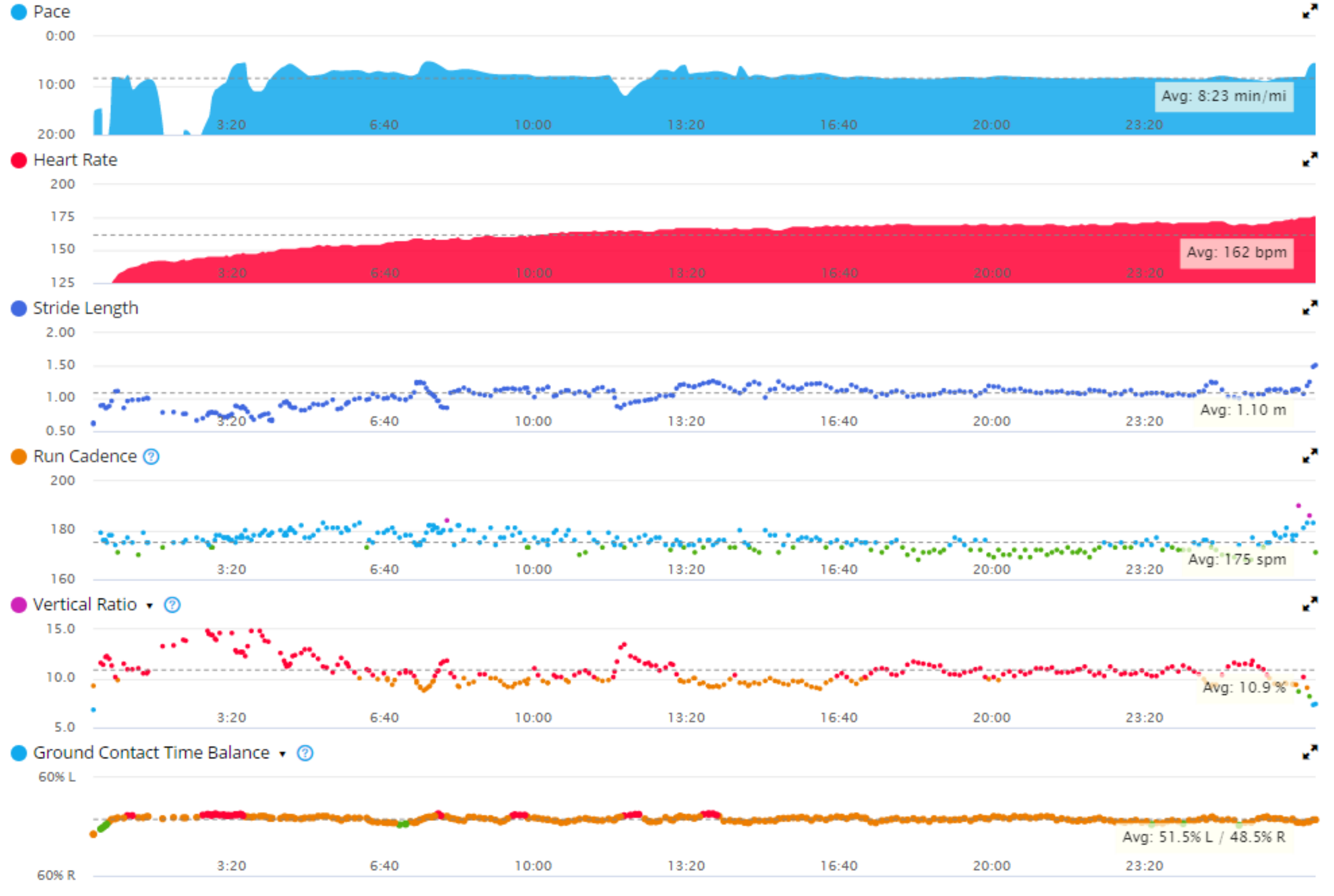
# RUN

| Metric | Definition | Units | Ex. | Manual | Sensor | Receiver |
|---|---|---|---|---|---|---|
| Speed | Instantaneous speed indicated in mph or kmh. Typically used for treadmill | mph or kmh | 6.2mph | Y | Y | Y |
| Pace | Speed indicated in minutes per mile or kilometer | 0:00/mi | 3:30/mi | Y | Y | Y |
| GCT | Ground Contact Time: the amount of time your foot is in contact with the ground on each stride. Excludes 0's from standing or walking. | ms | 225ms | N | Y | Y |
| Vertical Oscillation | The amount of “bounce” – i.e. vertical up and down movement – generated while running. Typically measuring centimeters your torso moves from a fixed point during each stride. | cm | 9cm | N | Y | Y |
| Stride Length | Distance traveled per one stride of running | m | 1.04m | N | Y | Y |
| Cadence | Number of times athlete's foot turns over, or strikes the ground, per minute | spm | 180 spm | Y | Y | Y |

# TRAINING PEAKS RUN PROFILE



# RUNNING DYNAMICS (GARMIN)




**Heart Rate**

bpm | % of Max | Zones

162 bpm
Avg HR

177 bpm
Max HR

3.6
Training Effect

**Timing**

Pace | Speed

26:39
Time

26:08
Moving Time

26:39
Elapsed Time

8:23 min/mi
Avg Pace

8:13 min/mi
Avg Moving Pace

5:03 min/mi
Best Pace

**Elevation**

69 ft
Elev Gain

56 ft
Elev Loss

844 ft
Min Elev

882 ft
Max Elev

**Running Dynamics**

175 spm
Avg Cadence

204 spm
Max Cadence

1.10 m
Avg Stride Length

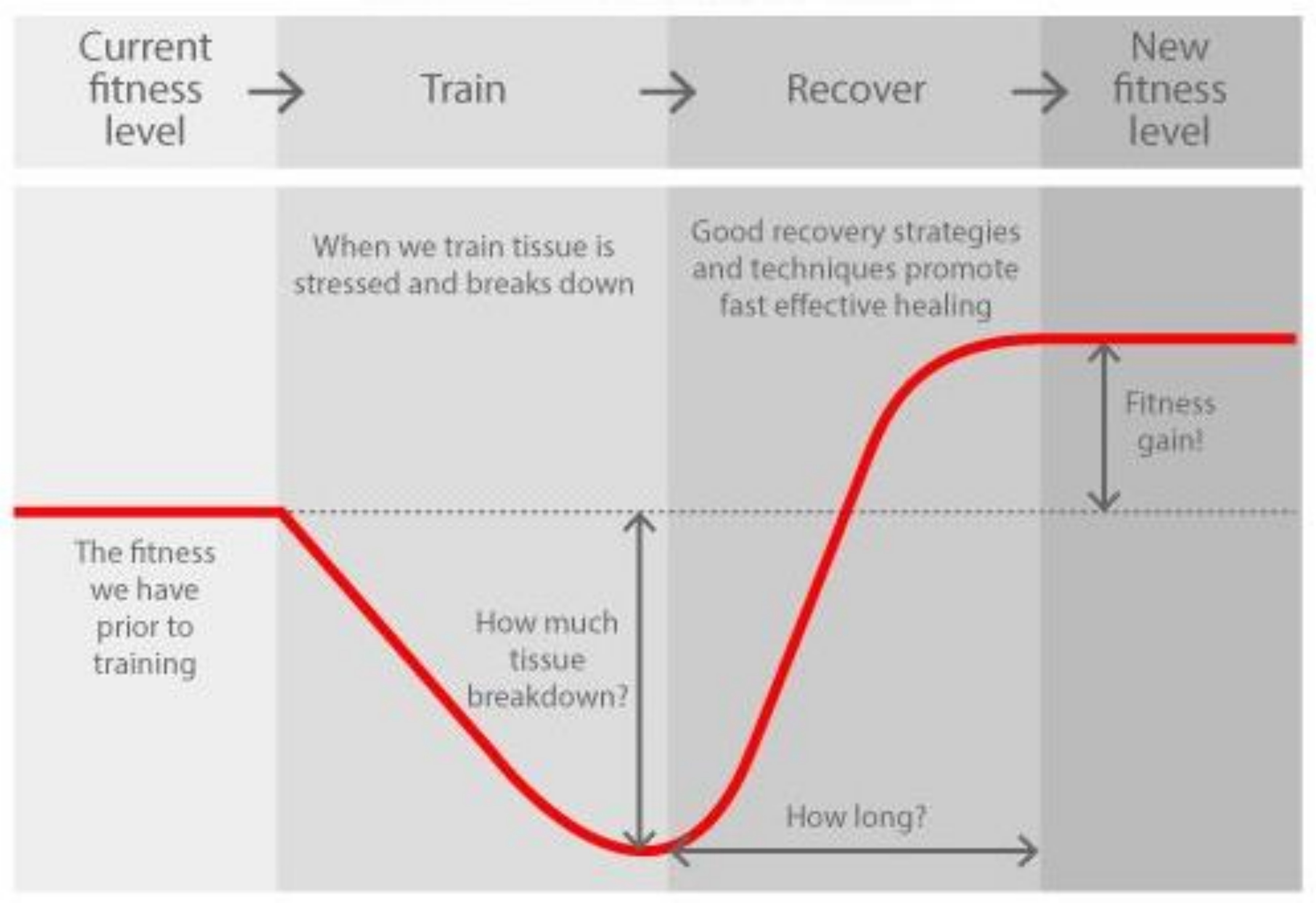
10.9 %
Avg Vertical Ratio

11.4 cm
Avg Vertical Oscillation

51.5% L / 48.5% R
Avg GCT Balance

231 ms
Avg Ground Contact Time

# RECOVERY



Current fitness level
Train
Recover
New fitness level
When we train tissue is stressed and breaks down
Good recovery strategies and techniques promote fast effective healing
Fitness gain!
The fitness we have prior to training
How much tissue breakdown?
How long?

# RECOVERY

| Metric | Definition | Units | Ex. | Manual | Sensor | Receiver |
|---|---|---|---|---|---|---|
| TSS | Training Stress Score: a quantitative score calculated for workouts taking into account intensity, duration and frequency relative to the individual athlete's threshold metrics (for power, heart rate and pace). Used to estimate recovery needs and ultimately to optimize training load to Peak training phase. | - | 370.7 | Y | Y | Y |
| ATL | Actute Training Load: Fatigue; short-term effect of training (last 7 days) | - | 109.5 | N | Y | Y |
| CTL | Chronic Training Load: Fitness; long-term effect of training (last 42 days) | - | 120.8 | N | Y | Y |
| TSB | Training Stress Balance: Difference between CTL and ATL from previous day (Fitness - Fatigue = Form). Typically slightly negative up to +25 at race peak. Can be used to optimize training fatigue to A-race date | - | -24.7 | N | Y | Y |

TSS = (sec x NP® x IF®)/(FTP x 3600) x 100

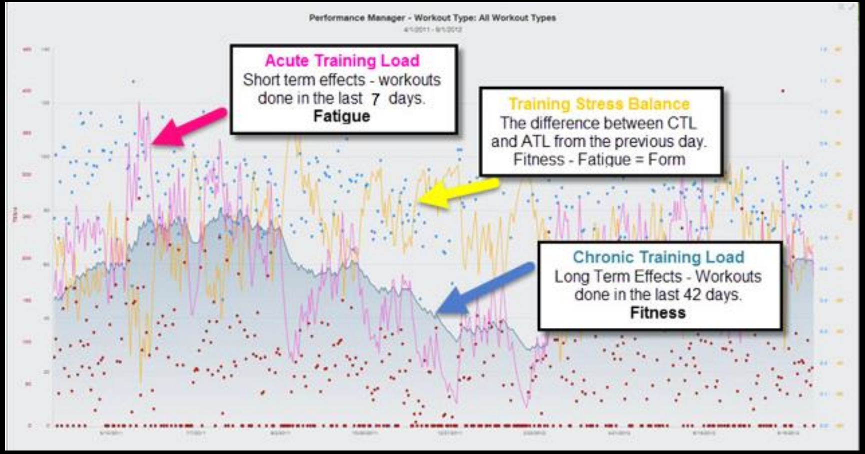



Table. Estimating TSS from RPE or Average Heart Rate

| RPE (1-10 scale) | Avg HR Zone | TSS per Hour |
|---|---|---|
| 1 | 1 (low) | 20 |
| 2 | 1 | 30 |
| 3 | 1 (high) | 40 |
| 4 | 2 (low) | 50 |
| 5 | 2 (high) | 60 |
| 6 | 3 | 70 |
| 7 | 4 | 80 |
| 8 | 5a | 100 |
| 9 | 5b | 120 |
| 10 | 5c | 140 |

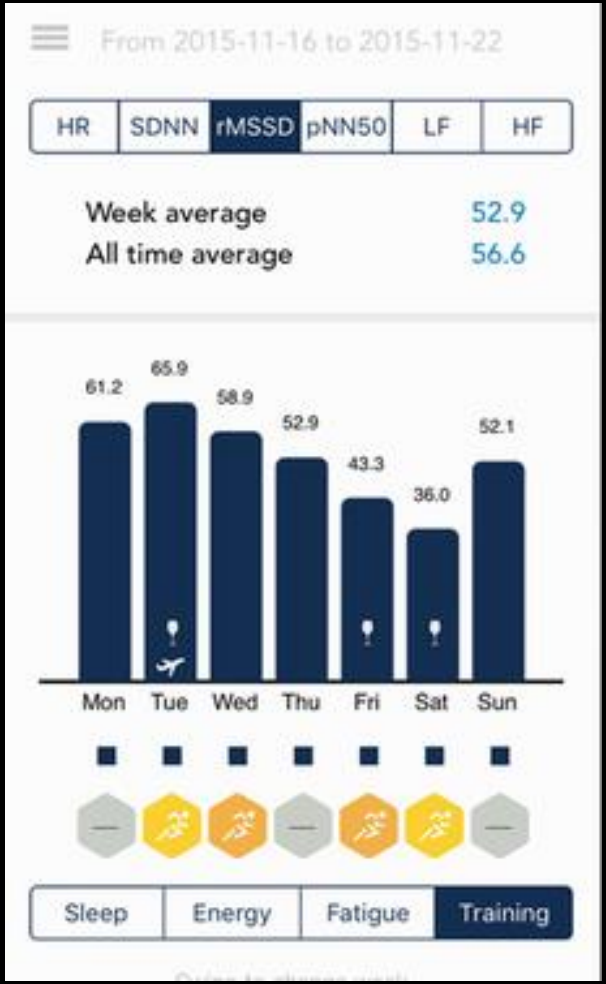
# TRAINING PEAKS PERFORMANCE MANAGEMENT CHART (PMC)

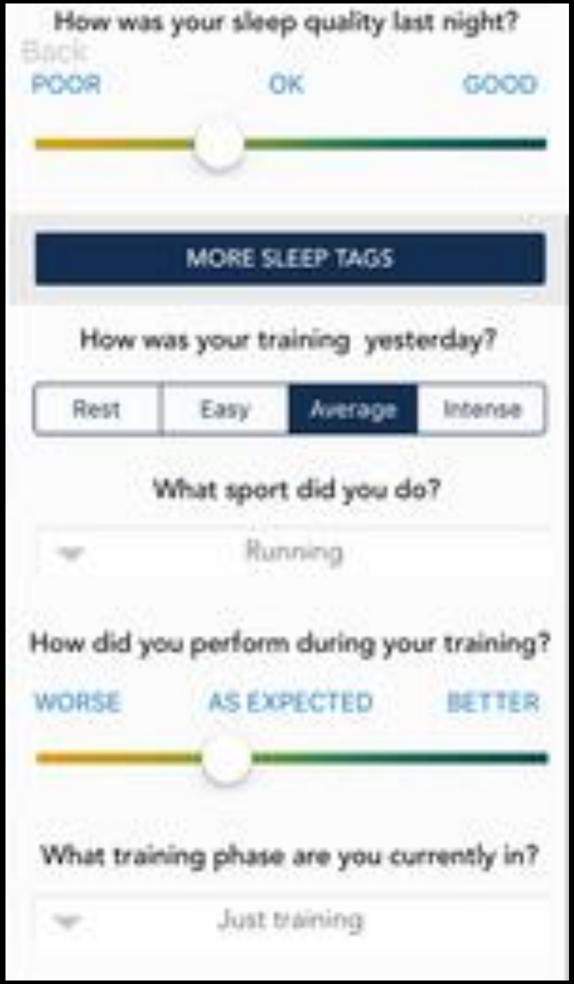
- Performance Management Chart (TrainingPeaks)

# RECOVERY

| Metric | Definition | Units | Ex. | Manual | Sensor | Receiver |
|---|---|---|---|---|---|---|
| HRV | Heart Rate Variability: is the physiological phenomenon of variation in the time interval between heartbeats. It is measured by the variation in the beat-to-beat interval and serves as a means to measure parasympathetic response to training (and non-training) stress. Higher variability is better, and indicates a well-recovered, calm state, whereas persistently low values of HRV indicate chronic stress. | varies: ms Hz - | varies: 20ms .05Hz 7.3 | N | Y | Y |
| RHR | Resting Heart Rate: the number of times your heart beats per minute while at complete rest. Resting heart rate will decrease as your heart becomes stronger. Lagging indicator vs HRV | bpm | 55 bpm | Y | Y | Y |
| Stress | Ahlete perceived daily stress rating (high/low relative to average) | - | Low | Y | N | N |
| Mood | Athlete perceived daily mood rating (better/worse relative to average) | - | Worse | Y | N | N |
| Soreness | Athlete perceived daily level of soreness (high/low relative to average) | - | Low | Y | N | N |
| Motivation | Athlete perceived daily level of motivation (high/low relative to average) | - | Inspired | Y | N | N |

# HRV: CORRELATING FACTS WITH HOW YOU FEEL




# RECOMMENDED ANALYSIS & FREQUENCY

1. **Immediate feedback:** quick review from this workout
   - Does the data reflect how you felt? Why or why not?
   - Key takeaways: reminder not to do ___ or remember to include ___ in race plan or when I do ___, ___ happens

2. **Monitoring:** periodically compare similar workouts from different training phases (i.e. test workouts)
   - Have you improved vs benchmark?
   - What do you need to adjust for the next training phase?
   - How does that proposed adjustment align to your overall training goals & capability?

3. **Race rehearsal analysis:** execute A-race race plan or key skills in training race to confirm effectiveness
   - Did your race plan deliver the expected results?
   - What to adjust (i.e. race power, cadence or HR zone), what to keep the same

**Note: it will require CONSISTENCY and TIME to develop attunement to your body!**

# WHAT HAPPENS NEXT

## Align Your Needs to Your Goals

- ❑ Choose one or two disciplines that you want to focus on:
  1. What is your limiter?
  2. What are you WILLING to put time and energy into monitoring & correcting?
  3. What will deliver the greatest time benefit for your A-race this year?  For your long-term goals?
- ❑ Mentally & emotionally prepare yourself
  1. Can you manage another step in the training process (data monitoring & goal re-assessment)?
  2. Will you obsess over the data instead of using it for good??

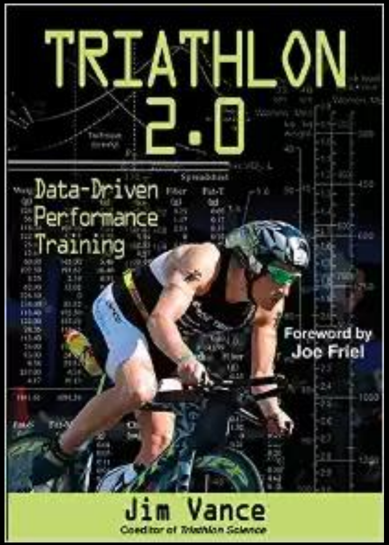
## Determine Your Budget

- ❑ How much are you willing to spend?
  - ❑ On device(s)?
  - ❑ On training software?
- ❑ Will you need a coach to help you interpret and action the data?
- ❑ Keep it simple! Aim for devices and software that
  - ➢ Auto-sync across multiple platforms
  - ➢ Measure metrics across multiple disciplines
  - ➢ Are easy-to-use
  - ➢ Allow for data-sharing between coaches and/or other athletes

## RTfM: Spend the Time to Set It Up!

- ❑ READ THE MANUAL – get the most out of your device(s) and software
  - ➢ Program workouts
  - ➢ Alert to individualized training zones
  - ➢ Record weather conditions
  - ➢ Predict adaptation & fatigue
- ❑ Set up the reports in a format that’s easy for you to understand
  1. Can you take one look and know whether your form was good or bad or different than usual?
  2. Do you know what you need to take away from the report?
- ❑ Ask for help if you need it!  See online tutorials or ask another athlete

# RESOURCES

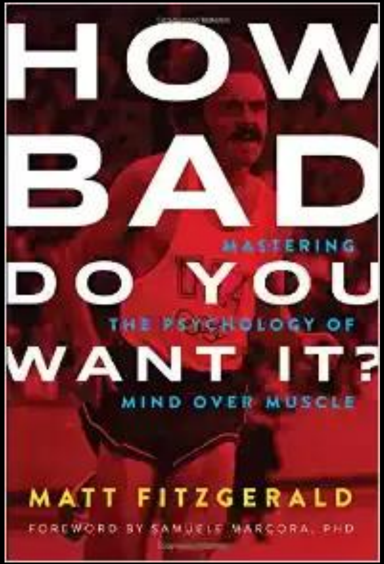



## Triathlon 2.0

- In-depth explanation on how to apply data analysis in training
- Heavy emphasis on cycling metric analysis and analysis programs

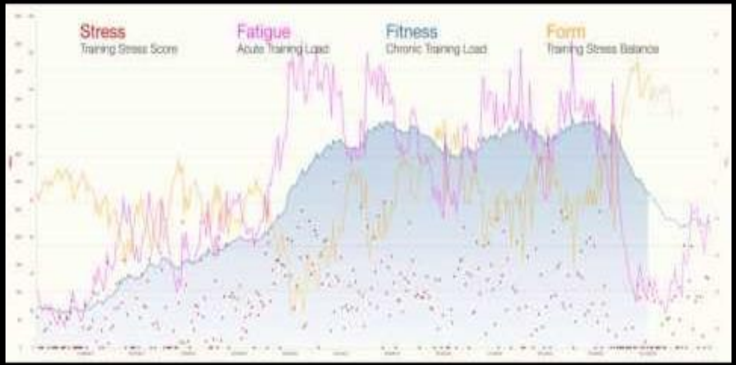
## Endurance Planet

- Podcasts & articles on a wide range of endurance-sport related topics
- Scientifically backed discussion on cutting edge research and training/nutrition trends
- Analysis and commentary by endurance professionals (coaches, professional and elite athletes, researchers, doctors, etc.)
- Features series on fellow clubmate Matt Bach "So You Wanna Go Pro"




## How Bad do you Want It?

- 8 mental coping strategies for minimizing RPE during training racing
- Examples from world champions




## TrainingPeaks

- Performance Management Chart and other articles on how to measure, use and interpret data.
- Articles on key charts for performance dashboard set-up
- How-to set up Annual Training Plans or individual workouts using TSS to define intensities and duration

# ‘ROUND-THE-ROOM ACTIVITY

## Audience Poll

1. Who wants advice on programs? Who can offer advice on programs?
2. Who wants advice on devices? Who can offer advice on devices?
3. Break up into groups for focused discussions

BUT FIRST, let me leave you with some nuggets for later…

# NEED AN INCENTIVE?

Check out the latest deals on devices, sensors and training logs at TriSports.com using the referral link below:

http://mbsy.co/trisports/27629224

Use code **SHARE15** for 15% off + 5% back on your purchase in rewards (when you use this link!)

TriSports.com

swim. bike. run. shop.®

# CLUB RECOMMENDATIONS

Sensors

Devices

Programs

# QUESTIONS & DISCUSSION

Contact @ Julie.Percifield@gmail.com