Kernel UDs 2016

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October 19, 2016

Kernel Utilization Distributions

This script uses the temporally rediscretized dataset (currently only 20 sec steps) to create utilization distributions. Here I compare the 2016 data with the 2015 data for LFC - I excluded the WRC for coding simplicity, not scientific reasons. Utiltimately I plan to also consider variability in flow and fish size, but have not yet incorporated those additional variables.


Create kernel UD from tracks

The fish positions are only those from the first two phases - includes 374 individuals (no individuals with tracks containing a >150m of gap between consecutive positions).

In 2015 the grid was automated to 10.03m squares, with a smoothing parameter h=3.03. The kernelUD() function in adehabitatLT gives options for how to select a smoothing parameter for the bivariate normal probability space defined at each recorded fish position. In 2015 I used the least squares cross validation to select an appropriate value for h (smoothing parameter) - the algorithm looks for a value of the smoothing parameter (h) where the CV(h) is minimized. In 2015 the value selected for h for LFC was 3.03 (some stochasticity in this, changes slightly by run). *For 2016 I set the grid to 10m exactly.* I ran the kernelUD() function with both lscv and href [the ad hoc method of smoother selection, which is h = Sigma*n^(1/6)] approaches to estimating the smoothing parameter, as well as setting it to match the 2015 analysis (h=3.03). The LSCV method for 2016 estimated a smoothing parameter of 3.09, so for consistency sake I adjusted this to 3.03 to be in accordance with the smoother used for 2015.

Read in RData object from 2015

LFC 2015
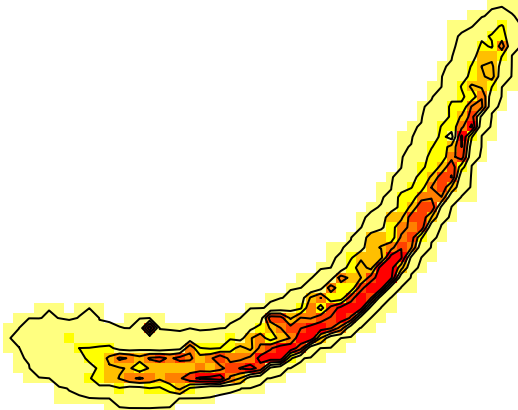

```
## [1] "smoothing parameter h, lscv; 2015-LFC =  3.027"
```

Estimate Kernel UD for 2016 using three methods for setting the smoothing parameter

Here I used LSCV (as noted above), href (also as noted above), and a set value of h=3.03 as was selected by lscv in 2015.

```
## [1] "smoothing parameter h, lscv; 2016-LFC = 3.438"
```

```
## [1] "smothing parameter h, href; 2016-LFC = 24.136"
```

Convert kernel UDs into volume UDs for plotting; then plot the three different smoothing parameters

```
## pdf
##   2
```

Compare 2016 UD (all fish) with 2015 UD (for 2015-LFC)

```
## pdf
##   2
```

```
## pdf
##   2
```

Compare similar flows (low flows) across years

In 2015 the river stage was at nearly 15 ft during all releases. In 2016 there was much more variability, with stages ranging from 16.3 to 31.12. Fish from release 1 passed at slightly lower flows, with a median stage of 18.4 ft and a max stage of 27.4 ft.

Summary of the flows experienced by each release group

```
##   grp   mn.stg    sd.stg max.stg min.stg nfish
## 1   1 18.37534 0.3843146   18.85   16.30   184
## 2   2 26.61882 1.4827967   31.12   20.93   190
```

Plots of UD at similar flows (2015 vs 2016-rel1) - heat maps & overlaid contours

```
## pdf
##   2
```

```
## pdf
##   2
```

Compare 2016-grp1 UD with 2016-grp2 UD - heat maps & overlaid contours

```
## pdf
##   2
```

```
## pdf
##   2
```