

Kernel UDs 2016

Anna Steel

October 19, 2016

Kernel Utilization Distributions

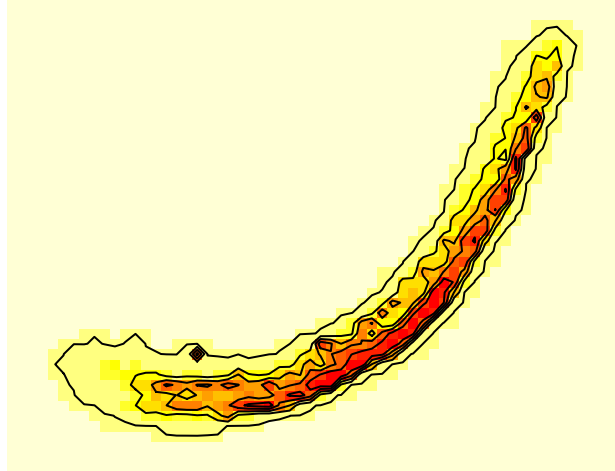
This script uses the temporally rediscrretized dataset (currently only 20 sec steps) to create utilization distributions. Here I compare the 2016 data with the 2015 data for LFC - I excluded the WRC for coding simplicity, not scientific reasons. Ultitimately I plan to also consider variability in flow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

Create kernel UD from tracks, using ALL tracks together

The fish positions are from both release phases (RelEv 1, 2, 3, 4, & 5) - includes 634 individuals after temporal rediscrretization (Vemco Data, 20 sec steps)

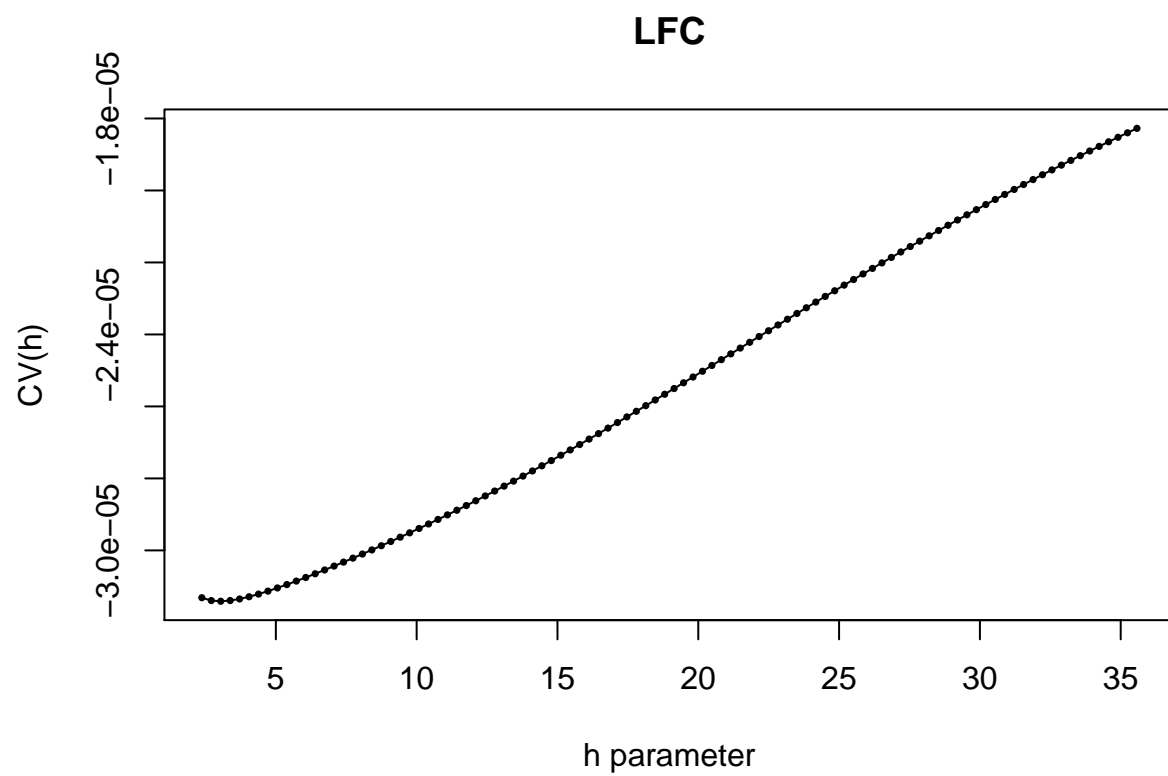
In 2015 the grid was automated to 10.03m squares, with a smoothing parameter $h=3.03$. The kernelUD() function in adehabitatLT gives options for how to select a smoothing parameter for the bivariate normal probability space defined at each recorded fish position. In 2015 I used the least squares cross 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 $h = \text{Sigma} \cdot n^{(1/6)}$] approaches to estimating the smoothing parameter, as well as setting it to match the 2015 analysis ($h=3.03$).

LFC 2015; h=LSCV



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

```
## [1] "smoothing parameter h, lscv; 2016-LFC = 3.043"
```

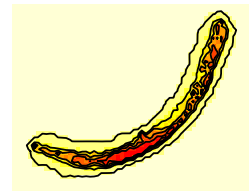
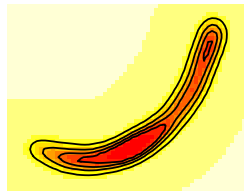
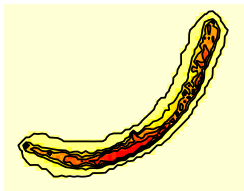


```
## [1] "smoothing parameter h, href; 2016-LFC = 23.718"
```

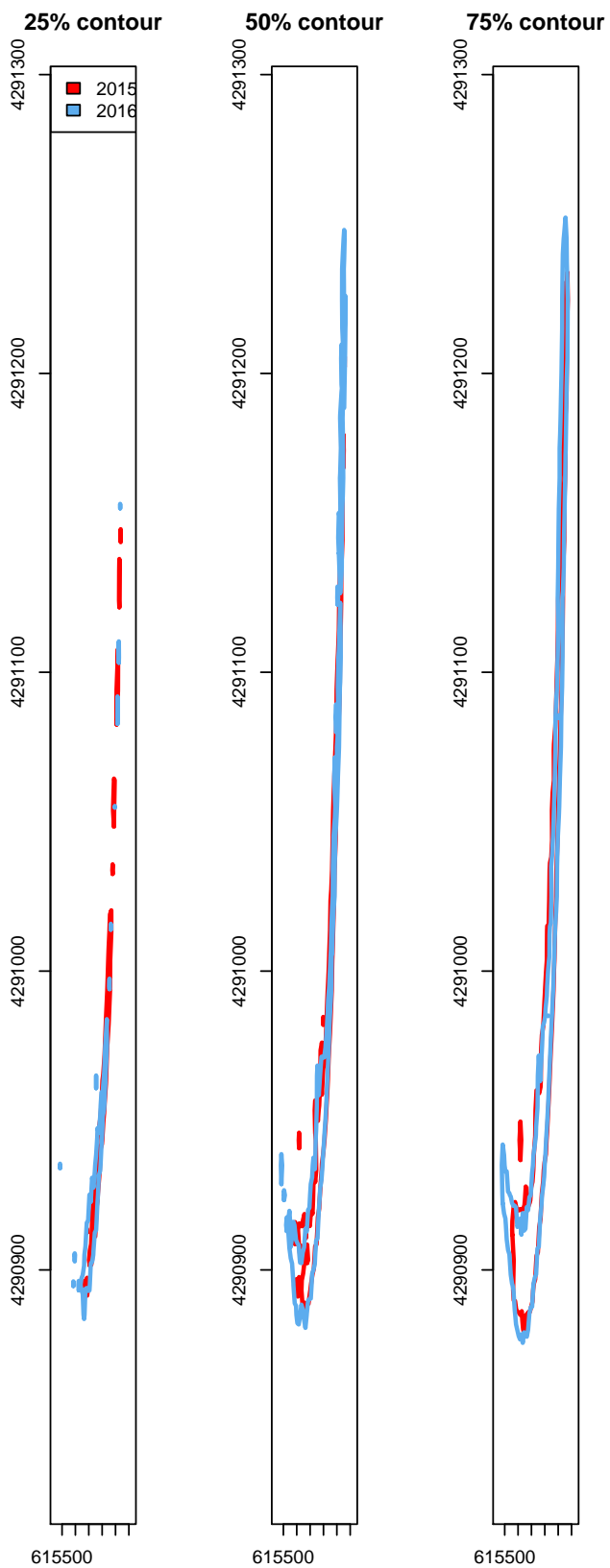
LFC 2016; h=LSCV

LFC 2016; h=HREF

LFC 2016; h=3.03



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

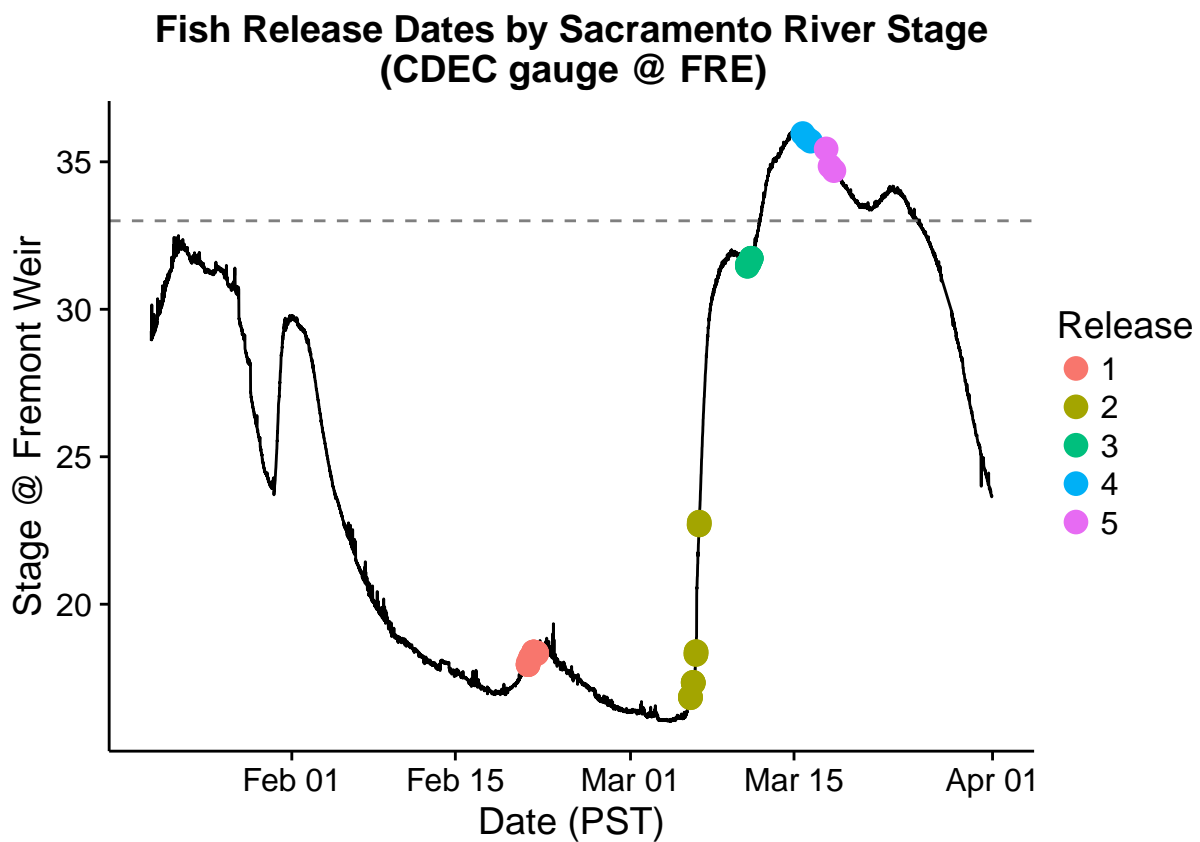


Comparing similar flows (low flows) across years

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 35.93.

Raw stage data

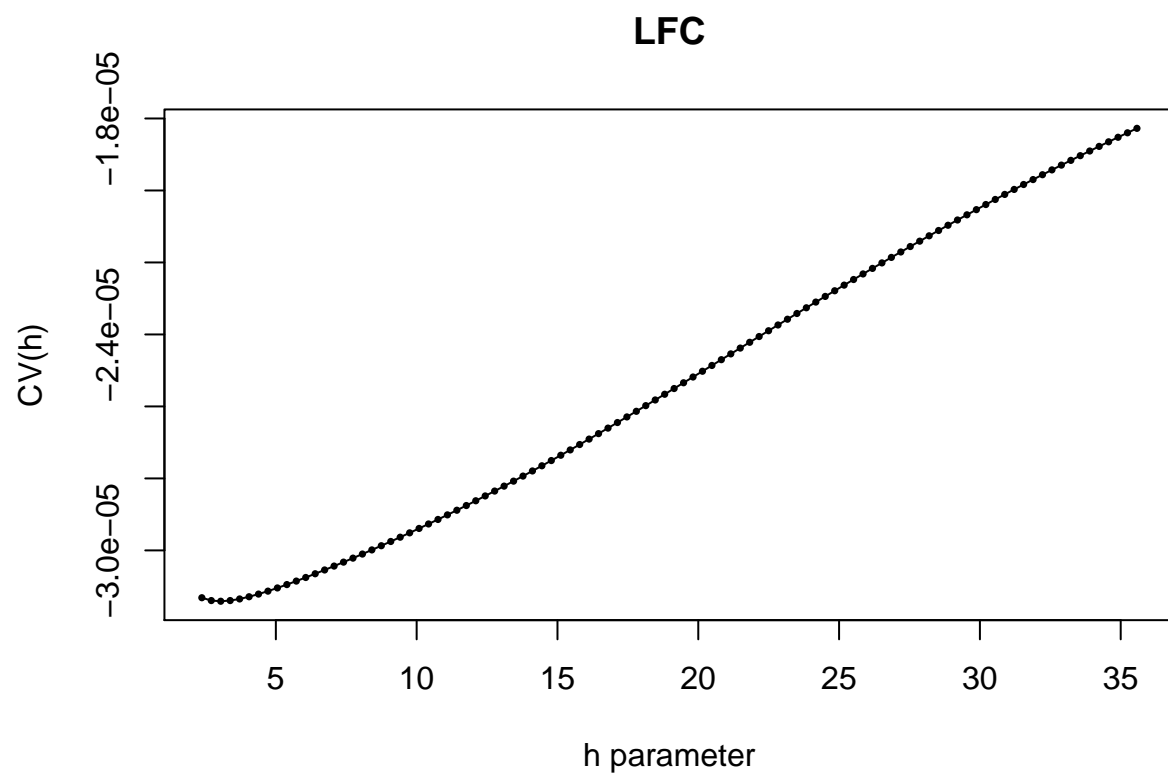
```
## pdf
## 2
```



Summary of the flows experienced by each release group

```
## RelEv mn.stg max.stg min.stg nfish
## 1 1 18.42481 22.28 16.30 216
## 2 2 26.76969 31.12 23.54 214
## 3 3 32.54599 35.93 32.00 125
## 4 4 35.44679 35.73 35.20 39
## 5 5 34.51343 34.74 34.26 40
```

```
## [1] "smoothing parameter h, lscv; 2016-LFC = 2.892"
```

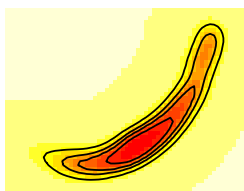


```
## [1] "smoothing parameter h, href; 2016-LFC = 25.339"
```

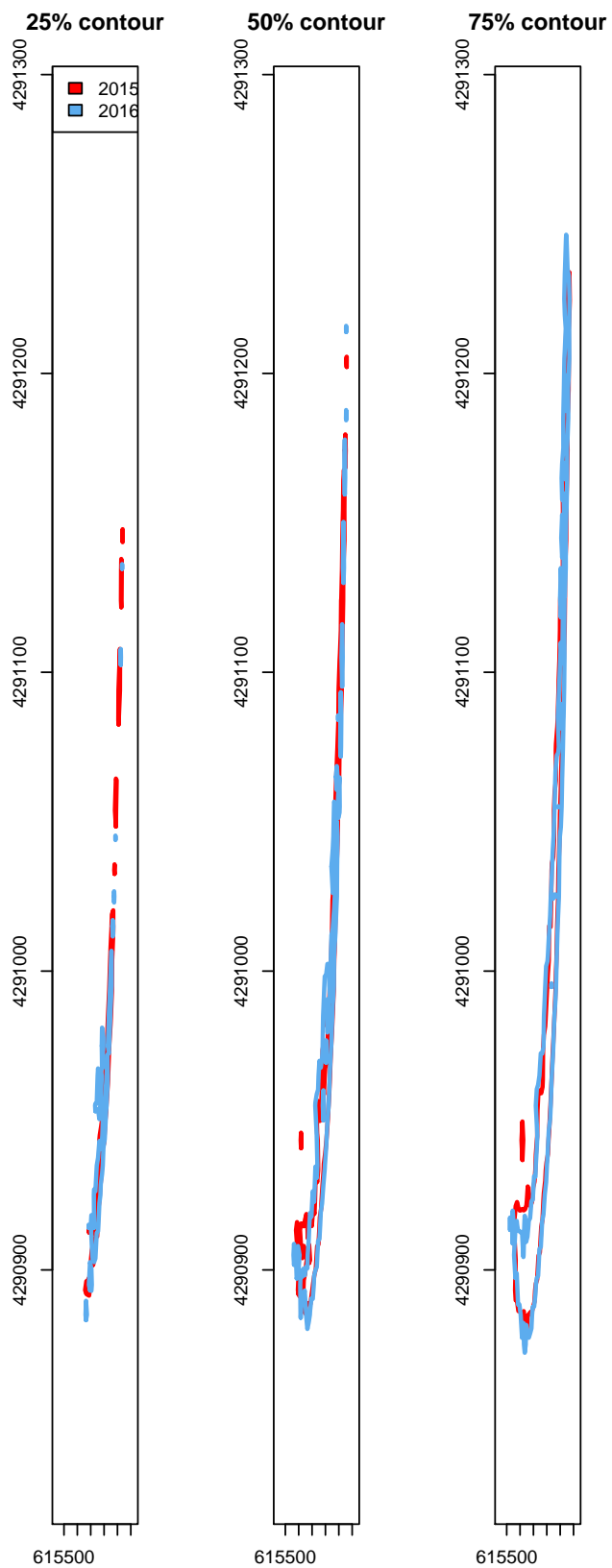
LFC 2016, rel1; h=LSCV

LFC 2016, rel1; h=HREF

LFC 2016, rel1; h=3.03

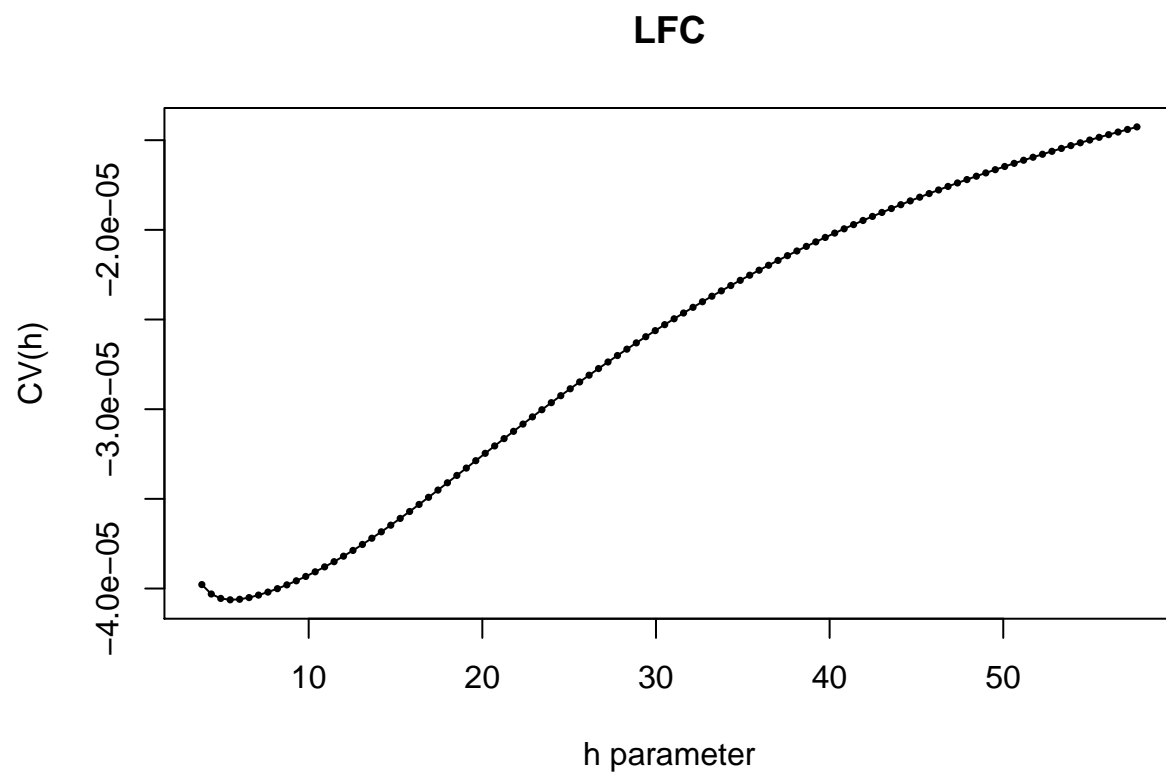


Compare 2016 UD with 2015 UD (for 2015-LFC)



Comparing low and high flows within 2016

```
## [1] "smoothing parameter h, lscv; 2016-LFC, Rel 4 & 5 = 5.479"
```

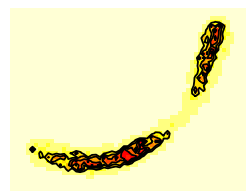
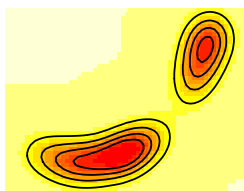
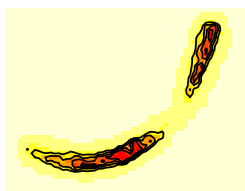


```
## [1] "smoothing parameter h, href; 2016-LFC = 38.466"
```

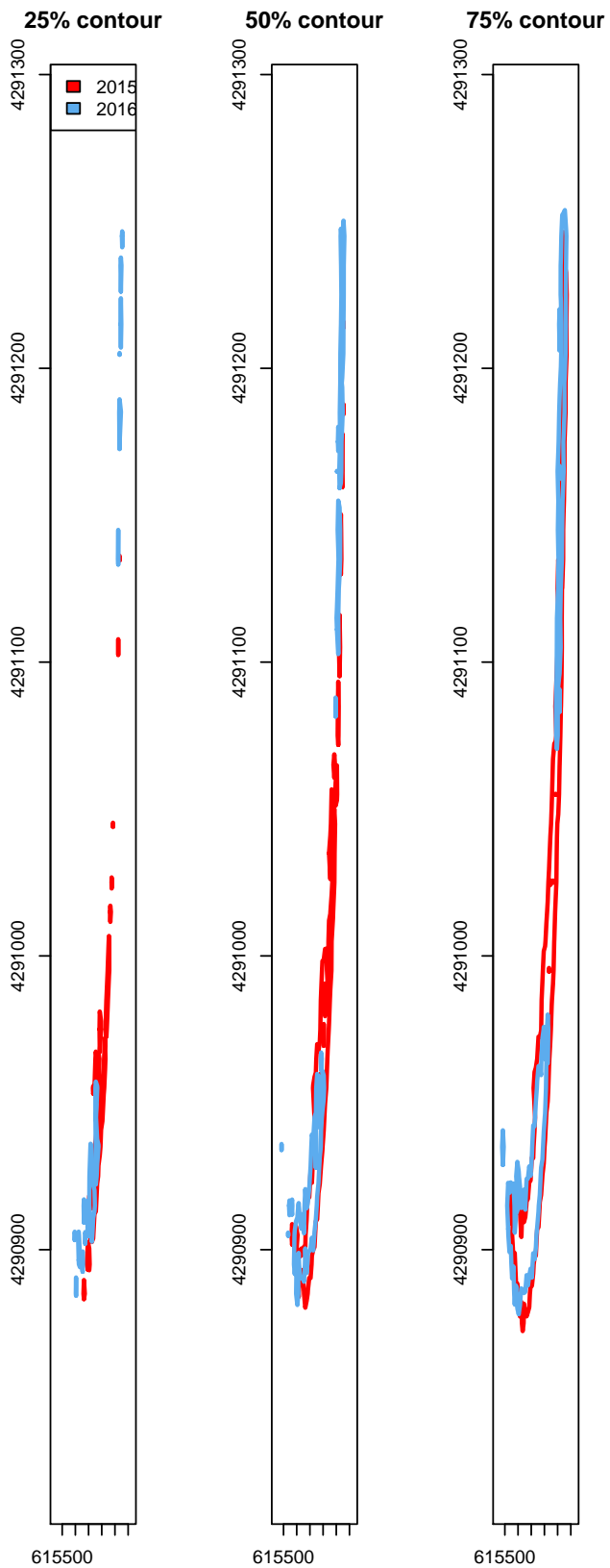
LFC 2016, rel45; h=LSCV

LFC 2016, rel45; h=HREF

LFC 2016, rel45; h=3.03

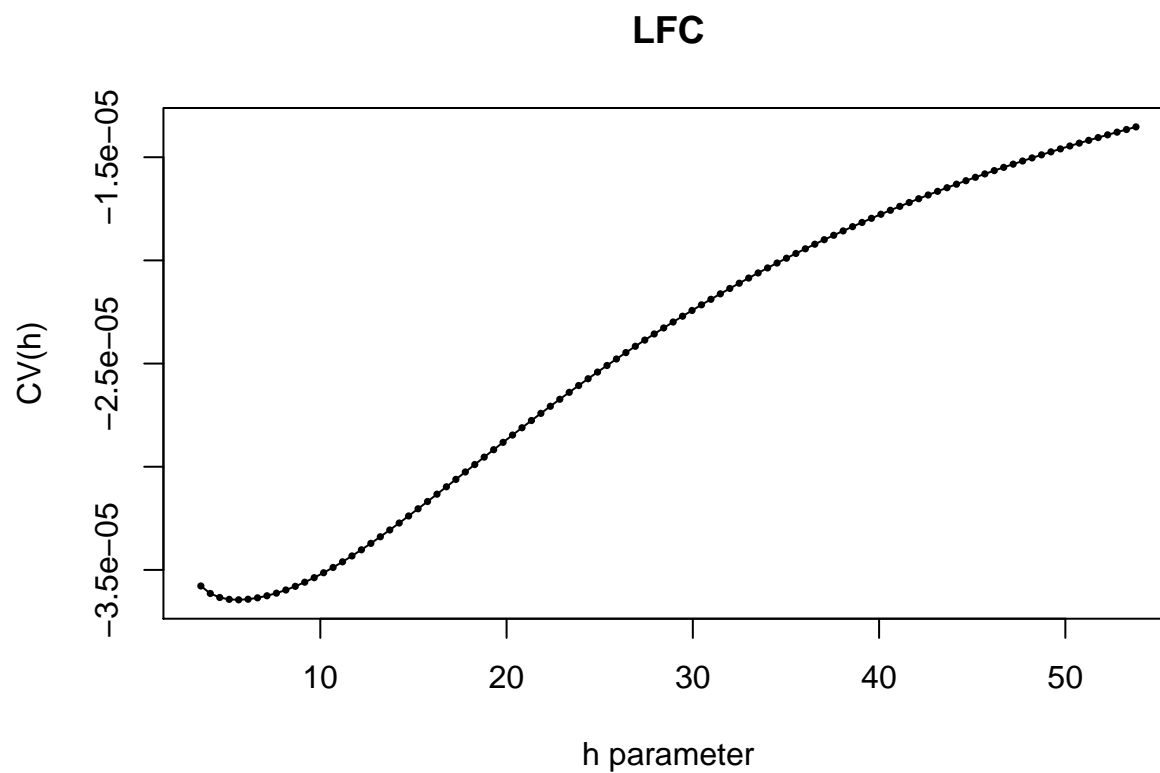


Compare rel1 2016 UD with rel4,5 2016 UD with consistent smoothing ($h=3.03$)



Comparing rel1 and rel3 in 2016, (rel 3 = just prior to overtopping)

```
## [1] "smoothing parameter h, lscv; 2016-LFC, Rel 4 & 5 = 5.614"
```

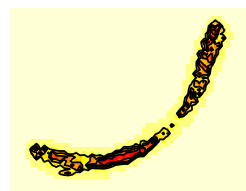
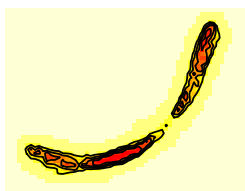


```
## [1] "smoothing parameter h, href; 2016-LFC = 35.86"
```

LFC 2016, rel3; h=LSCV

LFC 2016, rel3; h=HREF

LFC 2016, rel3; h=3.03



Compare rel1 2016 UD with rel4,5 2016 UD with consistent smoothing ($h=3.03$)

