Permuted CCF between raw FD and system state Phytoplankton Zooplankton 1.0 0.5 29 -40 36 Kasumigaura 31 -35 -60 **0** -**5**6 -9 58 -59-15 0.0 -0.5  $^{-1.0}_{1.0}$ 0.5 -32 10 -38-56 50 **−3**4 **−11** 53 -39 26 *-*5 -**\***1 **6**0 -39*-*60 60 Kinneret 0.0 -0.5-1.0 1.0 **FD Metric** 0.5 30 -1 -11 44 46 -45 17 55 -2<sup>2</sup> 15 -1 -1 4 -5 -3 -9 Lower Zurich -55-51 Ô -37 **4**5 -21 **FDis** 0.0 **FEve** -0.5**FRic** -1.0 1.0 0.5 Mendota 0.0 -0.5-1.0 1.0

Community

System state proxy

Density

FΙ

Windermere

Z\_P.ratio

MVI

Cross correlation

0.5

0.0

-0.5

-1.0

-6 -56

Community

38 - 33 45 - 40 - 44 37

Density

ĖΙ

MVI

Z\_P.ratio