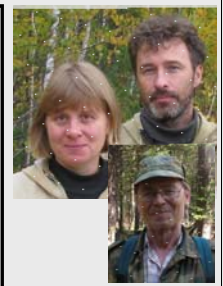
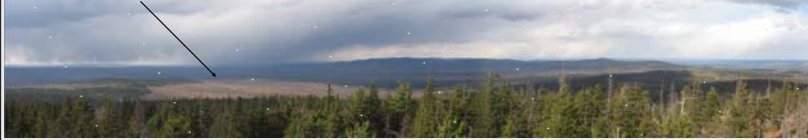


# SOME SIGNS OF SUDDEN ARRHYTHMIA IN URALS HEART OF SMALL MAMMALS POPULATION CYCLES

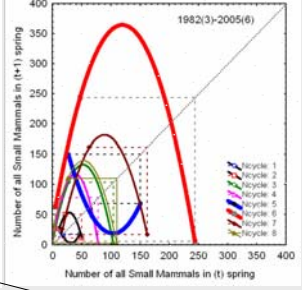
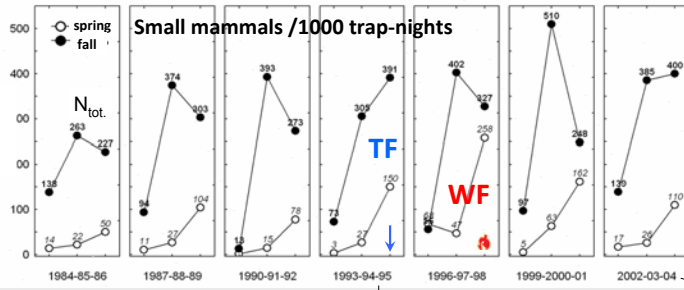
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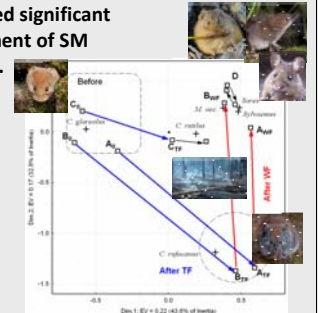
The burned (in 1998) area



We investigated the dynamics of small mammals (SM: rodent, shrews and mustelides) in dark coniferous southern taiga in the Visimskiy Biosphere State Reserve (Middle Ural, N57°22'402", E59°46'409") during more then quarter of century (YM since 1982, IK&YD since 1995).



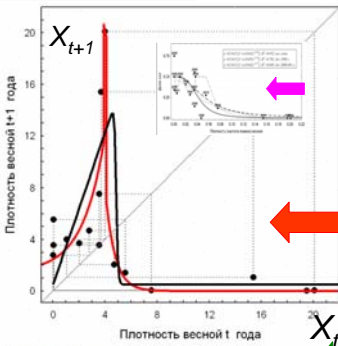
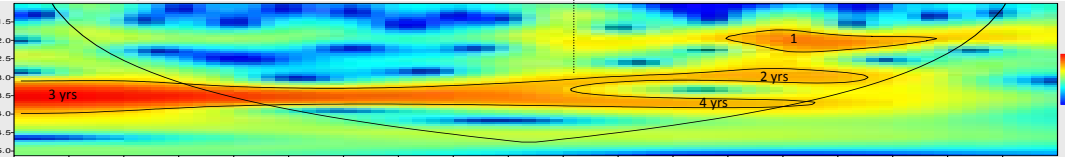
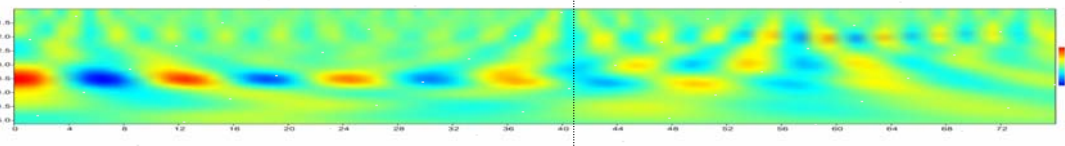
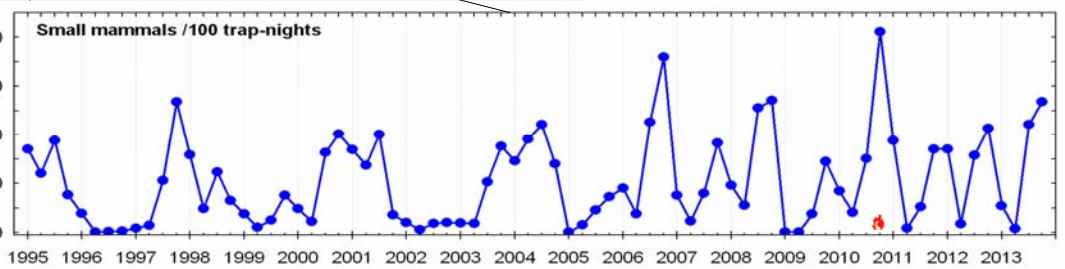
We observed significant rearrangement of SM community.



The long term SM population dynamics has apparently regular pattern (peak, trough, increase) – strong **three-year periodicity** (and weak seasonality) in spite of environmental disturbances after catastrophic trees falls TF (caused snow storm 06.06.1995) and wild fires (WF) in 1998 & 2010.

• But later (after drought in 2005) surprising signs of "fibrillation" are appeared, that can be observed via wavelet or short-time Fourier spectra.

The summer of 2005 characterized deep trough in SM abundance and we registered the unique (proven via mit. and nucl. DNA analysis) case of **contemporary interspecies hybridization** (female *C. rutilus* x male *C. glareolus*).



• We got an estimates for parameters of population growth model with discrete breeding seasons:  $X_{t+1} = R_0 X_t / [1 + (X_t/k)^\beta]$ , using the density in beginning of reproductive season. High value of parameter  $\beta \approx 61-386$ , suggest that overcompensation is not exclusively result of intraspecific competition, but strong effects of specialized predators – small mustelides. The data slightly better can be fitted by newly introduced nonlinear (first order phase transition) model of exponential growth with a threshold (K): if  $X_t < K$ , then  $X_{t+1} = a + \exp(b + cX_t)$ ; if  $x > K$ , then  $X_{t+1} = d$ , ( $R^2 = 0.92$ ). A threshold may be biologically interpreted simply as such prey density that "triggered on" negative density dependence not only via inhibition of yearlings' maturation, but mainly (?) via numerical response of specialist predators.

• We used GLM and IC model selection technique to determine the relative importance of different lags in delayed response of the least weasel on prey density, and got a maximum support ( $w = 0.96$ ) for the lag about 9 month.  
 • At the next step we developed a system of two differential equations with delay and investigate the sensitivity of model trajectories to some parameters variations.

We can only speculate,  
**Do observed "ARRHYTHMIA" in small mammals dynamics is just a period of intermittency and old regime should be back in future?**

