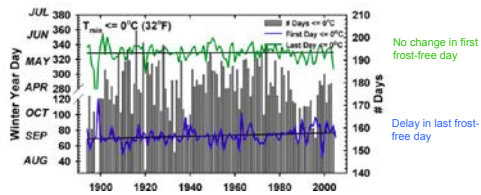


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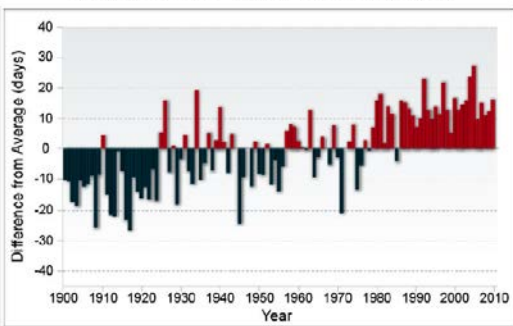
Changes in climate that affect phenology



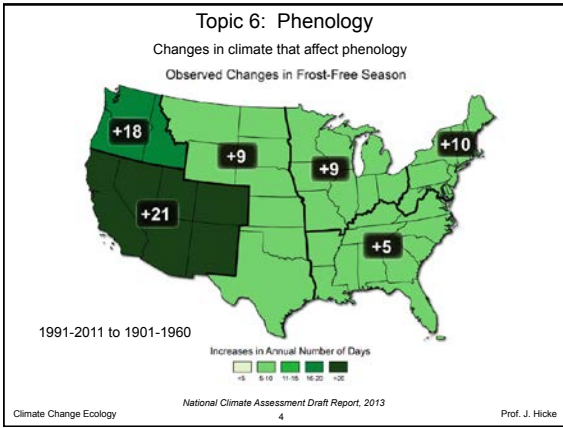
Pederson et al. 2010

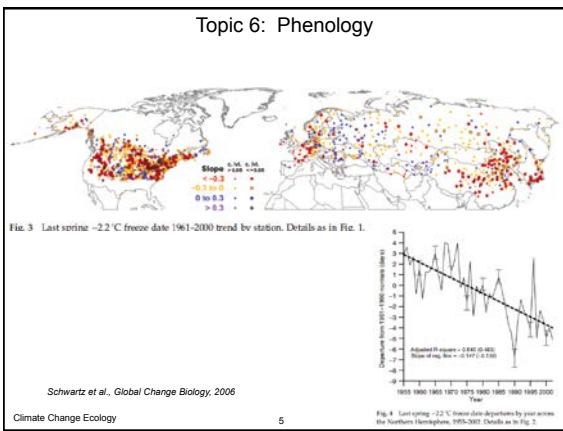
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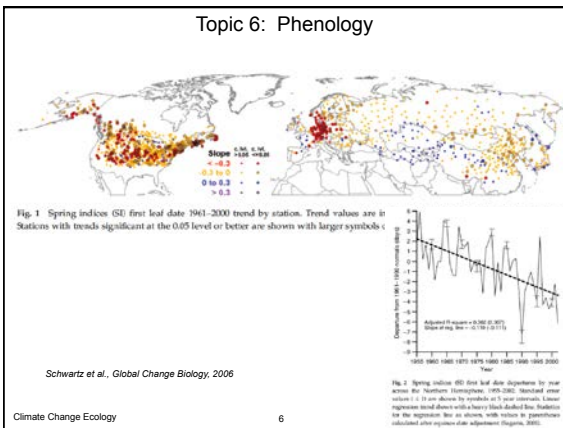
Southwest Frost-free Season Lengthens

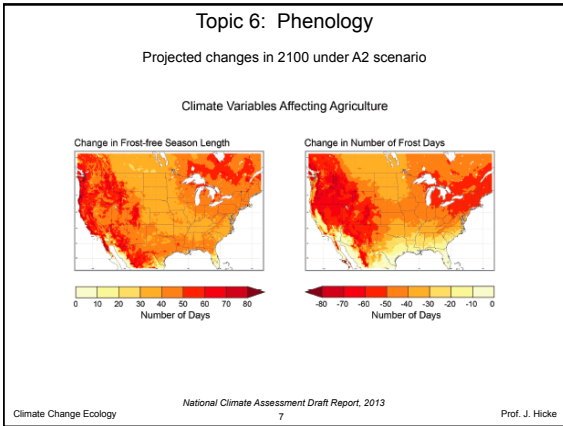


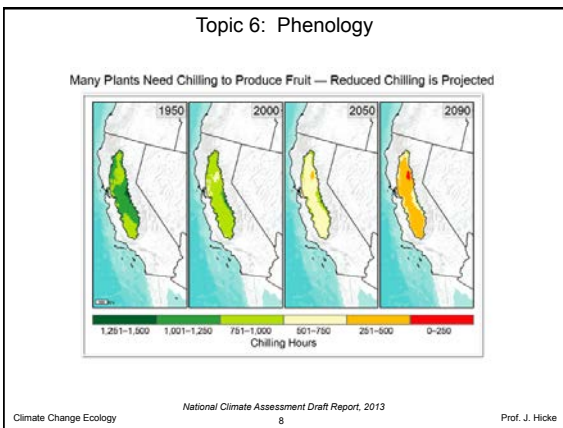
National Climate Assessment Draft Report, 2013

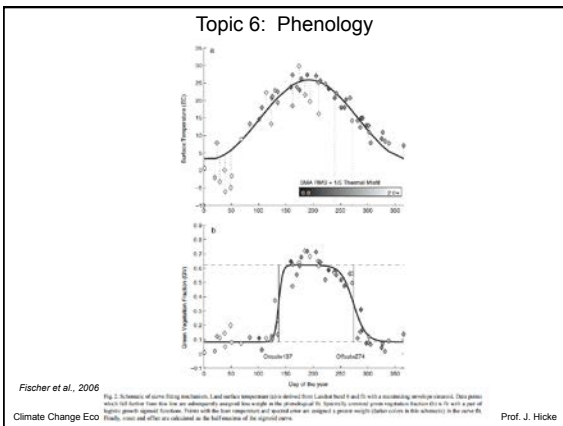


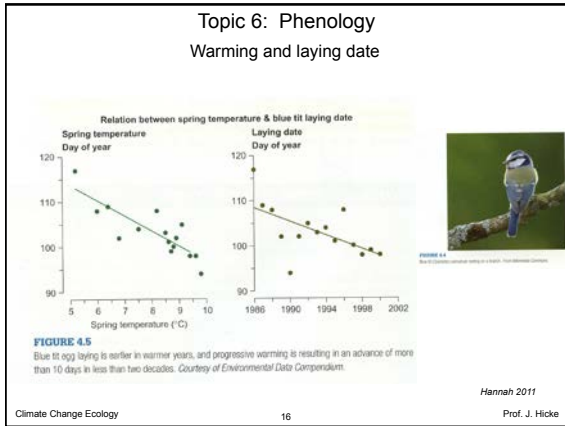


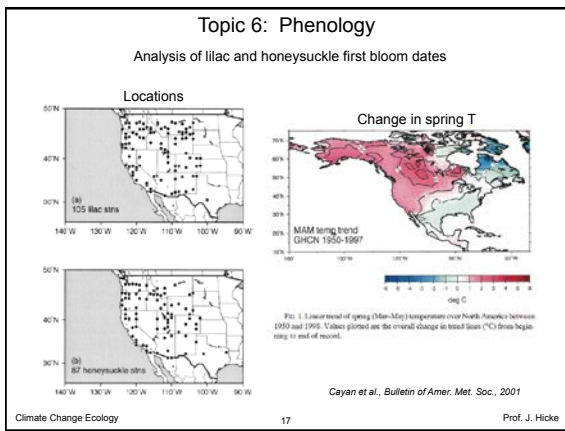


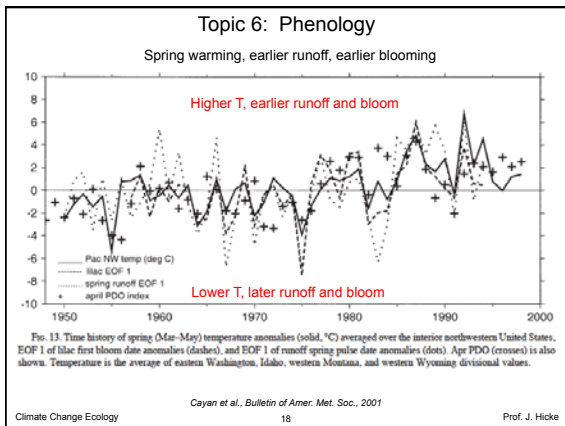


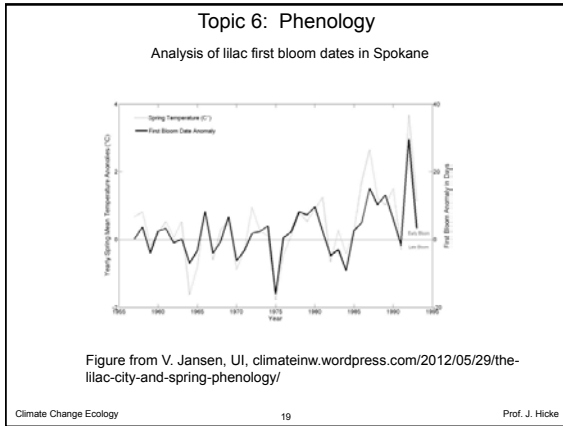


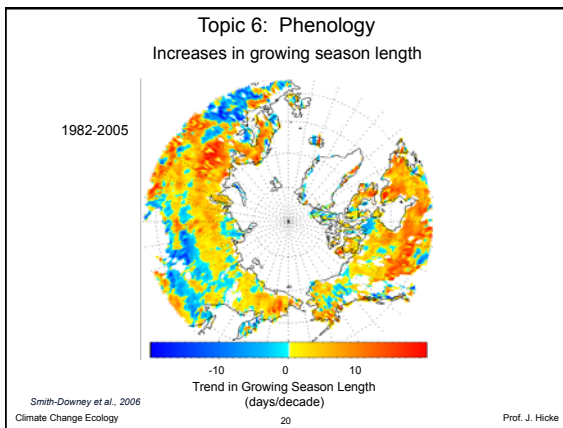


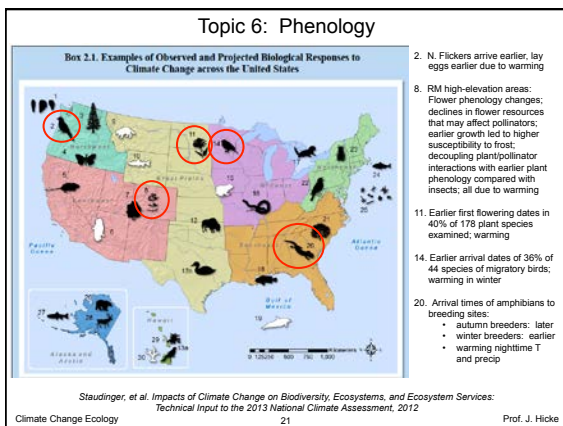












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Timing mismatches between species

Fig. 4. Date of the first sighting of a marmot at RMBL each year from 1976 to 2000 (data missing for 3 years; Julian date). Regression equation is $y = -2.126x + 1.899x^2 + 5.225$, $r^2 = 0.420$.

Fig. 5. Date of the first sighting of a marmot plotted against the mean minimum temperature for the month of April in Crystal Lake, Idaho. Regression equation is $y = -171.36x + 2.888x^2 + 8.236$, $r^2 = 0.8201$.

Fig. 6. Shift of remaining overpass on the date of first marmot sighting at RMBL (Julian date). $y = 2.08x - 1.601x^2 + 0.01$.

Consequences for marmot???

Inouye et al., 2000

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Topic 6: Phenology

Climate change may lead to seasonal mistiming

Climate change
Match → Mis-match

A. Great tit

B. American robin

chicks now hatch when food unavailable

differential regional climate change => mistiming of migration

Stenseth and Mysterud, 2002

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Climate change may lead to seasonal mistiming

Fig. 3. Date of the first sighting of a robin at RMBL each year from 1974 to 1999 (Julian date). The two lines are regressions, including 1974–1980 (\blacktriangle) and dashed line; $P = 0.109$ and data from 1981 to 1999 (\triangle) and solid line; $P = 0.003$.

Inouye et al., 2000

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