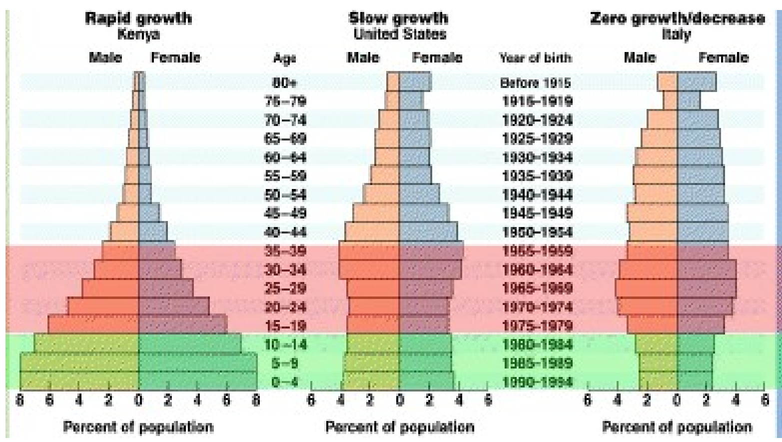
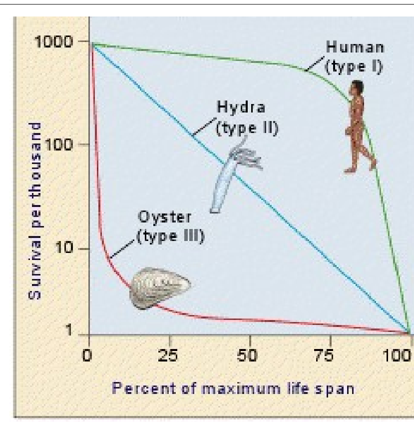
What is population density?	The number of individuals per unit area/volume.
What is dispersion?	The pattern by which individuals are spaced within a population. • **Clumped** is the most common; because of environmental factors that cause one particular spot to be most favorable, so organisms clump around it, or because of mating/group living. • **Uniform** patterns are results of territoriality or direct interactions between organisms (plants sometimes chemically inhibit others from growing too close to prevent competition) • **Random** patterns occur when organisms do not attract or repel one another.
What factors affect population growth rates?	• Sex ratio • Generation time • Age structure (how many females of reproductive age born together?)
What is demography?	The study of the statistics of populations and how they change over time.
What is a life table?	Summaries of the survival pattern of a population at age levels. To study a life table, follow a *cohort* (a group of individuals of the same age) throughout life; determine how many die each year and what proportion of the cohort remains.
What is a age structure graph?	 Red=reproductive green=pre-reproductive Look at the bottom, and compare it to the top. Is it bigger (growth), even (stable), or smaller (decline)?
What is a survivorship curve?	A graph that shows the proportion of a cohort still alive at each age. There are three types: I. High death rate in post-reproductive years. These reproduce late and produce few offspring but care for them extensively. II. Constant death rate throughout life span III. High early death rate, but those who survive live long, productively reproductive lives. These organisms produce large numbers of offspring but do not care for them and many die. 
What is the exponential model of population growth?	This models population growth under ideal conditions, without limiting factors. $\frac{change}{time} = \frac{birth}{time} - \frac{death}{time}$ Let N=population size, let t=time.

	Birth-death=change in population size. $rate\ of\ change=\frac{\Delta N}{\Delta t}$ Now, change this simple model into one that uses population averages—the *per capita* birth and mortality rates (number produced or dead per unit of time, divided by N). Let r=rate of change. Now: $rN=\frac{\Delta N}{\Delta t}=bN-mN$ This is equivalent to saying that $r_{\max}N=\frac{dN}{dt}$ r_{max}=r_i=intrinsic rate of growth=maximum rate of growth N=number of individuals dN=change in population dt=change in time
What is the logistic model of population growth?	This model includes the variable ***k***, carrying capacity—the maximum sustainable population size. $\frac{dN}{dt}=r_{\max}N\frac{(K-N)}{K}$ The per capita rate of increase decreases as N gets larger; resources are in shorter supply with a larger population, so it will not grow quickly. If N is greater than K, the population growth rate is negative; resources have been overused and the population will begin to decrease. As N approaches K, growth decreases until it is at 0 when N=K.
How do these models fit real populations?	• The exponential rate of growth fits populations that are growing unchecked, usually in recovery for some catastrophe (the population begins so small that there are, comparatively, infinite resources) • The logistic model is useful, but not perfect. Most populations, for example, do not instantaneously adjust to carrying capacity; they also may have trouble growing if population size decreases below a critical point. • The logistic model's best point is that it gives each birth the ability to affect the same decrease on population growth rate.
What is k-selection?	When populations are dense, at or near carrying capacity, resources are scarce; traits that are passed on are selected for success with limited resources. These traits are k-selected. (Type I survivorship curve).
What is r-selection?	Traits that maximize success in low population densities. (Type III survivorship curve).
What is a density independent population?	A population whose birth or death rate does not change when population density does; it is determined by other, outside factors that affect the same proportions always. (A population can be density dependent for birth or death and independent for the other.)
Density dependent?	Death rate that rises and a birth rate that falls with increasing population density. Factors that relate this are territoriality, competition for limited resources, health (diseases spread better in dense populations), predation (predators may prefer to feed more on larger populations and end up eating a greater proportion), toxic waste (micro-organisms accumulate this as populations grow), and intrinsic (physiological) factors.
What are the problems with determining the k for humans?	• Many different lifestyles • Many possible limiting factors, because we have many needs • Our ability to develop technology can increase carrying capacity

	• Few limits on some things, like space • We can change population growth socially
How do ecologists measure population size?	Not often by counting. • Usually, the number of individuals in a few random sample plots are counted, a population density is calculated, and using that and the size of the area, population size is calculated. • Sometimes, ecologists do not count individuals directly but instead determine density from some other indication of size, like number of nests or droppings in the sample plot. • The mark-recapture method: Animals are caught and tagged, then set free. Later, animals are caught again, and from the proportion of marked and unmarked, density may be determined. (Assumption: every individual has the same likelihood of being captured.