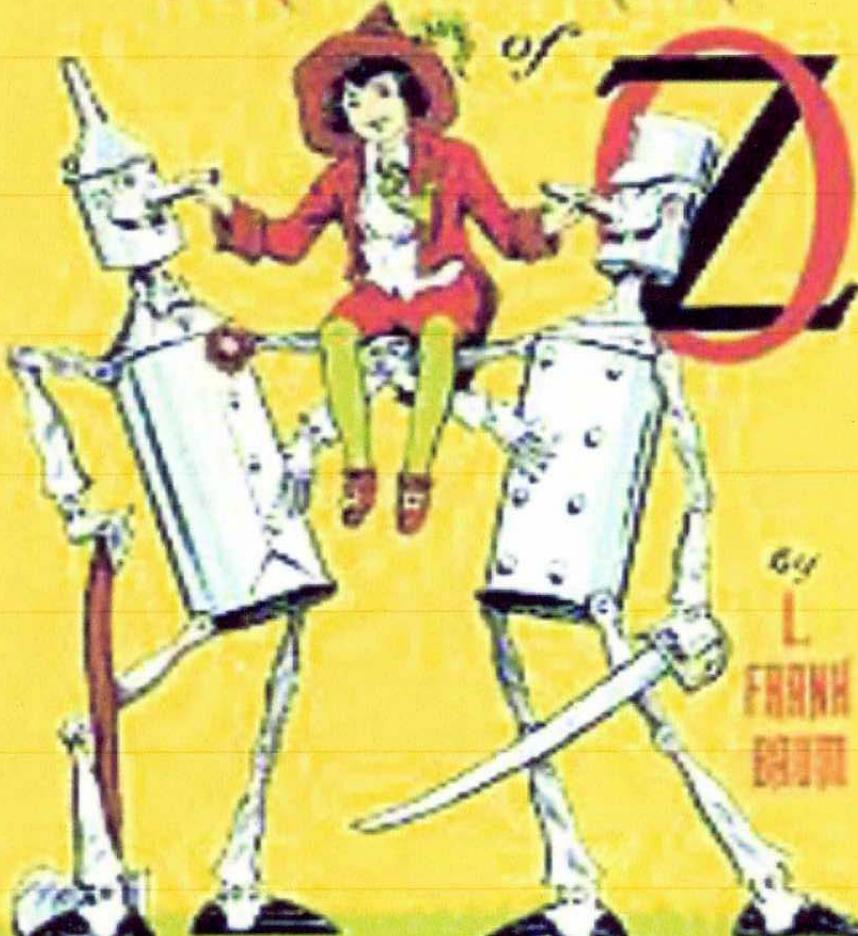


**ENERGY
MANAGEMENT
SEMINAR**

Professor Emeritus
William R. Catton, Jr
WASHINGTON STATE UNIVERSITY

**“Homo colossus,
the Prosthetic
Species”**

The Tin Woodman



by
**L.
FRANK
BAUM**

Illustrated by John R. Neill





**For ranchers
and range managers,**

CARRYING CAPACITY is:

**the maximum population
of a given species
that a particular environment
can support *indefinitely*
(i.e, without **habitat damage**)**

Human CARRYING CAPACITY:

**the maximum human population
equipped with
a given assortment of technology
& a given pattern of organization
that a particular environment
can support indefinitely
(i.e., without habitat damage)**

A fact of life: any organism
(and any population) must
use environment 3 ways

Source of sustenance

Activity space

Disposal site

**In an overloaded world
this fact becomes a SAD fact.**

$$m = W^{3/4} \cdot 70 \text{ kcal}$$

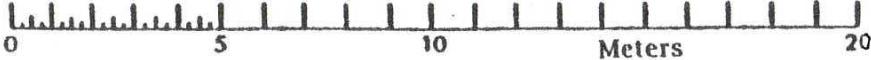
where m = metabolic rate (kcal/day)
 W = weight in kilograms

from: Kleiber, Max. 1947.

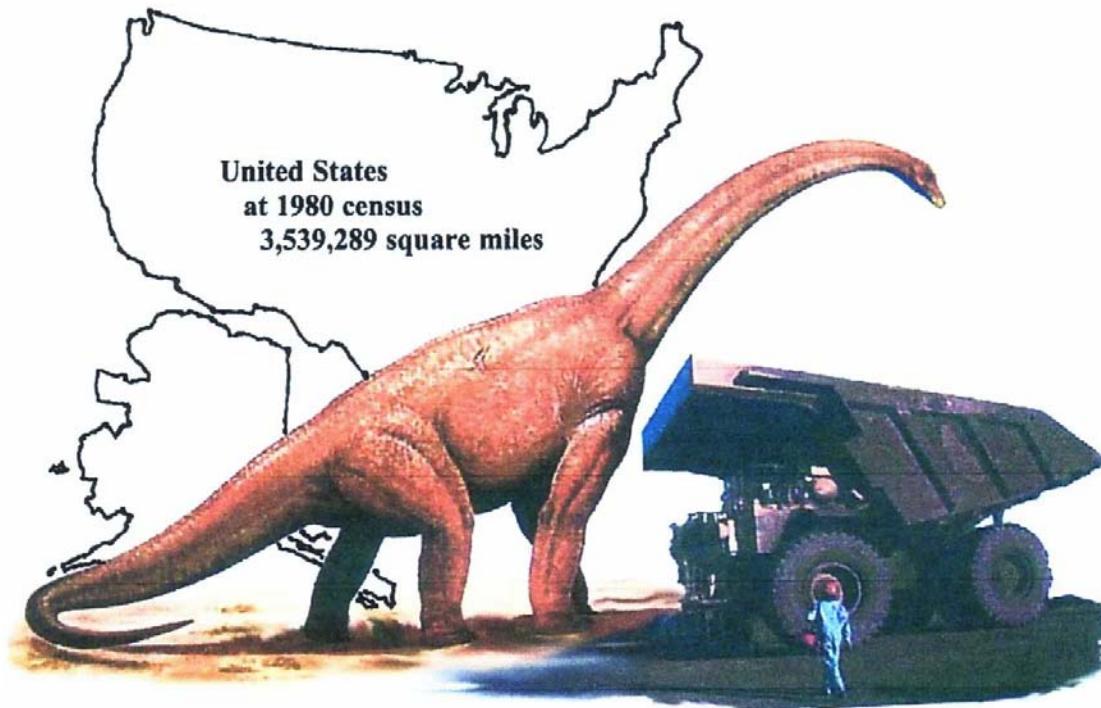
“Body size and metabolic rate.”

Physiological Reviews, 27 (Oct.):511-541

“Cetacean Equivalents” of Historic Human Loads

Date	Estimated global human population	Estimated per capita energy use (kcal / day)	<u>Cetacean equivalent</u>
35000 B.C.	3,000,000	2,584	 Common Dolphin (<i>Delphinus delphis</i>)
8000 B.C.	8,000,000	4,686	 Atlantic Humpbacked Dolphin (<i>Sousa teuszii</i>)
1500 A.D.	350,000,000	11,013	 Risso's Dolphin (<i>Grampus griseus</i>)
1800 A.D.	970,000,000	12,606	 Beluga Whale (<i>Delphinapterus leucas</i>)
2000 A.D.	6,000,000,000	31,816	 Long-finned Pilot Whale (<i>Globicephala melaena</i>)
???? A.D. (entire world at 1986 U.S.A. level)	? ,000,000,000	202,744	 Sperm Whale (<i>Physeter macrocephalus</i>)
			 <p>0 5 10 15 20 Meters</p>

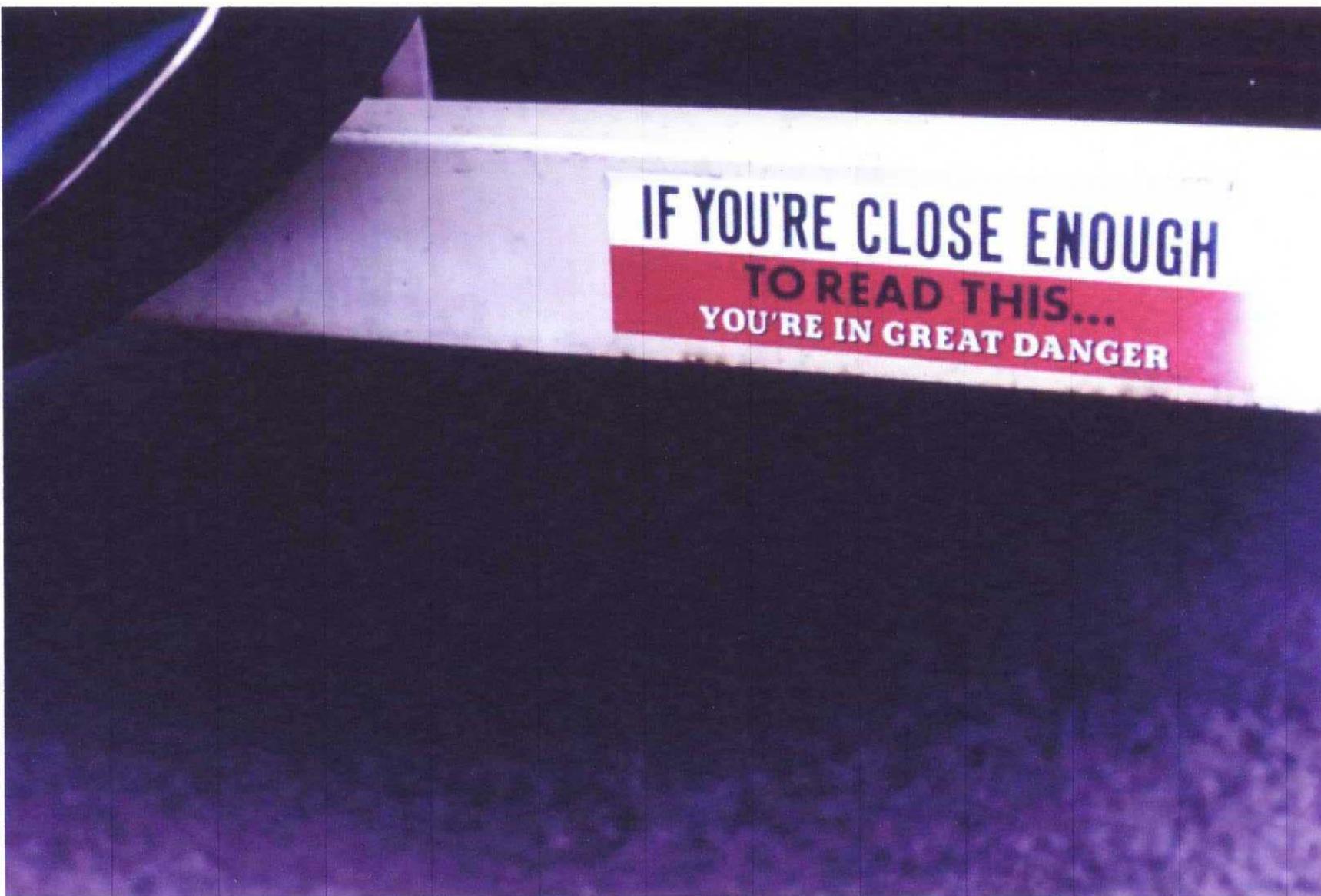
Modern U.S. human load



Homo colossus "Metabolic" load (somatic plus exosomatic)

equivalent to **64**

41-tonne dinosaurs
per square mile



IF YOU'RE CLOSE ENOUGH
TO READ THIS...
YOU'RE IN GREAT DANGER

- Discussion questions