Conservators of the River Cam
Calculation of Carrying Capacity for a Standard Punt

A naïve analysis might suggest that these punts could safely carry about eight or nine persons; rationalizing this, it is clear that such an approach would imply a carrying capacity of $8\frac{1}{2}$ persons, which is an absurdity indicating the inherent unsuitability of the method. Instead, a more careful approach is required.

Let n be the carrying capacity of the punt, l_x, l_y and l_z its length, width and depth respectively, M_p the mass of each passenger, M_P the mass of a punt, ρ the density of pure water at 13°C, θ_{min} and θ_{max} the maximum and minimum water temperatures irrespectively (of, amongst other things, the fact that punts don't tend to cut through ice), α the temperature coefficient of ρ, μ a factor to correct ρ for muddiness, N the number of punts on the Cam, $\mathscr{N}$ the number of swans, ${\scriptstyle\mathscr{N}}$ the mean number of cygnets per swan, $\mathbf{N}$ the mean driftwood vector, $\mathbf{n}$ the mean punt vector, $\hat{n}$ the number of silly hats typically worn by punters, $\mathbb{N}$ the number of punters seeing double due to excessive Pimms, $N_{\Gamma\neg}$ the number of people trying to traverse bridges, and $\tilde{\mathfrak{N}}^{(2)}_{ab^*}$ the correlation coefficient of pairs of punts with respect to the differential cross section for collisions. Then it can be shown that

$$n = \frac{\mu\rho(1+\alpha(\theta_{max}-\theta_{min}))l_x l_y l_z - M_P}{M_p}\left(1+\frac{N\mathscr{N}(1+{\scriptstyle\mathscr{N}})^7}{234567}+\right.$$

$$\left.+\frac{\mathbb{N}}{e^{\pi}}\sqrt[3]{\Re\{e^{i\mathbf{N}\cdot\mathbf{n}}\}}+\frac{\ln(N\hat{n}\mathbb{N}+\mathscr{N}N^2_{\Gamma\neg})}{4}+|\tilde{\mathfrak{N}}^{(2)}_{ab^*}|\cos^2(\pi N)\right)^{-\frac{1}{3}}.$$

Using the facts that $l_x = 6$m, $l_y = 1$m, $l_z = 0.3$m, M_p can be as great as 100kg in the case of over-fed tourists, $M_P = 700$kg, $\rho = 9.99377\times10^2$kgm^{-3}, $\theta_{min} = -5$°C, $\theta_{max} = 35$°C, $\alpha = -1.39921\times10^{-4}$ °C^{-1}, μ must surely be at least 1.2, $N = 200$ or so if it's sunny, $\mathscr{N}\approx 50$, ${\scriptstyle\mathscr{N}}\approx 1$, $\mathbf{N} = (1,0)$ (i.e. downstream), $\mathbf{n} = \mathbf{0}$, $\hat{n}$ and $\mathbb{N}$ can easily reach 20 and 100 respectively during May week, $N_{\Gamma\neg} = 19$, and we will have to set $\tilde{\mathfrak{N}}^{(2)}_{ab^*}$ to 1 as we don't really understand what it means, it therefore follows that $n = 6.0000$, consistent with the known discreteness of persons and eminently suitable as a mandatory limit.