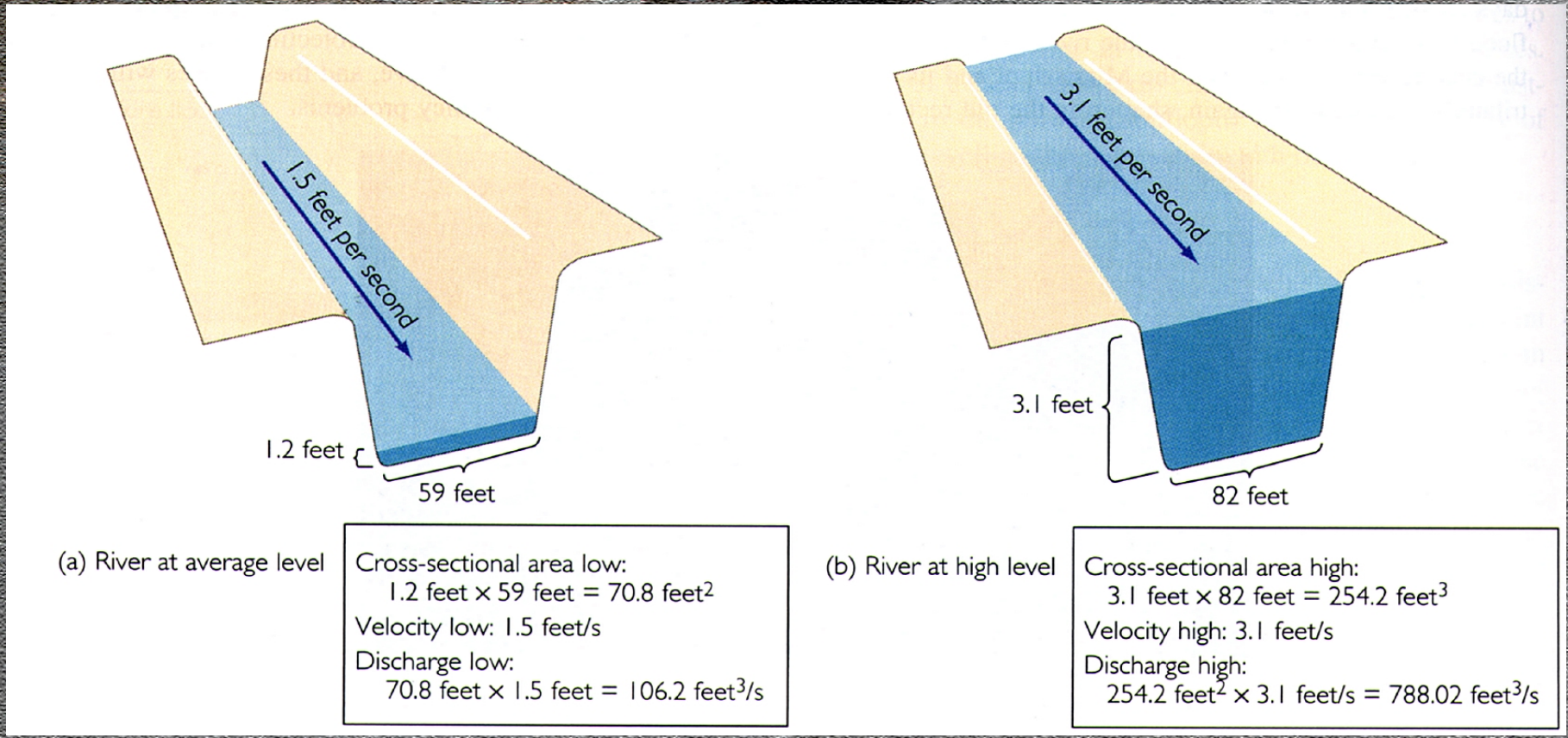
The Discharge

Discharge depends on:

- ✧flow velocity
- ✧channel width
- ✧height of flowing water

$$D = v * h * w$$



(a) River at average level

Cross-sectional area low:
1.2 feet × 59 feet = 70.8 feet^2
Velocity low: 1.5 feet/s
Discharge low:
70.8 feet × 1.5 feet = 106.2 feet^3/s

(b) River at high level

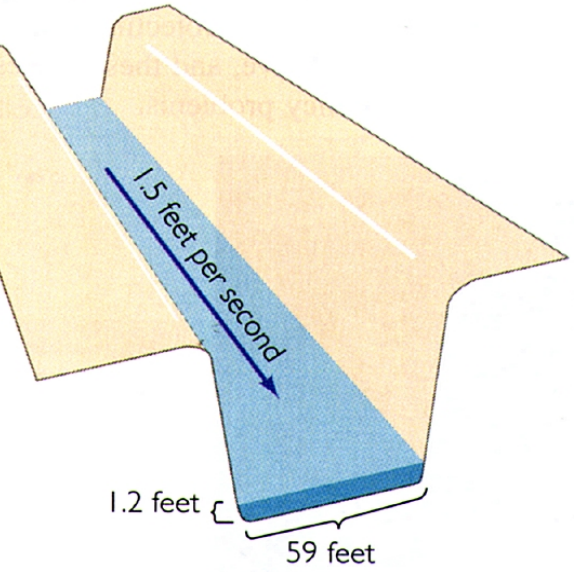
Cross-sectional area high:
3.1 feet × 82 feet = 254.2 feet^3
Velocity high: 3.1 feet/s
Discharge high:
254.2 feet^2 × 3.1 feet/s = 788.02 feet^3/s

The Discharge

Discharge depends on:
- ✧flow velocity
- ✧channel width
- ✧height of flowing water

D=v*h*w

DISCHARGE
- ❖flow velocity*area
- ❖volume/time



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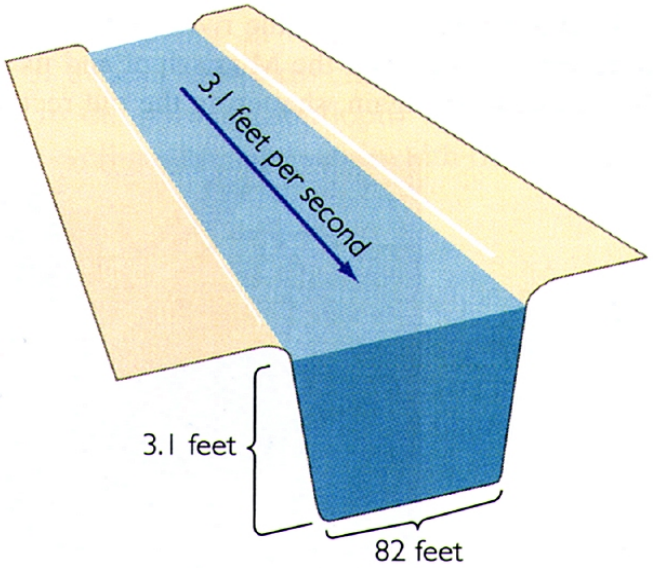

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Discharge high:
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Kinetic Energy

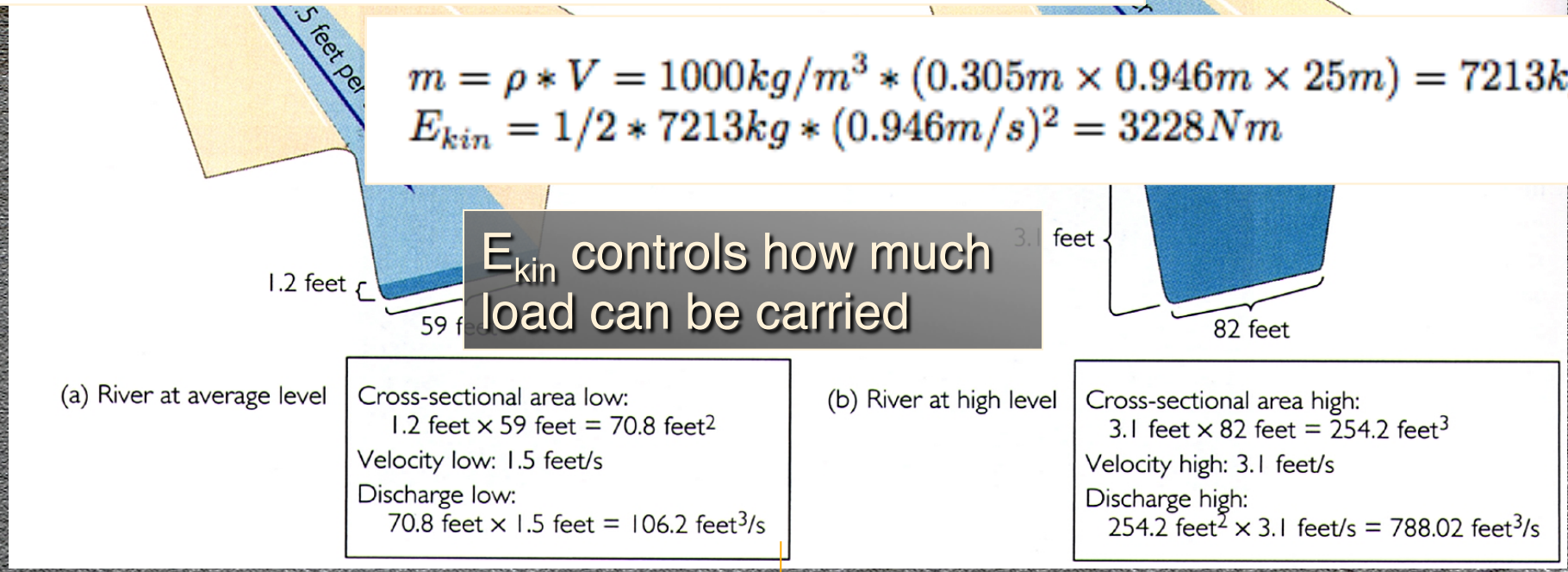
E_{kin} depends on:
- ✧flow velocity
- ✧mass of water

$E_{kin}=1/2*m*v^2$

$$\text{Density } \rho = 1000kg/m^3; 1ft = 0.305m$$
$$m = \rho * V = 1000kg/m^3 * (0.305m \times 0.366m \times 18m) = 2008kg$$
$$E_{kin} = 1/2 * 2008kg * (0.458m/s)^2 = 211Nm$$

$$m = \rho * V = 1000kg/m^3 * (0.305m \times 0.946m \times 25m) = 7213kg$$
$$E_{kin} = 1/2 * 7213kg * (0.946m/s)^2 = 3228Nm$$

E_{kin} controls how much load can be carried



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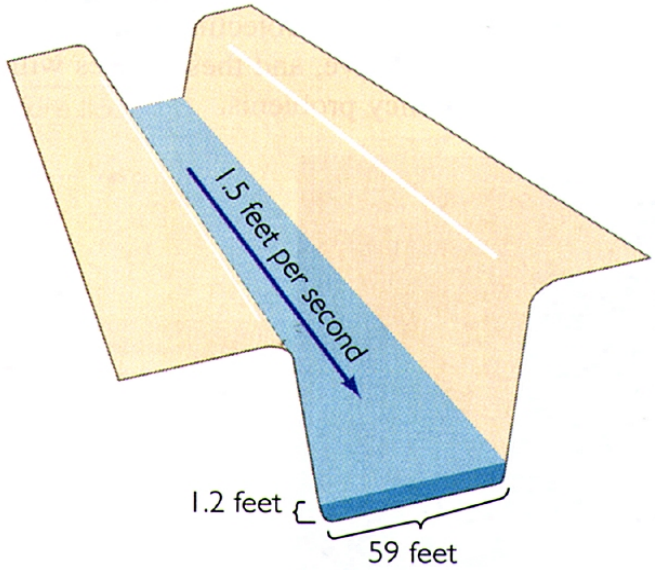
The Flow Speed

✧more friction near bottom and sides of channel
-> flow velocities lower!
✧flow velocities fastest near the top center



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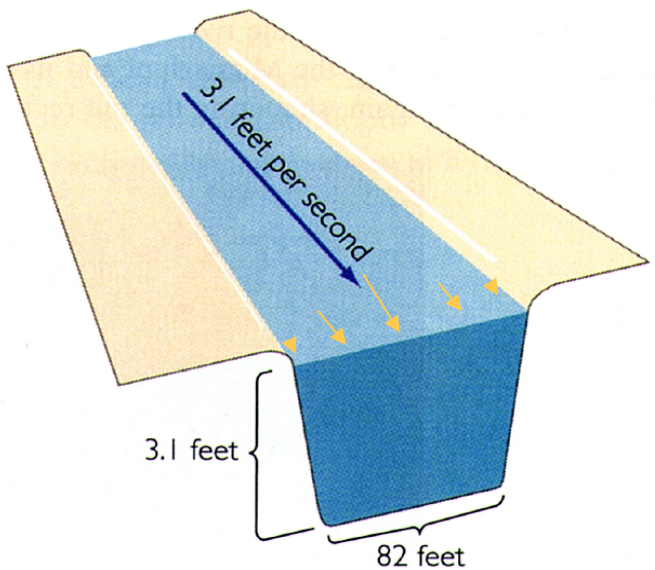

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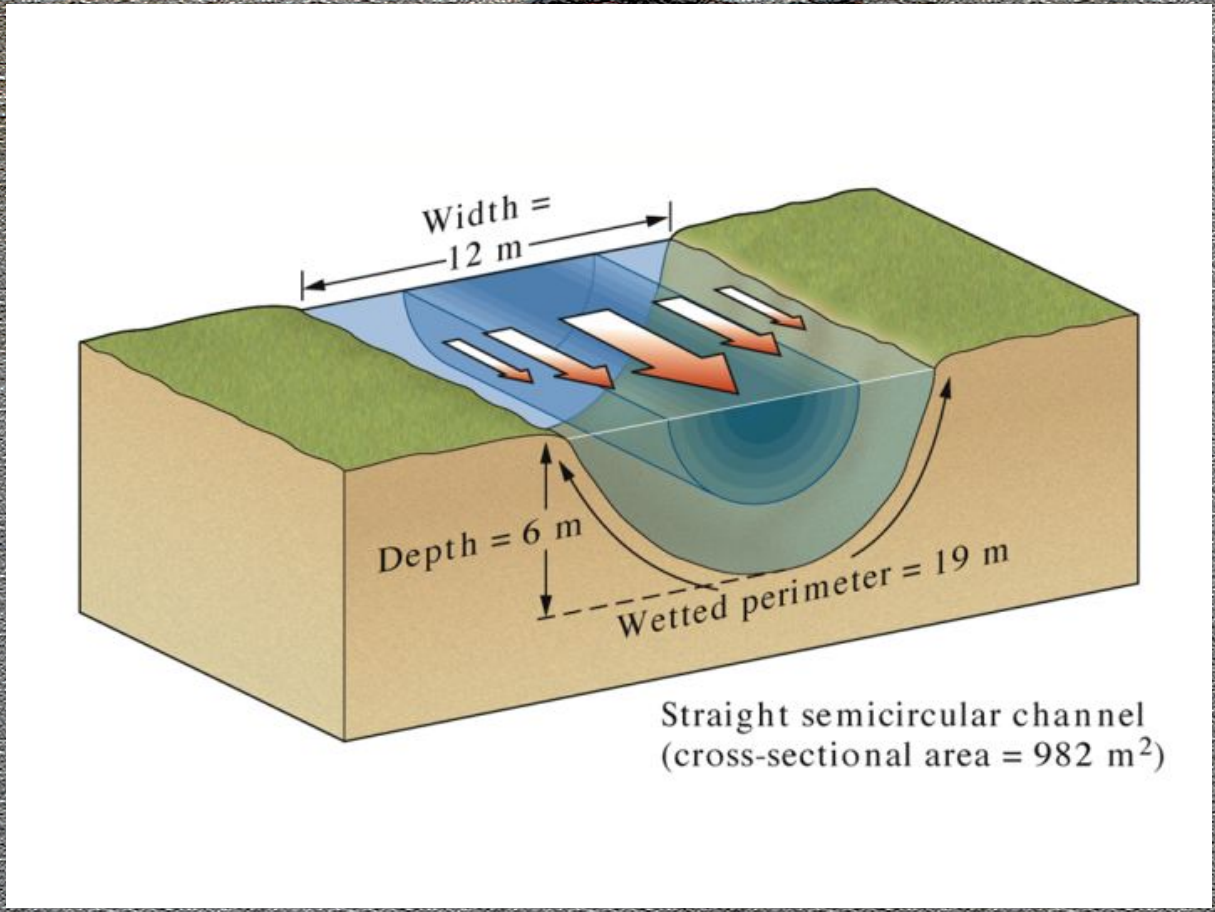
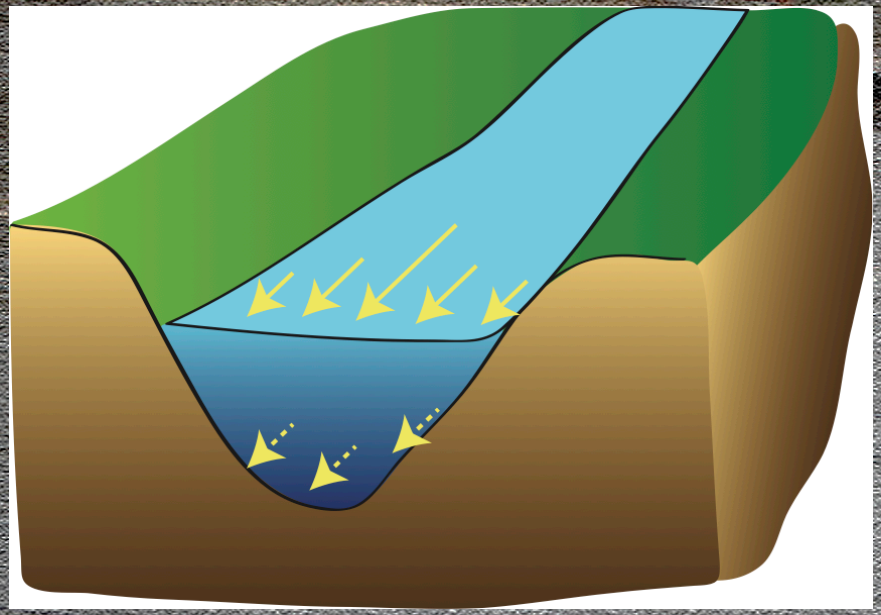
More Rounded River Beds

✧more friction near bottom and sides of channel
-> flow velocities lower!
✧flow velocities fastest near the top center

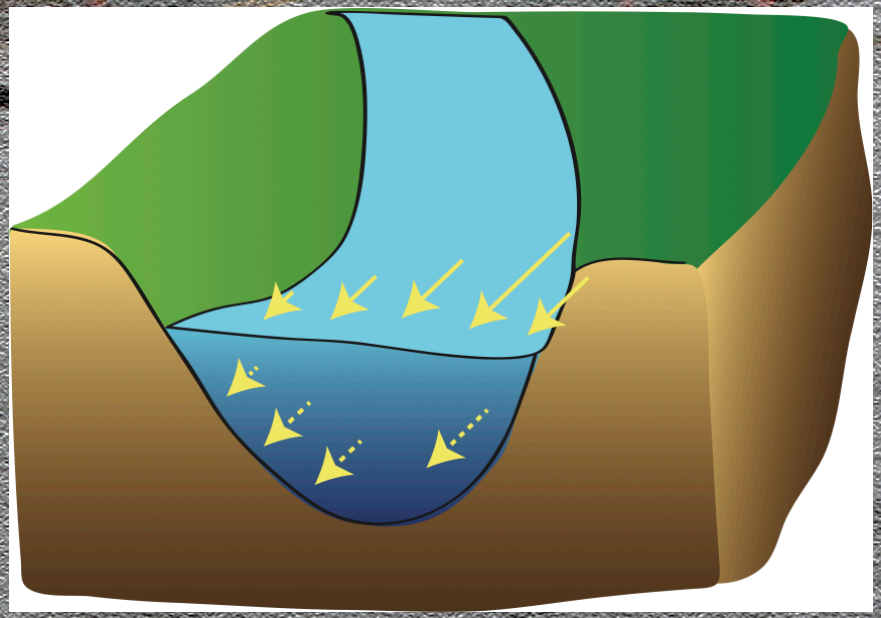


Straight and Bent Rivers

- Straight river – symmetric river bed
- Bent river – asymmetric river bed



Erosion on both banks
Max flow speed top center



Erosion on outer bank
Sedimentation on inner bank
Max flow speed toward outer bank