ALTERING THE BATHYMETRY OF WALKER LAKE, NEVADA

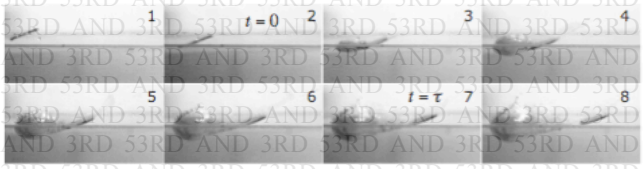

FIG. 3: Chronophotography of a skipping stone, obtained with an aluminium disc of radius $R = 2.5$ cm, thickness $h = 2.75$ mm, translation velocity $U = 3.5$ m.s^{-1}, angular velocity $\Omega = 65$ rot.s^{-1}, attack angle $\alpha = 20°$, trajectory angle $\beta = 20°$. Time increases from left to right and from top to bottom with the time step $\Delta t = 6.5$ ms.

FIG. 4: Chrono-photography of a surfing stone, obtained with an aluminium disc of radius $R = 2.5$ cm, thickness $h = 2.75$ mm, translation velocity $U = 3.5$ m.s^{-1}, attack angle $\alpha = 30°$, trajectory angle $\beta = 35°$. angular velocity $\Omega = 65$ rot.s^{-1}. The time step Δt between each image is $\Delta t = 8.9$ ms.

FIG. 5: Chrono-photography of a diving stone, obtained with an aluminium disc of radius $R = 2.5$ cm, thickness $h = 2.75$ mm, translation velocity $U = 3.5$ m.s^{-1}, attack angle $\alpha = 35°$, trajectory angle $\beta = 20°$. angular velocity $\Omega = 0$ rot.s^{-1}. The time step Δt between each image is $\Delta t = 8.9$ ms.

FIG. 6: Chrono-photography of a skipping stone in an intermediate rotation regime: radius $R = 2.5$ cm, thickness $h = 2.75$ mm, translation velocity $U = 3.5$ m.s^{-1}, attack angle $\alpha = 20°$, trajectory angle $\beta = 18°$. angular velocity $\Omega = 10$ rot.s^{-1}. The time step Δt between each image is $\Delta t = 8.9$ ms.

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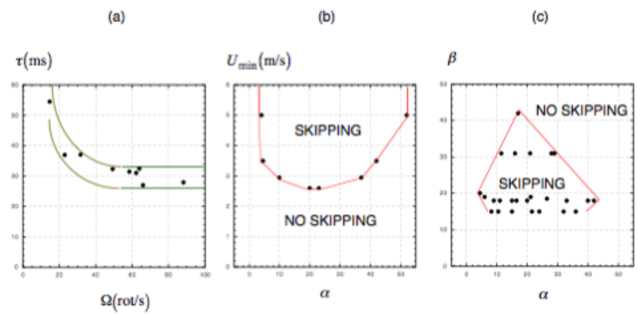

FIG. 7: (a) Evolution of the collision time τ with the spinning velocity Ω for $R = 2.5$ cm, $h = 2.75$ mm, $U = 3.5$ m.s^{-1}, $\alpha = 20°$, $\beta = 20°$; (b) Domain of the skipping stone in the $\{\alpha, U_{min}\}$ plane with $R = 2.5$ cm, $h = 2.75$ mm, $\Omega = 65$ rot.s^{-1}, $\beta = 20°$; (c) Domain of the skipping stone in the $\{\alpha, \beta\}$ plane with $R = 2.5$ cm, $h = 2.75$ mm, $\Omega = 65$ rot.s^{-1}, $U = 3.5$ m.s^{-1}. In the three figures, the continuous lines are to guide the eye.

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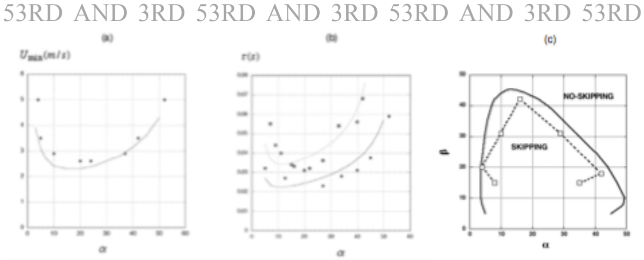

FIG. 10: (a) Minimum velocity as a function of α for $\beta = 20°$ (b) collision time. The solid lines are the theoretical prediction (see text). (c) Domain of the skippig stone : comparison between experimental results (–□–) and theoretical prediction (solid line). Parameters are similar to those in Figure 7-c.

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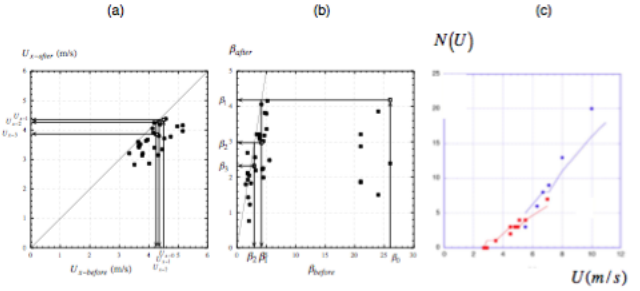

FIG. 9: (a) Transfer function of the horizontal component of the velocity U_x for stone 1 and different values of α (either 7° or 20°) and different values of β (ranging from 20° to 26°). The example marked with the white squares has been obtained with $\alpha = 7^\circ$ and $\beta = 26^\circ$. (b)Transfer function of the angle β for stone 1 and different values of α (either 7° or 20°) and different values of β (ranging from 20° to 26°). The example marked with the white squares has been obtained with $\alpha = 7^\circ$ and $\beta = 26^\circ$ and $U = 4.5$ m/s. (c)Number of skips as a functon of the initial velocity for stone 1 and $\alpha = 7^\circ$ and $\beta = 20^\circ$ (■), $\alpha = 10^\circ$ and $\beta_0 = 9^\circ$ (•). The continuous lines are the theoretical predictions obtained with the parameters of the experiment: $\alpha = 7^\circ$ and $\beta_0 = 20^\circ$ (bottom line) and $\alpha = 10^\circ$ and $\beta_0 = 9^\circ$ (top line).

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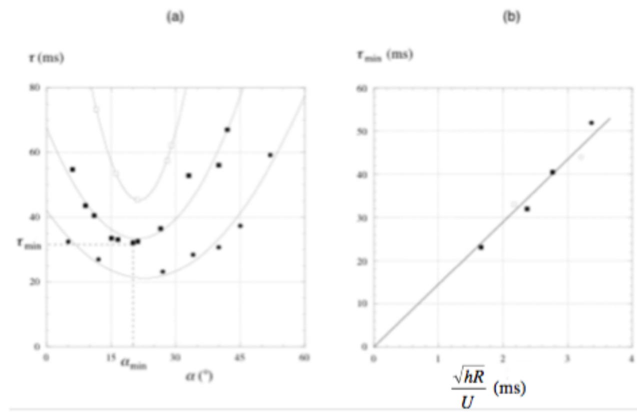

FIG. 8: (a) Evolution of the collision time τ as a function of the attack angle α for $R = 2.5$ cm, $e = 2.75$ mm and different conditions: ■ $U = 3.5$ m.s^{-1}, $\beta = 20°$, □ $U = 3.5$ m.s^{-1}, $\beta = 30°$, • $U = 5$ m.s^{-1}, $\beta = 20°$; (b) Evolution of the minimal contact time τ_{min} with the characteristic time scale $\sqrt{hR}/U$ with $\beta = 20°$ and $\alpha \approx 20°$ and different stones: ■ $R = 2.5$ cm, $h = 2.75$ mm, □ $R = 5$ cm, $h = 2.55$ mm, • $R = 2.5$ cm, $h = 5.55$ mm, ∘ $R = 5$ cm, $h = 5.55$ mm, the solid line present the results obtained numerically through the integration of equation (5)

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$$\underline{F}_L = C_L \rho_w U^2 S_{wetted} f(\alpha, \beta) \underline{n} \tag{1}$$

$$F_L = \frac{1}{2} \rho_w U^2 S_{wetted} \sin(\alpha + \beta) n \tag{2}$$

$$m \frac{dU}{dt} = K.0.5 \rho_w U^2 S_{wetted} \sin(\alpha + \beta) \underline{n} + m\underline{g} \tag{3}$$

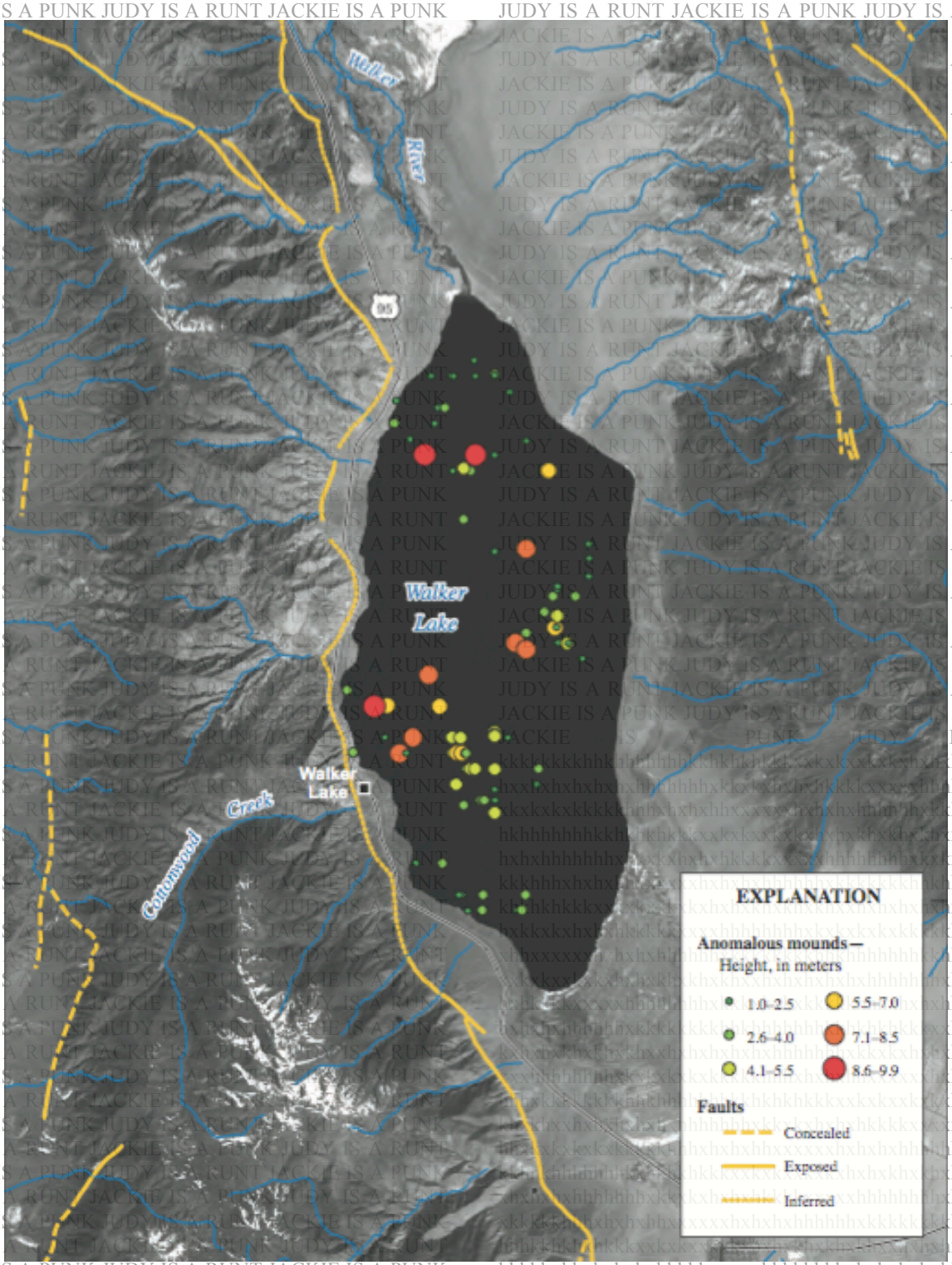
$$S_{wetted}(s) = R^2 [\cos^{-1}(1 - s/R) - (1 - s/R)\sqrt{1 - (1 - s/R)^2}] \tag{4}$$

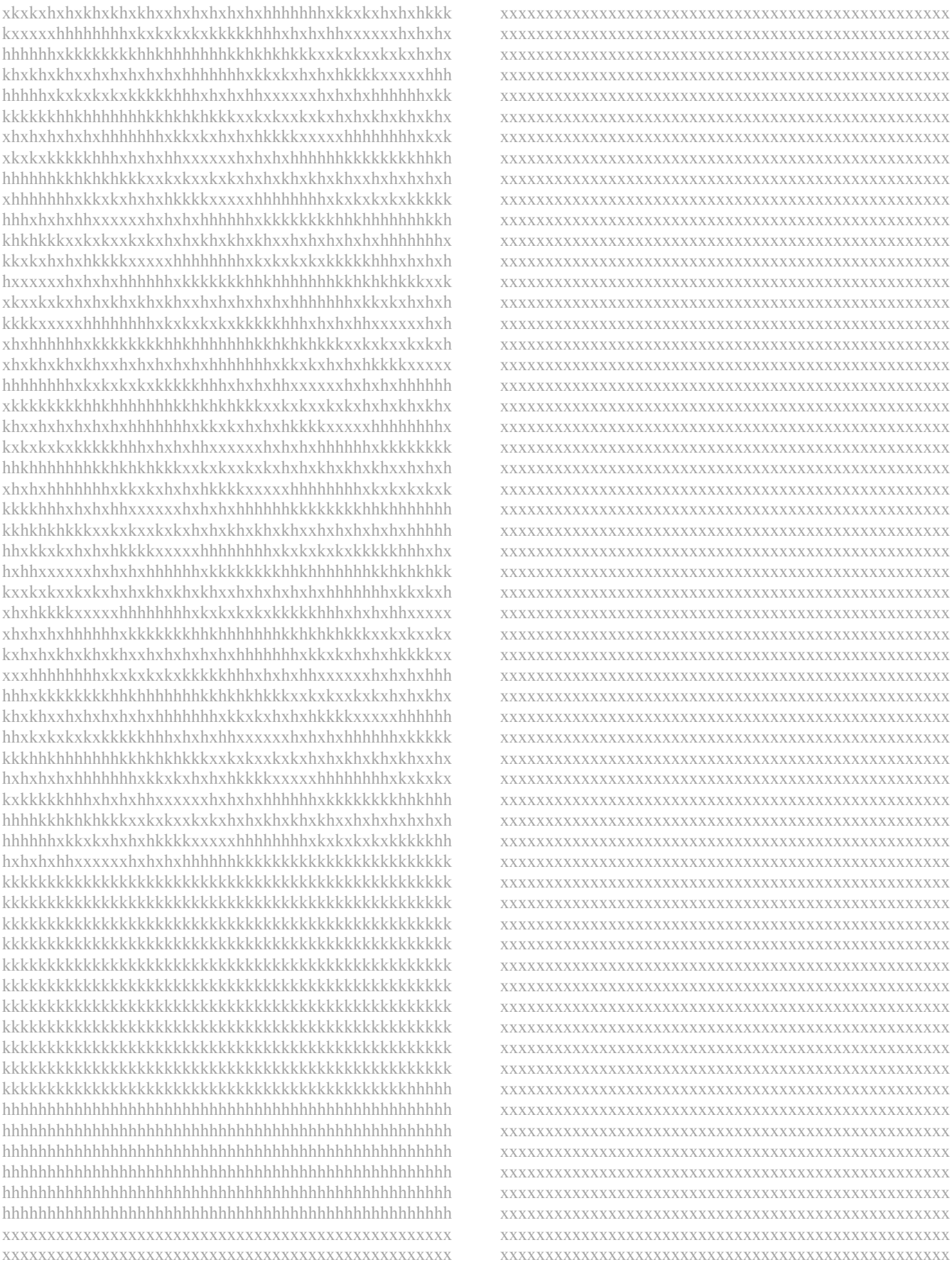
$$m \frac{dU}{dt} = \underline{F}_L^z - m\underline{g} \tag{5}$$

$$F_L^z = \frac{1}{2} \rho_w U^2 S_{wetted}(z) f(\alpha + \beta) \cos(\alpha) \tag{6}$$

$$m \frac{dV_z}{dt} = F^{(0)}(z) - \zeta(z) V_z - mg \tag{7}$$

$$\frac{1}{2} m [V_z^2]_{\text{final}} - \frac{1}{2} m [V_z^2]_{\text{initial}} = \int_0^t dt \, \zeta(z) V_z^2(t) \tag{8}$$


Walker
River
95
Walker
Lake
Walker
Lake
Cottonwood
Creek
EXPLANATION
Anomalous mounds—
Height, in meters
1.0–2.5
2.6–4.0
4.1–5.5
5.5–7.0
7.1–8.5
8.6–9.9
Faults
Concealed
Exposed
Inferred



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THERE IS A YOUNG COWBOY HE LIVES ON THE RANGE HIS HORSE AND HIS CATTLE ARE HIS ONLY COMPANIONS HE WORKS IN THE SADDLE AND SLEEPS IN THE CANYON WAITING FOR SUMMER HIS PASTURES TO CHANGE AND AS THE MOON RISES, HE SITS BY HIS FIRE THINKING OF WOMEN AND GLASSES OF BEER (THINK I ALWAYS SANG “GLASSES APPEAR" NO BEER) AND CLOSING HIS EYES AS THE DOGGIES RETIRE HE SINGS OUT A SONG WHICH IS SOFT BUT IT'S CLEAR AS IF MAYBE SOMEONE COULD HEAR GOODNIGHT YOU MOONLIGHT LADIES ROCKABYE SWEET BABY KYLE (JAMES IN REALITY) DEEP GREENS AND BLUES ARE THE COLORS I CHOOSE WONT YOU LET ME GO DOWN IN MY DREAMS AND ROCKABYE SWEET BABY KYLE THE FIRST OF DECEMBER WAS COVERED IN SNOW AND SO WAS THE TURNPIKE FROM STOCKBRIDGE TO BOSTON THE 'BERKSHIRES' SEEMED DREAMLIKE ON ACCOUNT OF THAT FROSTING (SO, I ALWAYS SANG 'BIRCHES') WITH TEN MILES BEHIND ME AND TEN THOUSAND MORE TO GO THERE'S A SONG THAT THEY SING WHEN THEY TAKE TO THE HIGHWAY A SONG THAT THEY SING WHEN THEY TAKE TO THE SEA A SONG THAT THEY SING OF THEIR HOME IN THE SKY MAYBE YOU CAN BELIEVE IT IF IT HELPS YOU TO SLEEP BUT SINGING WORKS JUST FINE FOR ME THERE IS A YOUNG COWBOY HE LIVES ON THE RANGE HIS HORSE AND HIS CATTLE ARE HIS ONLY COMPANIONS HE WORKS IN THE SADDLE AND SLEEPS IN THE CANYON WAITING FOR SUMMER HIS PASTURES TO CHANGE AND AS THE MOON RISES, HE SITS BY HIS FIRE THINKING OF WOMEN AND GLASSES OF BEER (THINK I ALWAYS SANG “GLASSES APPEAR" NO BEER) AND CLOSING HIS EYES AS THE DOGGIES RETIRE HE SINGS OUT A SONG WHICH IS SOFT BUT IT'S CLEAR AS IF MAYBE

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FOR JANA.