

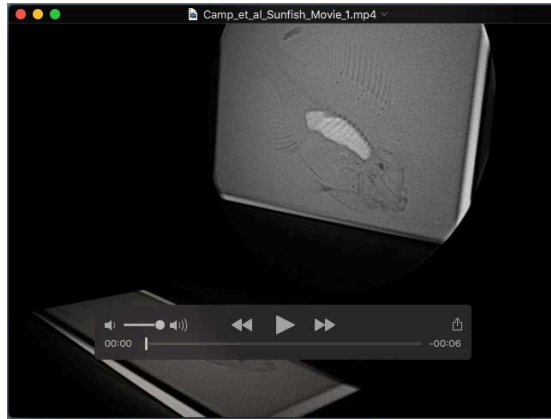
Supplementary Figure S1: Regional muscle strain across the axial muscles. Mean maximum muscle strain in 4 regions of the epaxials (**A**) and 3 regions of the hypaxials (**B**) in each fish. Muscle strains were calculated relative the mean initial length of the muscle region, with positive values indicating shortening. Means are shown with standard error bars ($N = 6$ strikes for Bluegill 1, $N = 5$ strikes for Bluegill 3). (**C**) The approximate location of each muscle region.

Supplementary Table S1. Mean (s.e.m) timing and magnitude of peak bone motion, as measured relative to the body plane with JCSs during suction feeding (rot, rotation; trans, translation).

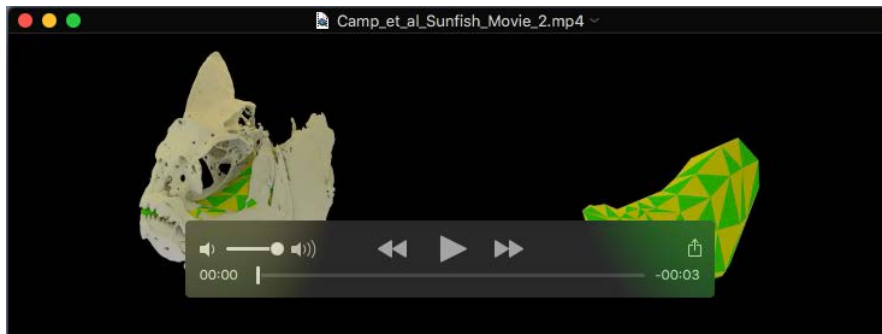
Bone	Variable	Bluegill 1 (<i>N</i> = 6)	Bluegill 3 (<i>N</i> = 5)
Neurocranium	X-rot (°)	1.6 (0.6)	1.2 (0.4)
	Y-rot (°)	-1.8 (1.1)	-3.2 (1.6)
	Z-rot (°)	11.9 (1.6)	13.7 (2.1)
	X-trans (mm)	-0.3 (0.05)	-0.2 (0.1)
	Y-trans (mm)	-0.2 (0.04)	-0.4 (0.2)
	Z-trans (mm)	-1.2 (0.3)	-0.7 (0.3)
	Time ^a of peak Z-rot (ms)	10.0 (3.7)	8.7 (1.8)
Cleithrum	X-rot (°)	2.1 (0.5)	2.4 (0.6)
	Y-rot (°)	-4.2 (1.0)	-4.5 (0.6)
	Z-rot (°)	-7.1 (0.7)	-4.6 (1.0)
	X-trans (mm)	-0.9 (0.1)	-0.7 (0.3)
	Y-trans (mm)	-0.3 (0.04)	-0.2 (0.1)
	Z-trans (mm)	-1.0 (0.2)	-0.5 (0.1)
	Time ^a of peak Z-rot (ms)	11.3 (1.9)	7.7 (1.9)
Urohyal	X-trans (mm)	-3.8 (0.5)	-1.7 (0.6)
	Y-trans (mm)	-7.9 (0.2)	-5.3 (0.5)
	Z-trans (mm)	0.8 (0.5)	2.2 (0.4)
	Time ^a of peak X-trans (ms)	11.7 (1.3)	7.6 (2.0)
	Time ^a of peak Y-trans (ms)	14.0 (2.8)	14.8 (6.5)

^aTime relative to the time of peak gape

Supplementary Movies



Movie 1: Animation of 3D bone models from X-ray Reconstruction of Moving Morphology (XRMM) during a sample bluegill sunfish suction feeding strike. The animated bones are the neurocranium and cranial bones from the left side of the head, with their medial sides shown here in oblique right lateral view. Also shown are the biplanar X-ray videos from which these motions were reconstructed. The X-ray videos were filmed at 500 Hz, but have been slowed down about 30 times in this movie.



Movie 2: Animation of skeletal kinematics and buccal cavity volume during a sample bluegill sunfish suction feeding strike (antero-lateral view). Buccal volume was measured with a dynamic digital endocast (green and yellow polygon), which is shown with the animated bone models (left) and by itself (right). The motion of both the endocast and the bones are viewed relative to the body plane, i.e., the motion of the fish's body. The animation was created from X-ray videos filmed at 500 Hz, but it has been slowed down about 30 times in this movie.