

Figure S1. The *sws2a* and *sws2b* mRNA levels were detected in 3-month-old wild-type and *sws2a^{-/-}* and *sws2b^{-/-}* mutant by qRT-PCR. (A) Location of the two primer pairs used for qRT-PCR experiments. (B) The stability of *sws2a* and *sws2b* mRNA are not affected by the mutation.

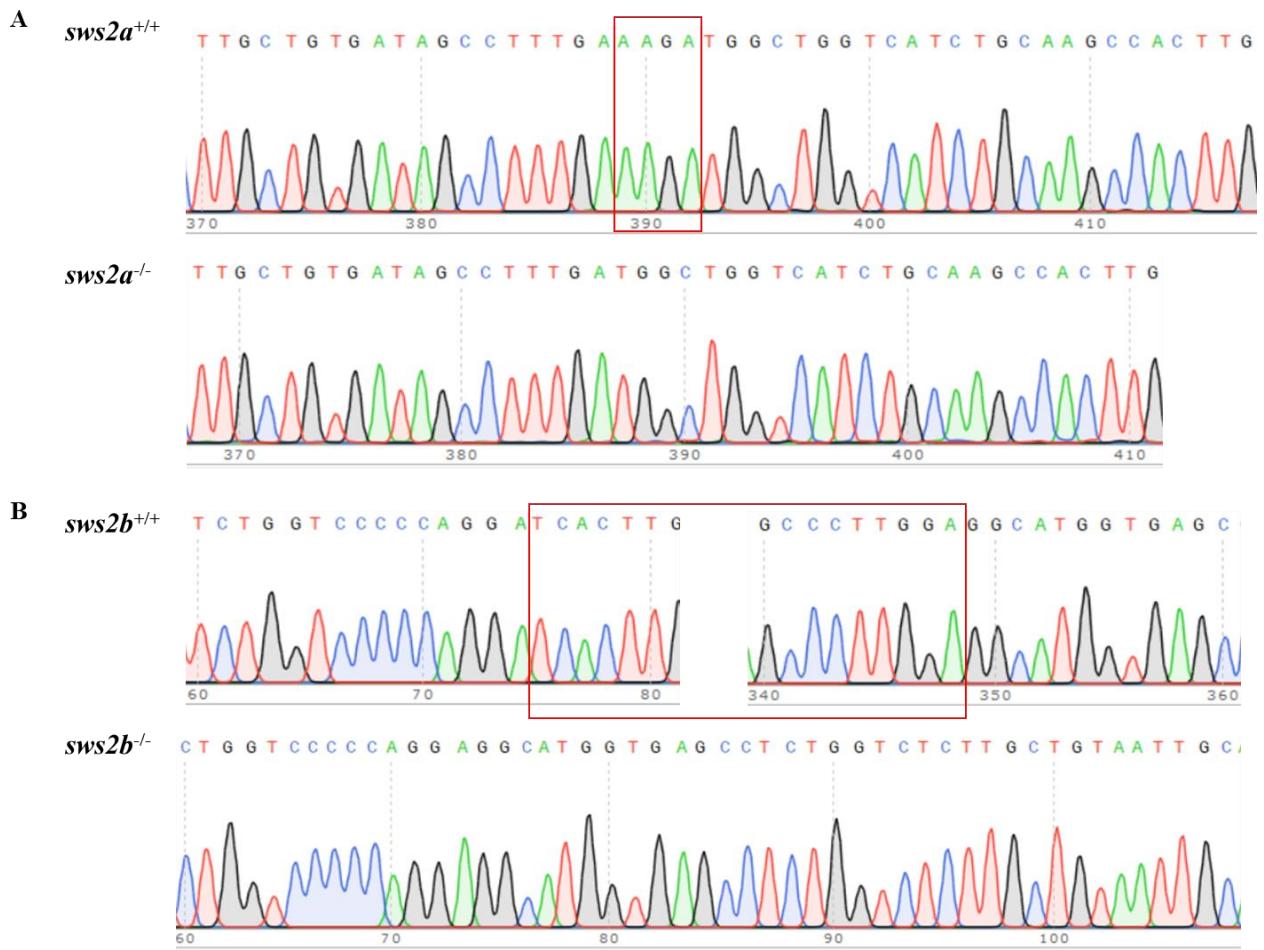


Figure S2. Sequencing the PCR product (spanning the 4-bp (A) and 274-bp (B) deletions) amplified from the cDNA of WT, *sws2a^{-/-}* and *sws2b^{-/-}* mutant medaka retinas. The mutations are present in the mature *sws2a* and *sws2b* mRNA.

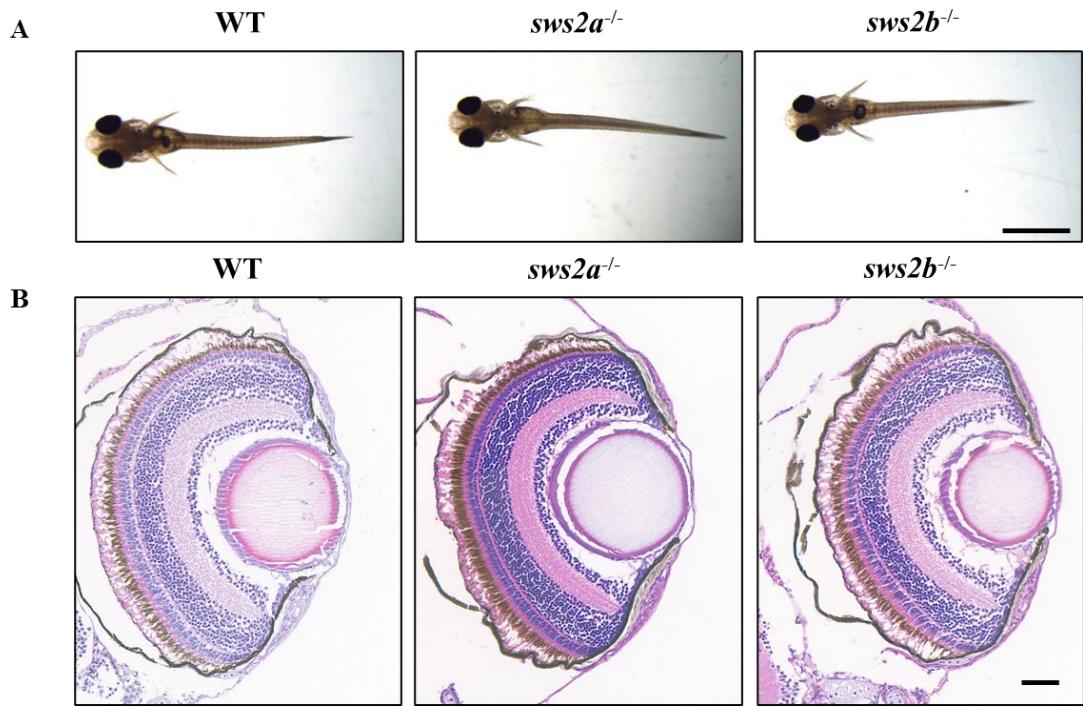


Figure S3. (A) The morphology of WT, *sws2a*^{-/-} and *sws2b*^{-/-} in developmental stages of 6dpf. Scale bars indicate 1000 μ m. (B) Histological morphology of the retina with H&E staining. Scale bar: 40 μ m.

Table S1 The primers used for CRISPR/Cas9.

Gene	Sequence (5'-3')
sws2a guide RNA	GATGACCAGCCATCTTCAAAGG
sws2a test-F	GGGAGCTGCCAGATGACTTC
sws2a test-R	TCTGTTACCTGCTCCATCCG
sws2a total length-F	ATGAGGCTCATCAGTGGTGG
sws2a total length-R	CTAAGCTGGTCCGACTTTAG
sws2b guide RNA1	TGGGGCTTCCCAGTGATCCTGG
sws2b guide RNA2	GAAGGCTTACTGCAGCCCTTGG
sws2b test-F	AGTGAGGAGCATCAAATATTGTCC
sws2b test-R	CTACTCCATCCCACCAGAGGT
sws2b total length-F	ATGAGGGGAAATCGTCTTGT
sws2b total length-R	TTAGGAAGGGCCGACTTTG

Table S2 The primers for qRT-PCR.

Gene	Gene No.	Forward (5'-3')	Reverse (5'-3')
actin	NM_001104808.1	TATCATTGCGCTGAAACCGAT	CTTTGCACATGCCAGATCCG
sws2a	XM_004069227.4	TGTTACCTGGGTGTGTGCTC	GAACCGCGAACGCAGAAACAG
sws2b	NM_001104654.1	TTCTGCTTGCCGTCCCTT	AAGCAACAACCATGACGACCA
gdf6a	XM_004086629.4	TTCCGTTCATCCAAATCCGC	CCTTAATTCTGCCCGACCA
foxq2	XM_011473845.3	ATCCAGAGAAATCCGCCGAC	TAAGTTGTGGCGAACGCTGT
sws1	NM_001104656.1	ACAAAGACTACCGGCTCGTCA	GCTTCCTCCATCTTCTTCCGA
rh2-a	NM_001104655.1	TTTGGGTTGGCTGGTCAAGGT	CACAAGGCTGCCATAGGTGA
rh2-b	XM_004086130.4	TGCACTTCTCGTCCCAGTC	CCAAGCTACCAGGAAGCCAA
rh2-c	XM_004086132.4	CTTCTGTGCCGTTGAGGGAT	ACAAGCCAGAGCCATTACCC
lws	XM_004069094.4	TGAGGGCTATGTGGTCTCCA	ACCTGCTCCATCCAAAGACG
gnat2	XM_004070401.3	GTGAGTCGGAAAAAGCACC	CCAGAGCCAGAACCGAAGTC
arr3b	XM_020706457.2	TATCTTGCCTGTGCCTCCG	GAGCATGGGAGATTGAGGGG
rho	NM_001104695.1	CTCGTTACATCCCAGAGGGC	ATGATGACAACCATGCGGGT
gnat1	XM_004084384.4	AAGCCCCTTGAGCATGTGT	TGATGATGTCGGTTACGGCA
gnb3a	XM_004077988.4	CAGCCTCAAAGACCAGATTACGG	TCATCTGCACACGTCCCAC
gnb3b	NM_001104851.1	GAAAGCTGAAATGGATGCACTGAA	ACATGCTCCCATTTGCTG
grk7a	NM_001104661.1	CCACCAAGGACGTACATCCA	CGTGTTCCTCGGATCCTC
grk7b	XM_004075815.3	TGAGAGGCAGAAGATTACTGACA	GCACAAACACAAACCTCACAAA
pde6c	XM_004080270.3	CGGCAAACCTAAAAAGCCA	TGAGGGGAAGGTGAGCATA
six3a	NM_001122928.1	GACCCGTATCCAAACCCCCAG	GCTCGGTCTATTGCTTGGT
six3b	NM_001104760.1	CCCCGACTCAAGTAGGGAAC	GGAACGTGTCTCCATCTGCC
six6	XM_004082283.4	GGCTACTGGACTTACACCCAC	TTTGCTGGACAAACTGGCCT
six7	XM_004079929.4	TACCGCATCCGCAAGAAGTT	GGTCGGGTACGGATCTTGG
pax6a	XM_004082283.4	GCCAGTGACAAGCAGCAAAT	TTCACCGAGATGCCGTTCTC
pax6b	XM_020714754.2	GCTAACGGTCAGACAGGAA	CGTCTCCTCTGAATCCTCGC