# FISH SENSES

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# VOCABULARY

- **ANADROMOUS -** MEANS FISH THAT CAN LIVE IN BOTH FRESH AND SALTWATER, SUCH AS MOST SALMON.
- **AQUATIC** – ANY ANIMAL OR PLANT FOUND LIVING IN OR NEAR A WATER HABITAT SUCH AS A STREAM, RIVER, POND, LAKE OR OCEAN.
- **BINOCULAR –** IS WHEN TWO EYES ARE USED TOGETHER TO SEE. THE EYES SEND A SIGNAL TO THE BRAIN, AND THE IMAGE IS PUT TOGETHER BY THE BRAIN INSTANTLY.
- **ENVIRONMENT** – THE PHYSICAL SURROUNDINGS ON THE EARTH ARE CALLED THE ENVIRONMENT. THE ENVIRONMENT INCLUDES EVERYTHING LIVING AND NONLIVING. ALL LIVING THINGS, PLANTS AND ANIMALS RELY ON THE NONLIVING PARTS OF THE ENVIRONMENT TO SURVIVE.
- **HABITAT -** A HABITAT IS A PLACE THAT AN ANIMAL LIVES IN. IT PROVIDES THE ANIMAL WITH FOOD, WATER, SHELTER AND SPACE. THERE ARE MANY DIFFERENT KINDS OF HABITATS AROUND THE WORLD, INCLUDING FORESTS, GRASSLANDS, MOUNTAINS, DESERTS, RIVERS, LAKES AND OCEANS. EACH HABITAT HAS DIFFERENT ANIMAL AND PLANT LIFE.
- **LATERAL -** LATERAL MEANS BEING ON THE SIDE OF SOMETHING OR MOVING IN A SIDEWAYS DIRECTION.
- **MIGRATE –** BIRDS, FISH AND MAMMALS MOVING OVER LONG DISTANCES FROM ONE REGION OR HABITAT TO ANOTHER ACCORDING TO THE SEASONS, AS IN SALMON MIGRATING TO SPAWN.

# VOCABULARY (CONTINUED)

- **MONOCULAR –** USING EACH EYE INDEPENDENT OF THE OTHER EYE TO SEE DIFFERENT THINGS.
- **NAVIGATION -** TO MOVE ON, OVER OR THROUGH WATER, AIR OR LAND TO A SPECIFIC LOCATION. TO DIRECT OR MANAGE A SPECIFIC COURSE. TROUT NAVIGATE A RIVER TO FIND THEIR HATCHING HOME TO SPAWN.
- **PREDATOR -** A PREDATOR IS AN ANIMAL THAT HUNTS, CATCHES AND EATS OTHER ANIMALS. FOR EXAMPLE, A FISH EATING A CRAYFISH IS A PREDATOR OR A RACCOON EATING THE FISH IS ALSO A PREDATOR.
- **PUPILS -** THE PUPILS ARE THE OPENINGS IN THE CENTER OF THE EYES. THE PURPOSE OF PUPILS IS TO CONTROL THE AMOUNT OF LIGHT ENTERING THE EYE.
- **SENSORY -** ANY ACTIVITY THAT STIMULATES A LIVING CREATURE'S SENSES OF TOUCH, SMELL, TASTE, SIGHT, HEARING AND IN A FISH'S CASE, IT'S LATERAL LINES. A LOUD NOISE WILL STIMULATE A FISH'S INNER EAR.
- **STIMULI** - AN ACTION THAT USUALLY COMES FROM OUTSIDE THE BODY AND EXCITES RECEPTORS OR SENSORY ORGANS, SUCH AS EARS, NOSE, TASTE, EYES AND TOUCH. FOR EXAMPLE, TOUCHING A HOT STOVE STIMULATES THE HAND, AND THE INTENSE HEAT SENDS MESSAGES TO THE BRAIN TO TAKE YOUR HAND OFF THE STOVE.

# INTRODUCTION

**WHAT ARE 'SENSES?"** SENSES ARE **SIGHT, HEARING, SMELL, TASTE** AND **TOUCH**. THE SENSING ORGANS ARE THE **EYES, EARS, NOSE, MOUTH** AND **HANDS,** WHICH SEND INFORMATION TO THE BRAINS OF ALL LIVING CREATURES GIVING THEM THE ABILITY TO NOTICE AND REACT TO THEIR SURROUNDINGS AROUND THEM.

HUMAN SENSES SHARE SOME SIMILARITIES WITH FISH SENSES, BUT BECAUSE PEOPLE LIVE ON LAND AND FISH LIVE IN WATER, THERE ARE SOME DIFFERENCES.

FISH USE THEIR HIGHLY DEVELOPED SENSES TO HELP THEM SURVIVE IN THEIR AQUATIC HABITAT. FISH USE THE SAME FIVE SENSES HUMANS DO BUT HAVE ONE ADDITIONAL SENSE.

IN ADDITION TO THE SENSES OF TASTE, SMELL, SIGHT, HEARING AND FEELING, **FISH HAVE A UNIQUE SIXTH SENSORY ORGAN**, CALLED THE **LATERAL LINE**, WHICH ALLOWS THEM TO **"SENSE VIBRATIONS" IN THE WATER**. THE LATERAL LINE **IS RELATED TO THEIR SENSE OF HEARING.** THE LATERAL LINES ARE LOCATED ON BOTH SIDES OF A FISH FROM THE TAIL TO THE GILLS AND USUALLY ARE CLEARLY VISIBLE.

# SENSE # 1 - TASTE

**FISH HAVE AN EXCELLENT SENSE OF TASTE** AND USE IT, ALONG WITH THEIR OTHER SENSES, **TO FIND FOOD**. SOME FISH, SUCH AS CATFISH, RELY PRIMARILY ON THEIR SENSE OF TASTE TO LOCATE SOMETHING TO EAT.

LIKE PEOPLE, **FISH HAVE TONGUES** LOCATED IN THE MOUTH **CONTAINING THOUSANDS OF TASTE BUDS**. IT IS BELIEVED A FISH'S TASTE BUDS CAN TELL THE DIFFERENCE BETWEEN SWEET, SOUR, SALTY AND BITTER.

SOME FISH, SUCH AS **WALLEYE, HAVE TASTE BUDS ON THEIR TONGUES, LIPS AND FACES**. A WALLEYE CAN TASTE FOOD OR A FISHING LURE WITHOUT EVER OPENING ITS MOUTH.

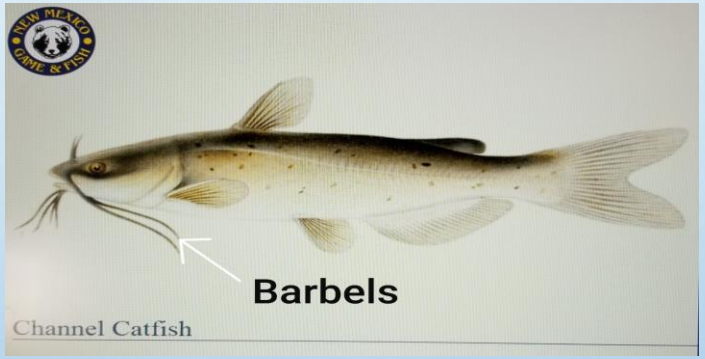
**CATFISH AND BULLHEADS HAVE TASTE BUDS ON THEIR BODIES FROM HEAD TO TAIL**. THEY ALSO USE **"WHISKERS," CALLED BARBELS, TO TASTE**. BARBELS LOOK LIKE STINGERS, BUT THEY ARE NOT. THEY ARE ACTUALLY SOFT, WHISKER-LIKE STRUCTURES ABOVE AND BELOW THE MOUTH. BARBELS ARE SENSORY STRUCTURES CONTAINING MANY NERVE ENDINGS, SOME OF WHICH ARE SIMILAR TO THE TASTE BUDS OF HUMANS. BOTTOM-DWELLING FISH LIKE CATFISH, CARP AND OTHER "WHISKERED" FISH DRAG THEIR BARBELS ALONG THE LAKE OR RIVER BOTTOM TO FIND FOOD WHERE IT IS USUALLY VERY DARK.

**QUESTION:** HOW WOULD A PERSON KNOW IF FOOD IS SPOILED EVEN IF IT SMELLED AND LOOKED OK?

# HOW DO FISH TASTE FOOD?

- **MOST FISH** TASTE BY USING THEIR TONGUE.


- **CATFISH** USE THEIR TONGUE AND BARBELS (WHISKERS) TO TASTE, BUT THEY ALSO HAVE TASTE BUDS OVER MOST OF THEIR BODIES. DID YOU KNOW THE ENTIRE BODY OF A CHANNEL CATFISH IS COVERED IN TASTE RECEPTORS?




- **WALLEYE** HAVE TASTE BUDS LOCATED ON THEIR HEADS, AS WELL AS ON THEIR LIPS AND TONGUE, AND CAN ACTUALLY TASTE FOOD OR BAIT BY BUMPING INTO THEM WITH THEIR FACE.

# SENSE # 2 - SMELL

**FISH HAVE AN AMAZING SENSE OF SMELL** WHICH IS **ONE OF THE BEST IN ALL OF THE ANIMAL KINGDOM.** FISH DO NOT HAVE NOSES BUT INSTEAD HAVE TWO OPENINGS ON EITHER SIDE OF THE SNOUT, JUST ABOVE THE MOUTH, WHICH ARE CALLED **NOSTRILS OR NARES.**

PEOPLE USE THEIR NOSES TO SMELL AND BREATHE, BUT **FISH USE THEIR NOSTRILS ONLY FOR SMELLING, NOT FOR BREATHING.**

NARES DO NOT LEAD TO THE THROAT THE WAY NOSTRILS DO IN HUMANS AND OTHER MAMMALS BUT OPEN UP INTO A CHAMBER LINED WITH SENSORY PADS. **THE KEY TO A STRONG SENSE OF SMELL FOR FISH IS THEIR ABILITY TO MOVE WATER RAPIDLY OVER THESE SENSORY PADS TO DETECT ODORS.**

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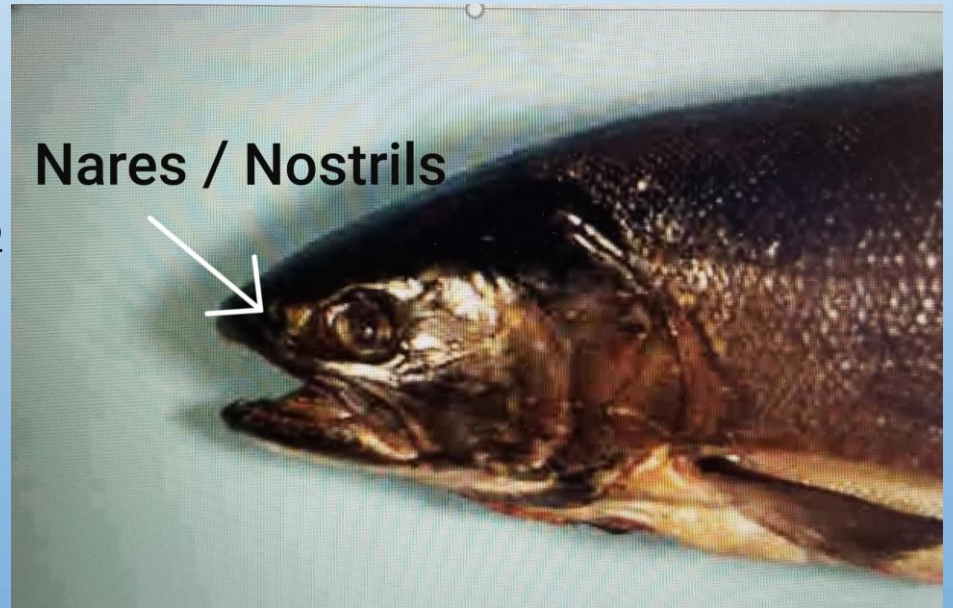


# SMELL (CONTINUED)

BECAUSE **SEEING UNDERWATER CAN USUALLY BE VERY DIFFICULT, SMELL BECOMES AN EXTREMELY IMPORTANT** SENSE FOR FISH. WHAT DO FISH USE THE SENSE OF SMELL FOR? **THEY USE SMELL TO FIND FOOD**, TO **FIND A SAFE HABITAT**, TO **FIND A MATE**, FOR **NAVIGATION BACK TO HOME WATERS**, TO FIND **SUITABLE SPAWNING GROUNDS**, TO **RECOGNIZE OTHER FISH** OF THE SAME SPECIES AND FOR **DETECTING PREDATORS.**

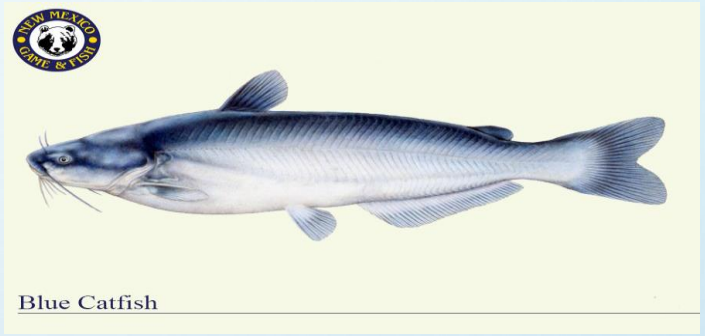
**FISH CAN SMELL FOOD FROM GREAT DISTANCES** AND WILL SWIM TO THE SOURCE OF THE SMELL AND USE THEIR TASTE BUDS TO FIND OUT IF IT'S EDIBLE. USUALLY, **THE DEEPER OR DARKER THE WATER, THE MORE A FISH HAS TO RELY ON ITS SENSE OF SMELL.**

BOTTOM DWELLERS, SUCH AS CATFISH, ARE KNOWN FOR BEING ATTRACTED TO BAITS THAT SMELL VERY BAD. FISH CONSTANTLY USE SMELL TO STAY SAFE AND AVOID DANGER BY SMELLING PREDATORS WHO HUNT FOR THEM EVERY DAY.

FISH ALSO HAVE THE ABILITY TO SMELL VERY TINY AMOUNTS OF CHEMICALS IN THE WATER. THEY USE THIS INFORMATION TO DETECT HARMFUL POLLUTANTS (SUCH AS ASHES FROM A BURNING FIRE) AND AVOID THESE THREATS IF THEY CAN.

# HOW GOOD CAN FISH SMELL?

- **CATFISH** CAN TASTE ITEMS WITHOUT BITING THEM, EVEN AT A DISTANCE OF 15 FEET JUST BY SMELLING.




- **MANY FISH** CAN SMELL PEOPLE. THEY WILL SWIM AWAY FROM ANY BAIT THAT SMELLS LIKE GAS, LOTION, PERFUME, DEODORANT, TOBACCO, GASOLINE OR INSECT REPELLENT.


- **TROUT SPECIES**, LIKE THE RAINBOW AND BROWN TROUT, RETURN TO THE STREAMS AND TRIBUTARIES WHERE THEY WERE HATCHED (BORN) TO SPAWN (MATE) BY USING SMELL TO FIND THEIR WAY BACK TO THEIR HOME.

# A SALMON'S AMAZING JOURNEY

**FISH ALSO USE TASTE AND SMELL FOR NAVIGATION.** AFTER SWIMMING HUNDREDS OF MILES TO AND FROM THE SEA, **SALMON USE THEIR SENSES OF TASTE AND SMELL TO FIND THE STREAMS WHERE THEY WERE BORN.** THEY SWIM UP THE STREAM TO THEIR TRADITIONAL SPAWNING AREAS TO LAY AND FERTILIZE EGGS WHERE THEY WERE HATCHED (BORN).

ANADROMOUS **SALMON CAN TRAVEL OVER 6,000 MILES** BEFORE COMING BACK HOME TO SPAWN. THEY OFTEN WILL **SWIM 200 MILES UP A RIVER** TO FIND THEIR HOME STREAMS. SALMON COME BACK TO THE STREAM WHERE THEY WERE 'BORN' BECAUSE THEY 'KNOW' IT IS A GOOD PLACE TO SPAWN.

**KOKANEE SALMON** ARE BORN IN A FRESHWATER STREAM AND MIGRATE DOWN TO A LAKE WHERE THEY WILL SPEND MOST OF THEIR ADULT LIVES. **KOKANEE TYPICALLY LIVE FOR FOUR YEARS IN A LAKE BEFORE RETURNING BACK HOME TO THEIR SPAWNING WATERS TO SPAWN AND DIE.**


# SENSE # 3 - SIGHT

**FISH HAVE GOOD EYESIGHT** BUT DO NOT SEE AS CLEARLY OR AS FAR AS PEOPLE DO. EVEN IN CLEAR WATER, MOST FRESHWATER FISH CAN USUALLY SEE NO FURTHER THAN FIFTEEN FEET. **FISH CAN SEE MOVEMENT, BRIGHTNESS AND COLOR**. **FISH NEAR THE SURFACE CAN DETECT MOST COLORS**, BUT **FISH IN DEEP WATER CANNOT SEE A FULL RANGE OF COLORS**. THIS IS BECAUSE LIGHT DOES NOT TRAVEL FAR IN DEEPER WATER, ESPECIALLY IF THE WATER IS VERY CLOUDY OR DIRTY.

UNLIKE HUMANS, **FISH LACK EYELIDS** AND HAVE A **PROTECTIVE FILM OVER THEIR EYES** TO HELP THEM SEE MORE CLEARLY UNDERWATER. **THEIR PUPILS REMAIN THE SAME SIZE** REGARDLESS OF THE AMOUNT OF LIGHT. TO PROTECT THEIR EYES FROM THE BRIGHT SUNLIGHT, FISH USUALLY SPEND SUNNY DAYS IN DEEP WATER OR IN THE SHADE OF TREES, UNDERCUTS AND ROCKS.

**MOST FISH ARE VISUAL PREDATORS WITH LARGE EYES** TO HELP THEM SEE BETTER IN THE DARK WATER. FISH ALSO NEED GOOD EYESIGHT TO BE ABLE TO SEE PREDATORS WHO ARE HUNTING THEM.

**QUESTION:** WHY CAN FISH NEAR THE SURFACE OF WATER SEE COLORS MORE CLEARLY THAN FISH THAT ARE IN DEEPER WATER?

# HOW DO FISH SEE IN THEIR ENVIRONMENT?

**A FISH'S ABILITY TO SEE IS MADE MORE DIFFICULT BECAUSE THEY LIVE IN WATER**, WHICH IS USUALLY CLOUDY OR DIRTY DUE TO WEATHER AND PHYSICAL CONDITIONS.

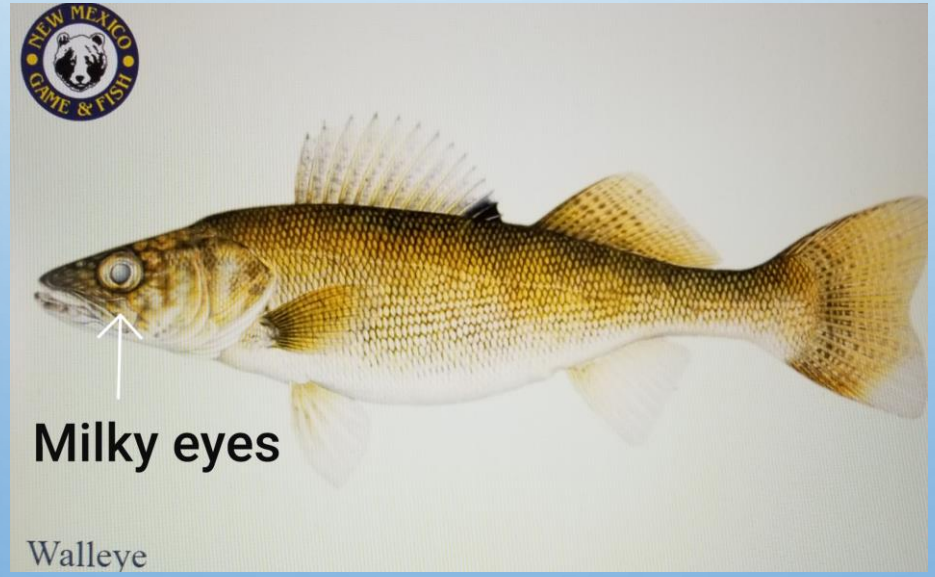
**FISH EYES USUALLY STICK OUT** (PROTRUDE) AND **ARE LOCATED ON THE SIDES OF THEIR HEAD**. **EACH EYE CAN MOVE INDEPENDENTLY,** LOOKING AROUND AND SCANNING UP AND DOWN. BECAUSE THEIR EYES ARE ON THE SIDES OF THEIR HEADS, FISH CAN SEE IN EVERY DIRECTION EXCEPT DIRECTLY BEHIND AND BELOW IT. THIS IS CALLED **MONOCULAR VISION OR USING ONE EYE TO SEE SOMETHING DIFFERENT FROM WHAT THE OTHER EYE IS SEEING.** THE SHAPE OF A FISH'S EYE IS ROUND SO THAT EACH EYE CAN SEE IN ALMOST A FULL HALF-CIRCLE (HEMISPHERE) OR 180 DEGREES. **MONOCULAR SIDE VISION IS GOOD FOR SEEING A WIDER AREA AND FOR SEEING MOVEMENT** OF PREDATORS OR PREY.

MONOCULAR VISION ALLOWS FISH A NARROW RANGE OF **BINOCULAR VISION** TO THE FRONT. FISH HAVE A 30–45 DEGREE LIMITED RANGE OF SIGHT DIRECTLY IN FRONT OF THEM. AT SOME FIXED POINT IN FRONT OF A FISH, BOTH EYES WILL PICK UP AN OBJECT, LIKE A PREDATORY FISH, AND AT THIS POINT, THEY ARE USING **BINOCULAR VISION OR USING BOTH EYES TO SEE THE SAME THING**.

- **QUESTION – A FISH'S EYES ARE LOCATED ON THE SIDE OF ITS HEAD, BUT WHERE ARE HUMAN EYES LOCATED, AND WHAT KIND OF VISION DO WE HAVE?**

# THE EYES OF A WALLEYE

- **WALLEYE** ARE NAMED FOR THEIR **LARGE, MILKY CLOUDY EYES** THAT **GATHER LIGHT AND GIVE IT MUCH BETTER VISION THAN THEIR PREY**, ESPECIALLY IN DIM TO DARK WATERS. ITS ABILITY TO SEE BETTER IN THE DARK, COMBINED WITH ITS **RAZOR-SHARP TEETH** AND THE **USE OF ITS OTHER SENSES, GIVE WALLEYE A BIG ADVANTAGE OVER OTHER FISH** MAKING THEM SERIOUS PREDATORS.
- **WALLEYE** TEND TO BE MOSTLY **NOCTURNAL (NIGHTTIME) PREDATORS,** WHICH MEANS THEY MOSTLY HUNT AT NIGHT. DURING THE DAY, THEY RETREAT TO DEEPER, DARKER WATERS TO ESCAPE THE LIGHT. WALLEYE ARE FOUND IN LAKES IN NEW MEXICO BUT ARE NOT NATIVE TO THE STATE.



# COLOR AND FISHING

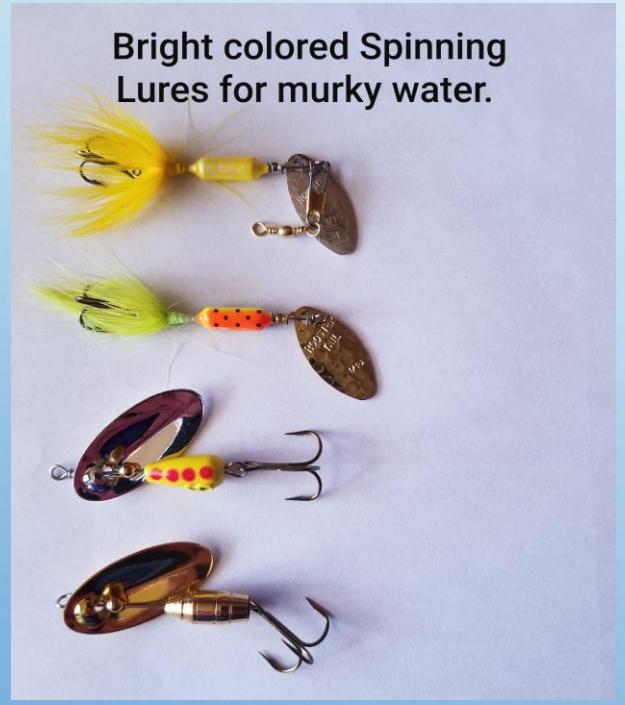
- **BRIGHT COLORS, SOUND, MOVEMENT** AND **SHADOWS** WILL ALERT FISH TO YOUR PRESENCE WHILE FISHING AND OFTEN SPOOK THEM, ESPECIALLY IF THEY ARE NEAR THE SURFACE FEEDING.
- IT IS RECOMMENDED YOU **WEAR DRAB COLORS SUCH AS OLIVE, GRAY, TAN OR EVEN CAMOUFLAGE** TO FISH AT RIVERS, PONDS OR LAKES.
- **FISH ARE ALWAYS ON FULL ALERT** FOR PREDATORS MOVING ALONG THE BANKS OR FOR SHADOWS FROM BIRDS FLYING OVERHEAD, SUCH AS OSPREY. ANGLERS SHOULD BE AWARE OF THIS FACT AND TRY NOT TO **MAKE SHADOWS** ON THE WATER, **MAKE LOUD NOISE** OR **WEAR BRIGHT COLORS**.

**COLORS, BAIT AND LURES.**

- A BASIC RULE OF FISHING IS TO USE **BRIGHT-COLORED** BAITS OR LURES **IN MURKY/DARK WATERS**. FISH WILL SEE THE BRIGHT COLORS BETTER IN DARKER WATER. IF THE **WATER IS CLEAR, USE LIGHT, SUBTLE COLORS** IN WATER WHERE FISH CAN ALREADY SEE THE LURE/BAIT EASILY.

# COLOR AND FISHING

## BRIGHT COLORED LURES FOR MURKY WATER





## DARKER COLORED LURES FOR CLEAR WATER


- PHOTOS BY DENNIS SEGURA

# SENSE # 4 – HEARING, HIDDEN EARS

HAVE YOU EVER **"FELT" THE RUMBLE OF THUNDER?** IF SO, YOU WERE SENSING **SOUND VIBRATIONS**. FISH HAVE THE ABILITY TO HEAR SOUND VIBRATIONS MOVING THROUGH THE WATER IN THE SAME MANNER. **FISH DO HAVE EARS**, BUT **THEY DON'T NEED EAR OPENINGS** ON THE OUTSIDE OF THEIR BODIES BECAUSE **SOUND TRAVELS ALMOST FIVE TIMES FASTER THROUGH WATER THAN THROUGH AIR**.

**FISH EARS ARE LOCATED UNDER THE SKIN, IN THE SKULL NEAR THE EYES**. THE STRUCTURE OF THE INNER EARS IS THE SAME AS HUMANS **AND IS USED FOR BALANCE AND HEARING**. FISH CAN HEAR SO WELL THAT THEY CAN HEAR A WORM WIGGLING AT THE BOTTOM OF A LAKE. EVEN THE FAINTEST SOUND CAN SPOOK FISH; THAT'S WHY IT HELPS TO REMAIN QUIET WHILE FISHING. TALKING IS FINE, BUT SOUNDS TRANSMITTED NEAR OR DIRECTLY FROM THE WATER CAN SCARE FISH AWAY.

**SOUND PROVIDES FISH WITH INFORMATION ABOUT OBJECTS IN THE WATER THAT THEY CANNOT SEE**. A FISH CAN TELL THE **DIRECTION**, **DISTANCE**, **SPEED** AND **SIZE** OF WHAT THEY HEAR, INCLUDING THE SOUNDS THAT SPECIFIC PREDATORS AND PREY MAKE. HEARING ALLOWS FISHES TO LEARN A GREAT DEAL ABOUT THEIR HABITAT THAT THEY CANNOT GET FROM THE OTHER SENSES.

**QUESTION:** WHY SHOULD YOU NOT PLAY LOUD MUSIC WHEN PEOPLE ARE FISHING?

# SENSE # 5 - LATERAL LINES

**FISH HAVE AN ADDITIONAL SENSE RELATED TO HEARING CALLED THE LATERAL LINE**. THIS STRUCTURE IS A **NETWORK OF ULTRA-SENSITIVE NERVE ENDINGS THAT RUN ALONG BOTH SIDES OF THE FISH,** FROM THE GILLS TO THE TAIL.


A FISH'S LATERAL LINE CONSISTS OF TINY PORES CONTAINING HAIRS CONNECTED TO MANY NERVE ENDINGS UNDERNEATH THE SKIN. THE SENSITIVE HAIRS INSIDE EACH PORE **DETECT THE LOCATION AND DIRECTION OF VIBRATIONS IN THE WATER**, ALLOWING THE FISH TO SENSE THE MOVEMENT OF OTHER FISH AND AQUATIC CREATURES AROUND THEM IN DARK OR MURKY WATER **BEFORE THEY CAN SEE IT**.

# HOW DO LATERAL LINES WORK?

FISH CAN DETECT FOOD BY **SOUND** AND THROUGH **WATER MOVEMENT IN THE FORM OF VIBRATIONS**. THEY HEAR AND FEEL THEIR WAY TO THEIR PREY WITH THEIR EARS AND LATERAL LINES. THEY WILL THEN SMELL AND POSSIBLY SEE THE PREY TO DETERMINE IF IT IS SOMETHING THEY USUALLY EAT. **THE COMBINATION OF HEARING/FEELING** VIBRATIONS IN THE WATER ALLOWS FISH TO LIVE IN WATER **WHERE THEY CANNOT SEE**.

**LATERAL LINES DETECT MOVING OBJECTS IN THE WATER**. THEY ALSO HELP **DETERMINE THE DIRECTION OF THE MOVEMENT AND ITS SPEED, SIZE AND SHAPE**. THE LATERAL LINES HELP FISH FIND FOOD BY SENSING WHEN SMALLER FISH ARE SWIMMING NEARBY. THE LATERAL LINES ALSO HELP A FISH AVOID BEING EATEN BY SENSING THE PRESENCE OF LURKING PREDATORS.

THE **LATERAL LINES** ALSO SENSE AND **DETECT WATER PRESSURE, DEPTH, CURRENTS AND SPEED**. THEY CAN FEEL THE SPEED OF FAST-MOVING WATER BEFORE THEY ARE IN IT. **LATERAL LINES HELP FISH NAVIGATE** BY DETECTING OBJECTS IN THE WATER SUCH, AS ROCKS, STUMPS AND DEBRIS.

* **QUESTION:** WHAT SMALL MAMMAL CAN FLY IN THE DARK USING SOUND VIBRATIONS TO DETECT FOOD?

# LATERAL LINES AND SCHOOLS OF FISH

**A GROUP OF THE SAME TYPE OF FISH** SWIMMING CLOSELY TOGETHER **IS CALLED A SCHOOL**. HAVE YOU EVER WONDERED HOW FISH CAN SWIM SO FAST AND CLOSE TOGETHER IN A SCHOOL WITHOUT BUMPING INTO EACH OTHER? THE ANSWER IS THEIR LATERAL LINES.

THEIR **LATERAL LINES HELP THEM SENSE THEIR LOCATION TO ONE ANOTHER BY DETECTING INSTANT VIBRATIONS IN THE WATER**. EVEN IN SCHOOLS WITH HUNDREDS OF FISH, THEY CAN SWIM WITHOUT BUMPING INTO ONE ANOTHER.

NOT ALL FISH SCHOOL THE SAME. SCHOOLS OF SALTWATER ANCHOVIES CONTAIN OVER A THOUSAND FISH AND LOOK VERY GRACEFUL AND WELL ORGANIZED WHEN THEY SWIM. HOWEVER, SCHOOLS OF SEVERAL PREDATORY FISH SUCH AS FRESHWATER LARGEMOUTH BASS MOSTLY SCHOOL IN SMALL NUMBERS OF BETWEEN FOUR TO TWELVE AND SWIM AROUND MORE RANDOMLY.

**WHY DO FISH SCHOOL?** THERE IS **SAFETY IN NUMBERS**. IT IS HARD FOR A PREDATOR TO PICK ONE FISH IN A SCHOOL. ALSO, **IT TAKES LESS ENERGY TO SWIM IN A SCHOOL,** AND **FINDING FOOD IS EASIER.**

**QUESTION** – WHAT OTHER ANIMALS LIVE IN LARGE GROUPS?

# REVIEW QUESTIONS

1. WHAT ARE A FISH'S FIVE SENSES, AND DESCRIBE HOW THEY USE EACH SENSE TO SURVIVE?
2. WHAT BODY PARTS OF A WALLEYE HAVE TASTE BUDS?
3. WHAT SPECIES OF FISH HAS TASTE BUDS ALL OVER ITS BODY?
4. WHY IS IT A GOOD IDEA NOT TO USE LOTION OR PERFUME WHEN YOU ARE FISHING?
5. DO FISH USE THEIR NOSE TO BREATHE? HOW DO THEY SMELL THROUGH THEIR NOSE?
6. DO FISH SEE IN COLOR? CAN FISH IN DEEP WATER SEE COLOR AS GOOD AS A FISH IN SHALLOW WATER?
7. WHY DON'T FISH NEED EAR OPENINGS LIKE MOST ANIMALS?
8. WHY SHOULD YOU BE QUIET WHEN YOU ARE FISHING?
9. WHAT ARE LATERAL LINES, AND WHAT DO THEY DO?
10. WHAT DO YOU CALL A GROUP OF FISH?

# ANSWERS TO REVIEW QUESTIONS

1. **TASTE** – USED TO TELL IF FOOD IS EDIBLE. **SIGHT** – USED TO DETECT PREY AND PREDATORS. **SMELL** – USED FOR DETECTING FOOD, PREDATORS, SIMILAR SPECIES, MATES AND NAVIGATION. **HEARING** – USED TO DETECT FOOD AND PREDATORS. **LATERAL LINES** – USED TO FEEL VIBRATIONS IN THE WATER.

2. A WALLEYE'S FACE, LIPS AND TONGUE ALL HAVE TASTE BUDS.

3. CATFISH, IN PARTICULAR THE CHANNEL CATFISH, HAVE TASTE BUDS ALL OVER THEIR BODIES.

4. FISH CAN SMELL ANY CHEMICALS HUMANS USE WHEN TOUCHING BAIT.

5. NO, FISH DO NOT BREATHE THROUGH THEIR NOSE. WATER FLOWING RAPIDLY OVER THE NASAL SENSORY PADS DETECT ODORS.

6. YES, FISH SEE IN COLOR. NO, COLORS FADE THE DEEPER WATER GETS, AND COLOR DISAPPEARS.

7. BECAUSE SOUND TRAVELS MUCH BETTER IN WATER THAN IN AIR.

8. NOISE TENDS TO SCARE FISH AWAY, AND MAKING LOUD NOISE AROUND OTHER ANGLERS IS RUDE.

9. THEY ARE SENSORY ORGANS ON BOTH SIDES OF A FISH THAT HELPS FISH DETECT SOUND AND VIBRATIONS.

10. A GROUP OF FISH IS CALLED A "SCHOOL."