# State code 18: Constructing or raising waterway barrier works in fish habitats

## **Purpose statement**

The purpose of this code is to ensure that development involving the constructing or raising of **waterway barrier works** in a **fish habitat**:

- maintains fish movement and connectivity throughout waterways and within and between fish habitats;
- 2. maintains the health and productivity of **fisheries** resources and **fish habitat**;
- 3. maintains the community and **fishing** sectors' use of the area and access to **fisheries resources**;
- 4. provides adequate **fish** passage including a **fish way**, if necessary;
- 5. avoid impacts or, where the **matters of state environmental significance** cannot be reasonably avoided, impacts are reasonably minimised and mitigated;
- 6. does not result in a significant residual impact on a matter of state environmental significance unless the significant residual impact is acceptable, and an offset is provided.

#### Using this code

The assessment benchmarks for this code comprise:

- a purpose statement which identifies the overall intent of the code;
- performance outcomes which set benchmarks to achieve the purpose statement of the code;
- acceptable outcomes which identify one way to achieve the relevant performance outcome.

Development complies with the code where:

- it complies with the acceptable outcomes for the performance outcome; or
- it complies with all the performance outcomes, where not complying with the acceptable outcomes; or
- development does not meet relevant performance outcome(s) and SARA determines, on balance, that the development complies with the purpose statement.

 $\ensuremath{\textbf{NOTE}}$  : The use of stepped spillways cannot comply with this code.

This code also includes the glossary of terms for definitions relevant to this code and reference documents; including the guideline <u>State Development Assessment Provisions</u> guideline: State Code 18: Constructing or raising waterway barrier works in fish habitats which provides direction on how to address this code.

## Performance outcomes and acceptable outcomes

#### Table 18.1 Operational work

Performance outcomes	Acceptable outcomes
All development - Impacts on waterway	
PO1 Waterway barrier works do not result in	No acceptable outcome is prescribed.
adverse impacts on waterways.	
<b>PO2</b> Development is designed, constructed and	No acceptable outcome is prescribed.
maintained to avoid and minimise impacts	
on matters of state environmental significance.	
PO3 Where development impacts on matters of	No acceptable outcome is prescribed.
state environmental significance, development	
mitigates impacts and provides an offset for	
any acceptable significant residual	
impact on matters of state environmental	
significance.	
Statutory note: For Brisbane core port land, an offset may only be	
applied to development on land identified as E1 Conservation/Buffer, E2 Open Space or Buffer/Investigation in the	
Brisbane Port LUP precinct plan.	

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Performance outcomes	Acceptable outcomes
All development in general	
<b>PO4</b> Aspects of development are only permitted within a <b>waterway</b> where there is a functional requirement and the development cannot be feasibly located elsewhere. Ancillary elements are to be located outside of the <b>waterway</b> .	No acceptable outcome is prescribed.
<b>PO5</b> For the life of the barrier, adequate <b>fish</b> passage must be provided and maintained at all <b>waterway barrier works</b> through:	<i>For all crossings:</i> <b>A05.1</b> Hydraulic conditions (depth, velocities and turbulence) from the downstream to the upstream
<ol> <li>fish way(s) that adequately provide for the movement of fish; or</li> <li>the movement of fish is adequately provided for in another way.</li> </ol>	limit of the structure allow for <b>fish</b> passage of all <b>fish</b> attempting to move through the crossing at all flows up to the <b>drownout</b> of the structure.
	AND
	<ul> <li>AO5.2 For the life of the crossing, the relative levels of:</li> <li>a bed level crossing or a culvert invert;</li> <li>bed erosion protection;</li> <li>apron scour protection; and</li> <li>the waterway bed are maintained to avoid drops in elevation at their joins.</li> </ul>
	AND
	<b>AO5.3</b> The crossing and associated erosion protection structures are installed at no steeper gradient than the <b>waterway</b> bed gradient.
	AND
	<b>AO5.4</b> The crossing and associated erosion protection structures are roughened throughout to approximately simulate natural bed conditions.
	AND
	<b>AO5.5</b> Design and maintenance measures are in place for the life of the crossing to keep crossings clear of blockages through a regular inspection program in order to retain <b>fish</b> passage through the crossing.
	AND
	For <b>waterway</b> crossings other than bridges and culverts:
	<b>AO5.6</b> The crossing is built at or below bed level so that the surface of the crossing is no higher than the stream bed at the site.
	AND
	<b>A05.7</b> The lowest point of the crossing is installed at the level of the lowest point of the natural <b>waterway</b>

Performance outcomes	Acceptable outcomes
	bed (pre-construction), within the footprint of the proposed crossing.
	AND
	<b>AO5.8</b> There is a height difference between the lowest point of the crossing and the edges of the low flow section of the crossing so that water is channelled into the low flow section of the crossing.
	AND
	<b>AO5.9</b> The level of the remainder of the crossing is no higher than the lowest point of the natural <b>waterway</b> bed outside of the low flow channel.
	AND
	For bridges:
	<b>AO5.10</b> Bridge support piles are not constructed within the low-flow channel and do not constrict the edges of the low-flow channel, and the number of piles within the <b>waterway</b> are minimised.
	AND
	<b>A05.11</b> Bridge abutments and bank revetment works do not extend into the <b>waterway</b> beyond the toes of the banks.
	AND
	AO5.12 Suitable fish habitats are maintained within the low-flow channel.
	AND
	For culverts:
	<b>A05.13</b> Culverts are only installed where the site conditions do not allow for a bridge.
	AND
	<b>A05.14</b> The combined width of the culvert cell apertures is equal to 100 percent of the <b>main channel</b> width.
	AND
	<ul> <li>AO5.15 The base of the culvert incorporates a low flow channel consistent with the natural low flow channel and:</li> <li>1. is buried a minimum of 300 millimetres to allow bed material to deposit and reform the natural bed on top of the culvert base; or</li> <li>2. the base of the culvert is the waterway bed; or</li> </ul>

Performance outcomes	Acceptable outcomes
	3. the base of the culvert cell and any instream scour protection within the <b>waterway</b> is roughened throughout to approximately simulate natural bed conditions.
	AND
	<b>A05.16</b> The outermost culvert cells incorporate roughening elements such as baffles on their bankside sidewalls.
	AND
	<b>A05.17</b> Roughening elements are installed on the upstream wingwalls on both banks to the height of the upstream obvert or the full height of the wingwall.
	AND
	<b>AO5.18</b> Roughening elements provide a contiguous lower velocity zone (no greater than 0.3 metres/second) for at least 100 millimetres width from the wall through the length of the culvert and wingwalls.
	AND
	<b>A05.19</b> Culvert alignment to the <b>waterway</b> flow minimises water turbulence.
	AND
	<b>AO5.20</b> There is sufficient light at the entrance to and through the culvert so that <b>fish</b> are not discouraged by a sudden darkness.
	AND
	<b>A05.21</b> The depth of cover above the culvert is as low as structurally possible, except where culverts have an average recurrence interval (ARI) greater than 50 years.
	AND
	<b>A05.22</b> For culvert crossings designed with a flood immunity ARI greater than 50 years, <b>fish</b> passage is provided up to culvert capacity.
	For all other development no acceptable outcome is prescribed.
<b>PO6 Waterway barrier works</b> are designed, constructed, operated and maintained to provide lateral and longitudinal <b>fish</b> passage for all members of the <b>fish</b> community.	No acceptable outcome is prescribed.
<b>PO7</b> The development is designed and operated so that all components of <b>waterway barrier works</b> and	No acceptable outcome is prescribed.

Performance outcomes	Acceptable outcomes
pathways of potential <b>fish</b> movement provide for	
safe <b>fish</b> passage. Stepped spillways are not	
acceptable.	
<b>PO8</b> The <b>drownout</b> characteristics of the <b>waterway</b>	No acceptable outcome is prescribed.
barrier works are designed and constructed to not	
result in adverse impacts to <b>fish</b> passage.	
<b>PO9</b> Development does not result in adverse	No acceptable outcome is prescribed.
impacts to <b>fisheries resources</b> .	
<b>PO10</b> The design, construction and maintenance of	No acceptable outcome is prescribed.
the development does not result in non-essential	
hardening or unnatural modification of the <b>main</b>	
channel of the waterway.	
PO11 The development retains natural fish habitat	No acceptable outcome is prescribed.
and features such as shade, pools, riffles, rock	
outcrops and boulders, wherever possible.	
<b>PO12</b> The design, construction and maintenance of	No acceptable outcome is prescribed.
the development does not result in straightening of	······································
meandering waterways.	
PO13 Where channels are to be significantly	No acceptable outcome is prescribed.
modified, the design and construction of the	······································
development replicates natural waterways and	
habitat features.	
PO14 Where waterway barrier works will modify	No acceptable outcome is prescribed.
water levels or flow characteristics of the waterway,	No acceptable outcome is prescribed.
existing up and downstream structures are upgraded	
to provide adequate <b>fish</b> passage in accordance	
with the new levels or flow characteristics.	
<b>PO15</b> The development is designed, constructed	No acceptable outcome is prescribed.
and maintained to provide water exchange sufficient	
to maintain or improve water quality and flow	
conditions on which <b>fisheries resources</b> depend.	
P016 Development likely to cause drainage or	No acceptable outcome is prescribed.
disturbance to acid sulfate soils, prevents the	
release of contaminants and impacts on fisheries	
resources and fish habitats.	
<b>PO17</b> The development is designed, constructed	No acceptable outcome is prescribed.
and maintained to not result in adverse impacts to	
beds, banks and vegetation adjacent to the	
permanent development footprint.	
PO18 After completion of works, disturbed areas of	No acceptable outcome is prescribed.
the bed and banks of the waterway outside the	
permanent development footprint are returned to	
their original profile and stabilised to promote	
regeneration of natural fish habitats.	
<b>PO19</b> The development is designed and constructed	No acceptable outcome is prescribed.
to maintain or restore the natural substrate of the	
waterway bed.	
PO20 Development does not adversely impact on	No acceptable outcome is prescribed.
community access to tidal land and waterways.	
PO21 Development does not adversely impact on	No acceptable outcome is prescribed.
community access to fisheries resources and fish	
habitats including recreational and indigenous	
fishing access.	
PO22 Development does not adversely impact on	No acceptable outcome is prescribed.
commercial fishing access and linkages between a	
commercial <b>fishery</b> and infrastructure, services and	
facilities.	

Performance outcomes	Acceptable outcomes
Development involving fish ways	
<b>PO23</b> Having regard to the hydrology of the site and	No acceptable outcome is prescribed.
<b>fish</b> movement characteristics, the <b>fish way</b> is	
capable of operating, and will operate:	
<ol> <li>for as long as the waterway barrier work is in position; and</li> </ol>	
in position; and	
2. whenever there are inflows into the	
impoundment or <b>waterway</b> , release out of	
the impoundment and during overtopping	
events; and	
3. when the impoundment is above dead	
storage level.	No constable suttants is preservited
<b>PO24</b> The development is designed, constructed	No acceptable outcome is prescribed.
and maintained to ensure the hydrology allows for	
fish movement for the life of the waterway barrier works.	
PO25 Fish ways are designed, constructed and	No acceptable outcome is prescribed.
maintained to not adversely impact on fish and fish	
movement.	
PO26 Fish ways are designed, constructed and	No acceptable outcome is prescribed.
operated to direct release water through the <b>fish</b>	
way as a priority over the outlet works.	
PO27 Fish ways are designed, constructed and	No acceptable outcome is prescribed.
operated to ensure flows and releases of water do	
not result in adverse impacts to <b>fish</b> or <b>fish</b>	
passage.	
PO28 The development is designed, constructed	No acceptable outcome is prescribed.
and operated to ensure <b>fishway</b> operational issues	
are promptly rectified for the life of the fishway	
including:	
1. all components are designed to be durable,	
reliable and adequately protected from damage	
during high flow and flood events	
<ol><li>all components can be replaced; and</li></ol>	
3. a contingency plan ensures provision of	
alternate adequate fish passage during the fish	
way re-instatement process.	
PO29 The development is designed to allow for	No acceptable outcome is prescribed.
installation of monitoring equipment and to allow	
access for monitoring and maintenance.	
PO30 Fish ways are designed, constructed and	No acceptable outcome is prescribed.
operated to source water supply from surface water	
or equivalent water quality.	
PO31 Tailwater control structures are designed,	No acceptable outcome is prescribed.
constructed and maintained to allow for fish	
passage.	
Development involving floodgates	
PO32 The design, construction and operation of a	No acceptable outcome is prescribed.
floodgate does not result in adverse impacts on fish,	
fish passage or fish habitat.	
PO33 Floodgates are designed, constructed and	No acceptable outcome is prescribed.
maintained to ensure the invert is at bed level.	
Temporary waterway barrier works	
PO34 The temporary waterway barrier works will	No acceptable outcome is prescribed.

Performance outcomes	Acceptable outcomes
<b>PO35</b> The temporary waterway barrier works provides adequate <b>fish</b> movement	No acceptable outcome is prescribed.
<b>PO36</b> The development is designed, constructed and maintained to ensure temporary barriers are removed and the bed and banks are returned to their original profile and stability.	No acceptable outcome is prescribed.
<b>PO37</b> Temporary <b>waterway barrier works</b> are designed, constructed and maintained to allow for downstream movement during works, where required by species present.	No acceptable outcome is prescribed.
<b>PO38</b> The condition and value of aquatic macrophytes and other <b>fish habitats</b> is maintained.	No acceptable outcome is prescribed.

## **Reference documents**

Department of Agriculture and Fisheries, <u>State Development Assessment Provisions guideline: State Code 18:</u> <u>Constructing or raising waterway barrier works in fish habitats</u>

Department of Agriculture and Fisheries website, What is a waterway?

Department of Agriculture and Fisheries website, What is a waterway barrier work?

Department of Agriculture and Fisheries website, What is not a waterway barrier work?

Department of Environment and Science 2018, Queensland environmental offsets framework documents

Department of Environment and Science 2018, <u>Fish habitat area code of practice: The lawful use of physical, pesticide and biological controls in a declared fish habitat area.</u>

Department of Primary Industries 1998, Restoration of fish habitats: Fisheries guidelines for marine areas FHG 002

Department of Primary Industries 2000, Fisheries guidelines for fish habitat buffer zones FHG 003

Department of Primary Industries and Fisheries 2006, Fisheries guidelines for fish-friendly structures FHG 006

Department of State Development, Infrastructure and Planning 2014, Significant residual impact guideline

Local Government Association of Queensland 2014, Mosquito management code of practice

#### **Policies**

Department of Environment and Science 2015, <u>Marine management: Fish habitat Area selection, assessment,</u> <u>declaration and review</u>

Department of Environment and Science 2015, Marine management: Management of declared fish habitat areas

Department of Primary Industries 1998, <u>Departmental procedures for provision of fisheries comments: Dredging,</u> Extraction and Spoil Disposal Activities (FHMOP 004)

Department of Primary Industries and Fisheries 2007, <u>Management and protection of marine plants and other tidal</u> <u>fish habitats (FHMOP001)</u>

Department of Primary Industries and Fisheries 2007, <u>Tidal fish habitats, erosion control and beach replenishment</u> (FHMOP010)

Department of Agriculture and Fisheries 2015, Oyster industry plan for Moreton Bay Marine Park

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Department of Agriculture, Water and the Environment 2020, <u>National policy guidelines for the translocation of live</u> aquatic animals

Queensland Department of Primary Industries 1996, <u>Departmental Procedures for Permit Applications Assessment</u> and Approvals for Insect Pest Control in Coastal Wetlands (FHMOP 003)

#### **Accepted Development**

Department of Agriculture and Fisheries 2017, <u>Accepted development requirements for operational work that is</u> constructing or raising waterway barrier works

#### Other references

Department of Environment and Science, Declared Fish Habitat Area Network Assessment Reports

Department of Agriculture, Fisheries and Forestry 2013, Guideline on fisheries adjustment as a result of development (available on request from DAF)

Department of National Parks, Sport and Racing 2015, <u>Declared fish habitat area network strategy 2015-2020:</u> Planning for the future of Queensland's declared fish habitat area network

Department of Environment and Resource Management 2011, Queensland Wetland Buffer Planning Guideline

Department of Environment and Science 2018, Declared fish habitat area network assessment report - 2017

Department of Environment and Science website, Declared fish habitat area plans

Department of Science, Information Technology, Innovation and the Arts 2014 , <u>Queensland Acid Sulfate Soil</u> <u>Technical Manual: Soil Management Guidelines</u>

International Ecohydraulics Symposium 2012, From Sea to Source: International guidance for the restoration of fish migration highways

International Erosion Control Association Australasia 2008, Best practice erosion and sediment control document

SEQ Catchments website

## **Glossary of terms**

**Drownout** means when the tailwater and headwater levels across a weir are essentially equal, velocities are sufficiently low at, or close to, the edge of the spillway crest and the weir is fully submerged to a sufficient depth to allow for **fish** passage and for the species and size-classes of **fish** moving through the site to cross the weir.

#### Fish see section 5 of the Fisheries Act 1994.

Note: Fish:

- 1. means an animal (whether living or dead) of a species that throughout its life cycle usually lives:
  - a. in water (whether freshwater or saltwater); or
    - b. in or on **foreshores**; or
  - c. in or on land under water
- 2. includes:

4.

- a. prawns, crayfish, rock lobsters, crabs and other crustaceans
- b. scallops, oysters, pearl oysters and other molluscs
- c. sponges, annelid worms, beche-de-mer and other holothurians
- d. trochus and green snails
- 3. does not include:
  - a. crocodiles; or
  - b. protected animals under the Nature Conservation Act 1992; or
  - c. pests under the Pest Management Act 2001; or
  - d. animals prescribed under a regulation not to be **fish**
  - also includes:
    - a. the spat, spawn and eggs of fish
      b. any part of fish or spat, spawn or eggs of fish
    - any part of fish or spat, spawn or eggs of fish
      treated fish, including treated spat, spawn and eggs of fish

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- coral, coral limestone, shell grit or star sand d.
- freshwater or saltwater products declared under a regulation to be fish. e.

#### Fish habitat see the Fisheries Act 1994.

Note: Fish habitat includes land, waters and plants associated with the life cycle of fish, and includes land and waters not presently occupied by fisheries resources.

#### Fish way see the Fisheries Act 1994.

Note: Fish way means a fish ladder or another structure or device by which fish can pass through, by or over waterway barrier works.

#### Fisheries resources see the Fisheries Act 1994.

Note: Fisheries resources includes fish and marine plants.

#### Fishery see section 7 of the Fisheries Act 1994.

Note: Fishery means activity by way of fishing, for example, activities specified by reference to all or any of the following:

- a species of fish 1.
- 2. a type of fish by reference to sex, size or age or another characteristic
- 3. an area
- 4. a way of fishing
- 5. a type of boat
- 6. a class of person
- 7. the purpose of an activity
- 8. the effect of the activity on a fish habitat, whether or not the activity involves fishing
- 9. anything else prescribed under a regulation.

#### Fishing see the Fisheries Act 1994.

- Note: Fishing includes:
- searching for, or taking, fish 1.
- 2. attempting to search for, or take, fish
- 3. engaging in other activities that can reasonably be expected to result in the locating, or taking, of fish
- 4. landing fish (from a boat or in another way), bringing fish ashore or transhipping fish.

#### Foreshore see the Fisheries Act 1994.

Note: Foreshore means parts of the banks, beds, reefs, shoals, shore and other land between high water and low water.

Main channel means the active component of the flow channel of a waterway characterised by a distinct change in appearance or structure at the upper limit of the channel (refer to accepted development requirements for examples).

#### Marine plant see section 8 of the Fisheries Act 1994.

Note: Marine plant includes the following:

- 1. a plant (a tidal plant) that usually grows on, or adjacent to, tidal land, whether it is living, dead, standing or fallen
- material of a tidal plant, or other plant material on tidal land 2.
- a plant, or material of a plant, prescribed under a regulation or management plan to be a marine plant. 3.

A marine plant does not include a plant that is a prohibited matter or restricted matter under the Biosecurity Act 2014.

Matters of state environmental significance see schedule 2 of the Environmental Offsets Regulation 2014. Note: Matters of state environmental significance are prescribed environmental matters under the Environmental Offsets Regulation 2014 that require an offset when a prescribed activity will have a significant residual impact on the matter. A matter of state environmental significance is any of the following matters: 1.

- regional ecosystems under the Vegetation Management Act 1999 that:
- are endangered regional ecosystems a.

2.

- are of concern regional ecosystems b.
- intersect with a wetland shown on the vegetation management wetlands map c.
- contain areas of essential habitat shown on the essential habitat map for an animal that is endangered wildlife or vulnerable wildlife or d. a plant that is endangered wildlife or vulnerable wildlife
- are located within the defined distances stated in the Environmental Offsets Policy 2014 from the defining banks of a relevant e. watercourse or drainage feature as shown on the vegetation management watercourse and drainage feature map
- contain remnant vegetation and are areas of land determined to be required for ecosystem functioning ('connectivity areas') f. wetlands in a wetland protection area or wetlands of high ecological significance shown on the Map of Queensland Wetland Environmental Values under the Environmental Protection Policy 2019
- wetlands and watercourses in high ecological value waters as defined in schedule 2 of the Environmental Protection (Water and Wetland 3. Biodiversity) Policy 2019
- 4 designated precincts in strategic environmental areas under the Regional Planning Interests Regulation 2014
- 5. threatened wildlife (plants and animals) under the Nature Conservation Act 1992 and special least concern animals under the Nature Conservation (Wildlife) Regulation 2006
- 6. protected areas under the Nature Conservation Act 1992 excluding coordinated conservation areas
- 7. highly protected zones of state marine parks under the Marine Parks Act 2004

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- 8. declared fish habitat areas under the *Fisheries Act* 1994
- 9. waterways that provide for fish passage under the *Fisheries Act 1994* if the construction, installation or modification of waterway barrier works carried out under an authority will limit the passage of fish along the waterway
- 10. marine plants under the Fisheries Act 1994
- 11. legally secured offset areas.

#### Offset means environmental offset under the Environmental Offsets Act 2014.

Note: Environmental offset means an activity undertaken to counterbalance a significant residual impact of a prescribed activity on a prescribed environmental matter, delivered in accordance with the Environmental offsets framework. The prescribed environmental matters assessed under the State Development Assessment Provisions are matters of state environmental significance.

#### Prescribed environmental matters see the Environmental Offsets Act 2014.

Note: A **prescribed environmental matter** is any species, ecosystem or other similar matter protected under Queensland legislation for which an **offset** may be provided. A **prescribed environmental matter** may be a matter of national, state or local environmental significance, however, assessment criteria in the State Development Assessment Provisions only relate to **matters of state environmental significance**. Each of the **prescribed environmental matters** are listed under the Environmental Offsets Regulation 2014.

#### Significant residual impact see the Environmental offsets Act 2014.

Note: Significant residual impact is an impact, whether direct or indirect, of a prescribed activity on all or part of a prescribed environmental matter that:

remains, or will or is likely to remain, (whether temporarily or permanently) despite on-site mitigation measures for the prescribed activity
 is, or will, or is likely to be, significant.

Guidance for determining if a prescribed activity will have a **significant residual impact** on a **matter of state environmental significance** is provided in the Significant Residual Impact Guideline, Department State Development, Infrastructure and Planning, 2014.

#### Strategic environmental area see the Regional Planning Interests Act 2014.

Note: A strategic environmental area is an area that:

1. contains one or more environmental attributes for the area

- 2. is either:
  - a. shown on a map in a regional plan as a strategic environmental area; or
  - b. prescribed under a regulation.
- Tidal land see the Fisheries Act 1994.

Note: Tidal land includes reefs, shoals and other land permanently or periodically submerged by waters subject to tidal influence.

#### Waterway see the Fisheries Act 1994.

Note: **Waterway** includes a river, creek, stream, watercourse, drainage feature or inlet of the sea. For further guidance see the fact sheet Maintaining Fish Passage in Queensland: What is a waterway? Department of Agriculture, Fisheries and Forestry, 2014.

#### Waterway barrier works see the Fisheries Act 1994.

Note: **Waterway barrier works** means a dam, weir, or other barrier across a **waterway** if the barrier limits **fish** stock access and movement along a **waterway**. For further guidance see the factsheets Maintaining Fish Passage in Queensland: What is a waterway barrier work?, Department of Agriculture, Fisheries and Forestry, 2014 and Maintaining Fish Passage in Queensland: What is not a waterway barrier work?, Department of Agriculture, Fisheries and Forestry, 2014.

### **Abbreviations**

ARI – Average Recurrence Interval

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